### ACADEMIC CALENDAR

See semester schedule of classes for more specific information on the academic calendar.

<table>
<thead>
<tr>
<th>2012-2013</th>
<th>Summer Session 2012</th>
<th>Fall Semester 2012</th>
<th>Spring Semester 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation and Registration</td>
<td>May 14</td>
<td>Aug. 22-24</td>
<td>Jan. 7-8</td>
</tr>
<tr>
<td>Classes Begin</td>
<td>May 14</td>
<td>Aug. 27</td>
<td>Jan. 9</td>
</tr>
<tr>
<td>Memorial Day</td>
<td>May 28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independence Day Holiday</td>
<td>July 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor Day Holiday</td>
<td></td>
<td>Sept. 3</td>
<td></td>
</tr>
<tr>
<td>Election Day Holiday</td>
<td></td>
<td>Nov. 6</td>
<td></td>
</tr>
<tr>
<td>Veterans Day Holiday Observed</td>
<td></td>
<td>Nov. 12</td>
<td></td>
</tr>
<tr>
<td>Thanksgiving Holiday</td>
<td></td>
<td>Nov. 20-21</td>
<td></td>
</tr>
<tr>
<td>Martin Luther King Holiday</td>
<td></td>
<td>Feb. 18</td>
<td></td>
</tr>
<tr>
<td>Spring Break</td>
<td></td>
<td>March 11-15</td>
<td></td>
</tr>
<tr>
<td>University Day Holiday</td>
<td></td>
<td>March 29</td>
<td></td>
</tr>
<tr>
<td>Finals Week</td>
<td></td>
<td>Dec. 10-14</td>
<td>April 29-May 3</td>
</tr>
<tr>
<td>Semester Ends</td>
<td>Aug. 2</td>
<td>Dec. 14</td>
<td>May 3</td>
</tr>
<tr>
<td>Commencement</td>
<td></td>
<td>Dec. 15</td>
<td>May 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2013-2014</th>
<th>Summer Session 2013</th>
<th>Fall Semester 2013</th>
<th>Spring Semester 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation and Registration</td>
<td>May 13</td>
<td>Aug. 21-23</td>
<td>Jan. 6-7</td>
</tr>
<tr>
<td>Classes Begin</td>
<td>May 13</td>
<td>Aug. 26</td>
<td>Jan. 8</td>
</tr>
<tr>
<td>Memorial Day Holiday</td>
<td>May 27</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor Day Holiday</td>
<td></td>
<td>Sept. 2</td>
<td></td>
</tr>
<tr>
<td>Independence Day Holiday</td>
<td>July 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veterans Day Holiday</td>
<td></td>
<td>Nov. 11</td>
<td></td>
</tr>
<tr>
<td>Thanksgiving Holiday</td>
<td></td>
<td>Nov. 27-29</td>
<td></td>
</tr>
<tr>
<td>Martin Luther King Holiday</td>
<td></td>
<td>Feb. 17</td>
<td></td>
</tr>
<tr>
<td>Presidents’ Day Holiday</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spring Break</td>
<td></td>
<td>March 10-14</td>
<td></td>
</tr>
<tr>
<td>University Day Holiday</td>
<td></td>
<td>April 18</td>
<td></td>
</tr>
<tr>
<td>Finals Week</td>
<td></td>
<td>Dec. 9-13</td>
<td>April 28-May 2</td>
</tr>
<tr>
<td>Semester Ends</td>
<td>Aug. 2</td>
<td>Dec. 13</td>
<td>May 2</td>
</tr>
<tr>
<td>Commencement</td>
<td></td>
<td>Dec. 14</td>
<td>May 3</td>
</tr>
</tbody>
</table>

### IMPORTANT NOTICE TO ALL STUDENTS

The following information pertains to student and institutional rights and responsibilities under this catalog.

This general catalog is published bi-annually by Montana State University as a guide for students, faculty and others interested in the institution. Students are expected to be familiar with all University regulations and information set forth in this publication or any amendment to or modifications thereof.

Montana State University reserves the right to change regulations and to add or withdraw degree programs and to change fees at any time. Effective dates of changes will be determined by the proper authorities and shall apply to prospective students and to those who are already enrolled.

Montana State University places full responsibility upon the student for registering for the proper courses and for fulfilling all requirements for a degree as set forth in this catalog, as amended from time to time. No agent or employee of the University has the authority to warrant graduation, the attainment of any type of license, or attainment of any other career goal. The institution does not accept responsibility for delays in graduation or attainment of career goals resulting from errors in registration, cancelled courses, time schedule changes, changes in degree requirements, or similar related changes; or for errors resulting from consultation with and reliance upon any information acquired from and University employee. Advisor’s signatures on preregistration, drop-add or similar cards or forms do not necessarily indicate agreement with or approval of the student’s choice of courses nor may they be construed in any way as a warranty that the student’s choice of courses is sufficient for graduation or attainment of any career goals.
The most current and therefore most accurate version of this catalog is available on the Montana State University Web site at: http://www.montana.edu/wwwcat/

Montana State University is accredited by the Northwest Commission on Colleges and Universities, an institutional accrediting body recognized by the Council for Higher Education Accreditation and the U.S. Department of Education.

www.nwccu.org

Effective Fall Semester 2012
ON JANUARY 21, 1994, the Montana Board of Regents voted unanimously to restructure the Montana University System. Under the plan, the (now) Montana State University campuses in Billings, Great Falls and Havre were administratively joined with the Bozeman campus.

Since the consolidation, the MSU campuses have emphasized course transferability, sharing resources, telecommunications, and providing more and better services to students everywhere.

This catalog is specific to Montana State University – Bozeman. For additional information, please contact:

406-994-0211
1-800-662-6132
1-800-446-2698 or 1-406-771-4300 if you are outside Montana
406-657-2011 or 1-800-565-6782 if you are outside Montana
CONTENTS

Welcome to MSU .......................... 1
MSU at a Glance .......................... 1
Research Programs & Centers ........ 2
Statewide Research, Educational
  Outreach and Service ................. 6
Global Connections ....................... 7
Library and Information Resources 7
MontanaPBS .............................. 8
Museum of the Rockies ................... 8
Alumni Association ...................... 8
Undergraduate Admissions ............. 9
Admission as an Undergraduate ...... 9
Campus Visitation Opportunities ... 10
Freshmen .................................. 10
Transfer Students ....................... 12
International Students ............... 13
Canadian Undergraduates .......... 15
Early Admission ......................... 16
Special University Attendance ..... 17
Non-degree Students ................... 17
Former MSU Students ................. 17
Appeal of Admission Decisions ...... 18
Special Academic Opportunities .... 19
A.C.E. Language Institute ........... 19
American Indian Research
  Opportunities ........................... 19
Extended University ................... 20
Health Sciences .......................... 20
WWAMI Medical Program .......... 21
International Programs .............. 22
  National Student Exchange .......... 23
  Montana Space Grant ................. 24
  Space Science and
    Engineering Laboratory .......... 25
  Department of
    Native American Studies .......... 25
    Pre-Law ............................. 26
    Pre-Medical Entry Major .......... 26
    Pre-Veterinary Medicine .......... 26
  Service Learning ..................... 27
  Summer Session ...................... 27
  Spectrum Lab .......................... 27
  Undergraduate Scholars
    Program ............................. 28
    University Honors Program ...... 28
    University Studies Program ..... 29
  Student Life ........................... 31
    Residence Halls .................... 31
    Student Activities ................ 33
    Student Services .................. 37
    University Regulations .......... 42
  Expenses ............................... 47
    Estimated Expenses ............... 47
    Special Fees and Charges ...... 48
    Special Exemptions .............. 48
    Refund of Fees ..................... 49
    Financial Aid and
      Student Employment ............ 49
    Fee Descriptions .................. 50
  General Curricular Requirements . 51
  Catalog and Curriculum ............. 51
  Core Curriculum ..................... 51
  Credits for Degree completion ..... 55
  Graduation Requirements for
    Baccalaureate Degrees .......... 55
    Second Majors and Degrees ... 55
  Graduation Procedures ............. 56
Academic and Registration
  Policies ............................... 59
  Academic Policies .................... 59
  Student Records ...................... 60
  Courses, Credits and Grades .... 61
  Registration ......................... 64
  Programs of Instruction .......... 69
    College of Agriculture .......... 74
    College of Arts and Architecture 92
    College of Business .......... 104
  College of Education, Health
    and Human Development ....... 111
    College of Engineering .......... 131
    College of Letters and Science .. 152
    College of Nursing .............. 197
    Gallatin College Programs ..... 204
Division of Graduate Education .... 209
  Course Descriptions ................. 301
  Faculty ............................... 453
  Index ................................ 477

IMPORTANT UNIVERSITY POLICIES

Equal Opportunity/
Affirmative Action Policy

University Policy

Montana State University does not discriminate on the basis of race, color, national origin, sex, sexual preference, marital status, age, religion, creed or political belief, mental or physical handicap or disability, or veteran status, access to, or conduct of its educational programs and activities nor in its employment policies and practices.

Montana State University is committed to providing a working environment for all employees and an educational environment for all students that supports and rewards career and academic goals on the basis of ability and work or academic performance. Harassment based on race, color, national origin, religion, sex, gender, sexual orientation, age or disability is a form of discrimination and is prohibited.

The University is committed to a program of affirmative action in the recruitment, hiring, training, and promotion of persons in all classes of employment to help overcome the present effects of past discrimination and prevent underutilization of qualified women and minorities, persons with disabilities, and covered veterans. In addition, Montana State University assumes particular responsibility for providing opportunities for education and training for the state’s Native American peoples in the various disciplines and professions that are characteristic of this land-grant university. The University’s Affirmative Action Plan is available in the Human Resources/Affirmative Action Office.

Employees or students who commit or supervisors who knowingly condone or fail to report incidents of discrimination are subject to disciplinary actions when instances of discrimination are identified and confirmed. Knowingly filing false complaints of discrimination or knowingly providing false testimony will likewise result in disciplinary or corrective action when instances of such conduct are identified and confirmed. Retaliation against persons who file complaints or serve as witnesses is also a violation of laws prohibiting discrimination and will lead to appropriate disciplinary action against offenders.

Montana State University affords any student, employee, applicant for employment or admissions, or person who believes he or she was discriminated against by the University, the right to file a grievance on grounds of discrimination. As a condition of their employment and enrollment, employees and students are expected to cooperate in formal investigations of complaints of discrimination. Failure to cooperate will result in disciplinary action.

Continued on page iv.
Complaints of discrimination, including harassment on the basis of race, color, national origin, sex, gender, sexual orientation, religion, age, disability or veteran’s status should be reported to the Human Resources/ Affirmative Action Office.

Sexual Harassment and Sexual Intimidation

Sexual harassment includes unwelcome sexual advances, requests for sexual favors, or other verbal or physical conduct of a sexual nature when:
• Submission to such conduct is made implicitly or explicitly as a term or condition of an individual’s employment or education,
• Submission to or rejection of such conduct is used as a basis for employment or educational decisions, or
• Such conduct has the purpose or effect of unreasonably interfering with an individual’s work or academic performance or of creating an intimidating, hostile, or offensive environment.

Sexual intimidation includes any unreasonable behavior, verbal or nonverbal, which has the effect of subjecting members of either sex to humiliation, embarrassment, or discomfort because of their gender.

Sexual harassment is a form of sex discrimination and is prohibited by state and federal non-discrimination laws. Sexual intimidation in education is prohibited by state rules.

Sexually Explicit Materials in the Workplace

In keeping with the University’s policy on sexual harassment, Montana State University desires to create a working environment for employees and a learning environment for students which is free of sexual harassment and intimidation. Materials such as calendars, posters, post cards, photography and cartoons that contain sexually explicit images or language can create an intimidating, hostile or offensive environment and may subject persons of either sex to humiliation, embarrassment or discomfort because of their gender. Such materials are inappropriate and should be removed from the workplace.

This policy applies to space provided by the University such as offices, shops, classrooms, hallways, lounges and study carrels.

This policy does not apply to: (1) libraries, resource rooms, research collections; (2) materials related to course content or assignments used in the educational setting; (3) displays and exhibits in galleries and museums or (4) private rooms or family housing units rented from the University.

Consensual Relationships
(Same as Faculty Handbook Section 445.00, Conflict of Interest)

A consensual romantic relationship in which one party is in a position to evaluate the work of the other is a potential conflict of interest. When such a potential conflict of interest results between employees or an employee and a student, the employee(s) shall disclose the potential conflict of interest to his or her supervisor. The supervisor and the employee shall take steps to ensure that there is no conflict of interest.

The employee’s failure to disclose such a potential conflict of interest may require appropriate resolution.

Accommodation for Persons with Disabilities

The University is committed to the elimination of disability-based discrimination against qualified persons with disabilities and will make appropriate reasonable accommodation for any known disability that interferes with an applicant’s ability to compete in a selection process, an employee’s ability to perform the essential functions of a job, a student’s ability to meet the essential requirements of an academic program, or a person’s ability to benefit from a University service or participate in a University sponsored or hosted event.

All applicants, employees, students or participants, including those with disabilities, are expected to be able to perform the essential functions of the position or program, with or without reasonable accommodation.

It is the responsibility of the applicant, employee, student or participant with a disability to inform the appropriate person, as indicated below, that an accommodation is needed.

1. To request accommodation in a job application or interview process,

contact:
The hiring authority or chair of the search committee of the search, as indicated on the vacancy announcement; Employee Relations and Services (406) 994-3583; if the position is for classified employment, or Human Resources/ Affirmative Action (406) 994-2042; if the position is for faculty or contract professional employment.

2. To request accommodation in employment, including concerns about job duties, contact the direct supervisor.

3. To request accommodation when applying for admission to the University, contact:
The Director of New Student Services, (406) 994-2452, if applying for undergraduate admission; the Dean of Graduate Studies, (406) 994-4145, if applying for graduate admission.

4. To request accommodation when applying for housing or to request housing accommodation, contact:
Residence Life and University Food Service (406) 994-2661, TDD (406) 994-5808, if applying for housing in the residence halls; Family Housing (406) 994-3730, TDD (406) 994-5808, if applying for family or graduate housing.

5. To request accommodation related to an academic program or requirement, class, or other educational opportunity or activity, contact:
The Office of Disabled Student Services, Room #155, Strand Union Building, (406) 994-2824. A student who desires accommodation for a disability must submit appropriate documentation of the disability and request for accommodations to this address.

6. To request public accommodation or accommodation to participate in a university sponsored or hosted event, contact:
Event sponsor or the University Compliance Officer (406) 994-2042.

University Compliance Officer

The person responsible for the University’s compliance efforts is:
Diane Letendre
Human Resources/ Affirmative Action Director
Suite 7, Hamilton Hall
Montana State University
Bozeman, MT 59717-2430

Phone: (406) 994-2042
Fax: (406) 994-7999
TELEPHONE NUMBERS

Area Code 406

If dialing from an on-campus phone, “994” should be excluded.

Numbers for academic departments are listed with their course descriptions.

Academic Affairs .......... 994-4371
212 Montana Hall
Administration and Finance. 994-4361
201 Montana Hall
Admissions .................. 994-2452
201 Strand Union Building
Affirmative Action/Human Resources .......... 994-2042
11th Ave. and Lincoln St.
Agricultural Experiment Station . 994-3681
280A Strand Union Building
Agriculture, College of .......... 994-3681
209 Linfield Hall
Alumni Relations .............. 994-2401
Foundation/Alumni Center, 11th Ave. and Lincoln St.
Arts and Architecture, College of 994-4405
217 Cheever Hall
ASK US Information Center . 994-4636
280A Strand Union Building
ASMSU ...................... 994-2933
280A Strand Union Building
ASMSU Day Care Center ....... 994-4370
209 Hamilton Hall
Athletics ..................... 994-4221
206 Fieldhouse
Bookstore ..................... 994-2811
185 Strand Union Building
Business, College of .......... 994-4423
112 Reid Hall
Career Services ............... 994-4353
125A Strand Union Building
University Communications . 994-4571
437 Culbertson Hall
Conference Services .......... 994-3081
280F Strand Union Building
Counseling and Psychological Services ........ 994-4531
211 Swingle Health Center
Disability, Re-entry, and Veteran’s Services .... 994-2824
180 Strand Union
Development, College of ....... 994-4133
250 Reid Hall
Engineering, College of ....... 994-2272
212 Roberts Hall
Extended University ........... 994-6550
120 EPS Building
Extension Service ................ 994-1750
203 Culbertson Hall
Facilities Services ............. 994-2001
11th Ave. and Lincoln St.
Family Housing ............... 994-3730
102 W. Garfield St.
Financial Aid Services ......... 994-2845
135 Strand Union Building
Foundation, MSU ................ 994-2053
Foundation/Alumni Center, 11th Ave. and Lincoln St.
Gallatin College Programs .... 994-5536
201 Hamilton Hall
Graduate School .............. 994-4145
108 Montana Hall
Health Service ............... 994-2311
121 Swingle Health Center
Honor Program ................ 994-4110
106D Quad D
HR – Personnel and Payroll Services.......... 994-3651
19 Montana Hall
Information Technology Center . 994-3042
49 Renne Library
International Programs ......... 994-7150
400 Culbertson Hall
KGLT Radio .................. 994-3001
325 Strand Union Building
KUSM Television ............... 994-4288
2-205 Wilson Hall
Letters and Science, College of. 994-4288
2-205 Wilson Hall
Library ...................... 994-3119
106 Montana Hall
Museum of the Rockies ......... 994-2251
600 W. Kagy Blvd.
Native American Studies ....... 994-3881
2-179 Wilson Hall
Nursing, College of ........... 994-3783
115 Sherrick Hall
Orientation Office ............. 994-2827
201 Strand Union Building
Outdoor Recreation Center ....... 994-3621
201 Montana Hall
Provost ....................... 994-4371
212 Montana Hall
Recreational Sports and Fitness . 994-5000
120 Hosaeus Fitness Center
Registrar ..................... 994-2601
106 Montana Hall
Research, Creativity and Technology Transfer .......... 994-2891
207 Montana Hall
Residence Life and Food Services 994-2661
31 Hedges Complex
Strand Union Bldg. Information. 994-3082
280A Strand Union Building
Student Activities Office .......... 994-3591
207 Montana Hall
Student Affairs ................ 994-2828
207 Montana Hall
Student Employment Office ...... 994-5859
125A Strand Union Building
Summer Session ............... 994-7136
318 Montana Hall
University Business Services ... 994-1991
318 Montana Hall
University Police .............. 994-2121
106 Montana Hall
University Studies ............. 994-3532
418 Reid Hall
Women’s Center ............... 994-2661
308 Leon Johnson Hall
WWAMI/Division of
Health Services .............. 994-4411
MSU-Billings
Admissions and Records ........ 657-2158
Chancellor .................... 657-2300
Academic Vice Chancellor ...... 657-2307
Administrative Vice Chancellor . 657-2356
Facilities Services ............. 657-2356
Financial Aid .................. 657-2188
Graduate Studies and Research... 657-2238
Library ...................... 657-2262
Life-Long Learning ............ 896-5890
Students Affairs/Vice Chancellor 657-2307
University Relations .......... 657-2266
MSU College of Technology-Great Falls
Administration ................ 771-4305
Admissions and Registrar ....... 771-4420
Business and Finance .......... 771-4321
Community and Continuing Education .......... 771-4303
Distance Education Coordinator. 771-4444
Financial Aid .................. 771-4334
Public Relations .......... 771-4314
MSU-Northern (Havre)
Chancellor ..................... 265-3720
Academic Affairs, Vice Chancellor 265-3726
Academic and Student Affairs ... 265-3599
Administration, Vice .......... 265-3599
Extended University ........... 265-3730
Graduate Studies .............. 265-3738
Library ...................... 265-3706
Registrar ..................... 265-3703
University Relations .......... 265-3727
Directory

Board of Regents of Higher Education

Governor Brian Schweitzer, ex officio member
Denise Juneau, Superintendent of Public Instruction, ex officio member
Clayton Christian, Commissioner of Higher Education, ex officio member
Stephen Barrett, Bozeman
Todd Buchanan (Vice Chair), Billings
Angela McLean (Chair), Anaconda
Major Robinson, Billings
Joseph Thiel, Bozeman, Student Regent
Paul Tuss, Anaconda

Local Executive Board
Jay Bentley, Bozeman
Bill Bryan, Bozeman

Central Administration

President's Office
Waded Cruzado, Ph.D., President of Montana State University
Rolf Groseth, Ph.D., Vice President for Inter-Campus Affairs
James Rimpau, Ph.D., Vice President for Planning and Analysis and Chief Information Officer
Henrietta Mann, Ph.D., Special Assistant to the President

Academic Affairs
Martha A. Potvin, Ph.D., Provost and Vice President for Academic Affairs
Douglas Steele, Ph.D., Vice Provost and Director of Extension
David Singel, Ph.D., Associate Provost
Ronald Larsen, Ph.D., Associate Provost
Norman Peterson, Ph.D., Director of International Programs

Student Success
Allen Yarnell, Ph.D., Vice President for Student Affairs
Matthew Gaines, Ed.D., Dean of Students
Glenn Puffer, Ed.D., Associate Dean of Students
Erika Swanson, B.S., Assistant Dean of Students
Erin McDonald-Peck, M.Ed., Assistant Dean of Students

Research and Creative Activities
Thomas McCoy, Ph.D., Vice President for Research, Creativity and Technology Transfer
Leslie Schmidt, B.S., Assistant Vice President for Research, Creativity and Technology Transfer

Administration and Finance
Terry Leist, M.B.A., C.P.A., Interim Vice President for Administration and Finance
Robert Lashaway, B.A., Associate Vice President for University Services
Laura Humberger, B.S., C.P.A., Assistant Vice President for Financial Services

Colleges

Agriculture
Jeffrey Jacobsen, Ph.D., Dean and Director
Nora Smith, Ph.D., Assistant Dean for Academic Programs

Arts and Architecture
Joseph Fedock, Ph.D., Interim Dean
Bill Rea, B.Arch., Assistant Dean

Business
Kregg Aytes, Ph.D., Interim Dean
Bruce Raymond, Ph.D., Associate Dean of Administration and Finance
Christine Lamb, Ed.D., Assistant Dean
Harry Benham, Ph.D., Associate Dean of Academic Affairs

Education, Health and Human Development

Engineering
Robert Marley, Ph.D., Dean
Anne Camper, Ph.D., Associate Dean for Research and Graduate Studies
Heidi Sherick, M.S., Assistant Dean

Letters and Science
Paula Lutz, Ph.D., Dean
Susan Monahan, M.A., Associate Dean
Melody Zajdel, Ph.D., Associate Dean

Nursing
Helen Melland, Ph.D., Dean
Gretchen McNeely, D.N.S.C., Associate Dean
Donna Williams, Ph.D., Associate Dean, Research and Graduate Education

Graduate School
Carl Fox, Ph.D., Dean

Administrative Offices

Admissions
Ronda Russell, M.Ed., Director

Affirmative Action/Human Resources
Diane LeTendre, B.A., Director

Alumni Relations
Jayne Groseth, M.A., President and Chief Executive Officer

Athletics
Peter Fields, M.S., Director

Career Services
Carina Beck, Ed. D., Director

University Communications
Thomas Calcagni, M.S.J., Executive Director

Counseling and Psychological Services
Patrick Donahoe, Ed.D., Director

Extended University
Kimberly Obbink, Ed.D., Executive Director

Facilities Services
Jeff Butler, CET, Director, Facilities Services

Foundation
Michael Stevenson, M.S., President and Chief Executive Officer

University Studies
Diane Donnelly, M.Ed., Director

Honors Program
Ilse-Marie Lee, D.M.A., Director

Human Resources
Dennis Dela, M.S., Chief Human Resources Officer

Information Technology Center
Jim Rimpau, Ph.D., Chief Information Officer

International Programs
Norman Peterson, Ph.D., Director of International Programs

Legal Counsel
Leslie Taylor, J.D.

Library
Tamara Miller, M.L.S., Dean
Brian Rossmann, M.L.S., Associate Dean

Mail Services
Wanda DeMay, Manager

Museum of the Rockies
Sheldon McKeay, B.S., Dean and Director

Native American Studies
Walter Fleming, Ph.D., Director

Registrar
Bonnie Ashley, M.Ed., Registrar
Tony Campeau, B.A., Associate Registrar
Jerri Weston, Assistant Registrar

Residence Life and Food Services
Thomas Stump, C.P.A., Director of Auxiliary Services
Tammie Brown, M.S., Director of Residence Life and Family and Graduate Housing
Todd Jutila, Director of University Food Service

Safety and Risk Management
Jeff Shada, M.Ed., Director

Strand Union
Frank Damberger, B.S., Director

Student Accounts
Bonnie Holden, B.S., Director

Student Health Service
James Mitchell, M.B.A., Director
Ita Killeen, M.D., Associate Director

University Police
Robert Putzke, B.S., Director and Chief

WWAMI/Division of Health Sciences
Martin Teintze, Ph.D., Director

Women’s Center
Betsy Danforth, B.A., Director
WELCOME TO MONTANA STATE UNIVERSITY

For the most up-to-date catalog information:

www.montana.edu/wwwcat

MONTANA STATE UNIVERSITY
AT A GLANCE

The integration of learning and discovery is a hallmark of the undergraduate experience at Montana State University. MSU students have ample opportunities to pursue exciting research or creative projects throughout their college careers, both on campus and in unique outdoor laboratories such as nearby Yellowstone National Park. Not limited to the sciences, these projects include artistic endeavors such as original musical compositions, paintings, and architectural designs.

Our students work with world-class faculty in a community that values diversity and is invested in every student’s success. Our preeminent research involves students in developing creative solutions to today’s and tomorrow’s challenges.

Founded in 1893 as the state’s land grant institution, Montana State University is the university of choice for those seeking a student-centered learning environment distinguished by innovation and discovery in a Rocky Mountain setting.

THE MSU PROMISE

Each of our undergraduate students participates in hands-on research or creative experience during their education. This experience prepares them for successful futures beyond MSU.

MSU is designated as one of 107 research universities with “very high research activity” by the Carnegie Foundation for the Advancement of Teaching, and offers significant opportunity for research, scholarship and creative work. This highest tier Carnegie classification—out of 4,400 institutions—distinguishes MSU as a highly ranked research institution.

MSU SNAPSHOT

- Location: Bozeman, Montana
- Accreditation: Regionally accredited by Northwest Commission on Colleges and Universities (NWCCU). Professional schools and departments are approved by specialized accrediting organizations.
- Degrees offered: Bachelor’s, master’s, and doctoral degrees
- Degree options: Over 120 degree options are available in the seven colleges: Agriculture; Arts & Architecture; Business; Education, Health & Human Development; Letters and Science; Nursing; and offers 1 and 2 year degrees from Gallatin College Programs
- Faculty/student ratio: 16:1
- Average class size: 36
- Average High School GPA: 3.28
- Average ACT: 24
- Average SAT: 1115
- Academic year: Fall and spring semesters, summer sessions
- Campus: 1,170 acres located in the Gallatin Valley

BUILDING UPGRADES

MSU recently completed several renovation and construction enhancements on campus:

- Renovations to Gaines Hall and Hamilton Hall include classrooms with high-tech equipment and updated labs and support spaces as well as energy efficiency improvements.
- The newly constructed Animal Bioscience Building allows for growth and expansion of Animal and Range Science education, research and outreach programs.
- The east end zone of Bobcat Stadium was replaced in summer 2011 to bring the stadium capacity to over 17,000.
- Cooley Laboratory is being renovated. Scheduled to reopen in Fall 2012, Cooley Lab will add significant capacity to MSU’s medical research.
- Two residence halls (Hapner Hall and Langford Hall) were renovated in 2011 with new common areas and new furniture in student rooms to allow more options for students. A completely new suite-style residence hall is in the planning stages, for completion in Fall 2013.

VARSITY SPORTS

- Men (Bobcats): football, basketball, track, cross-country, skiing, and tennis
- Women (Lady Bobcats): volleyball, basketball, track, cross-country, tennis, golf, and skiing.
- Athletic conference: Big Sky Conference, National Collegiate Athletic Association, Division I (I-AA football)

CAMPUS ORGANIZATIONS

Approximately 140 student organizations on campus

MAJOR EMPLOYERS OF MSU


NEARBY ATTRACTIONS

- Bridger Bowl Ski Area, 16 miles; Big Sky Ski Resort, 45 miles; Lee Metcalf Wilderness Area, 10 miles; Absaroka-Beartooth Wilderness, 25 miles; Yellowstone National Park, 80 miles; Glacier National Park, 350 miles

BRIEF MSU HISTORY

- February 16, 1893: Montana State University was established as the Agricultural College of the State of Montana at Bozeman by an act of the State Legislature. The first term of instruction began on April 17 of that year.
- 1913: the name of the institution was changed to the State College of Agriculture and Mechanical Arts.
• 1920: the name was changed to Montana State College
• July 1, 1965: name became Montana State University
• January 21, 1994: the Montana Board of Regents of Higher Education restructured the Montana University System. Five campuses were consolidated to comprise Montana State University and include MSU Billings, MSU-Northern, MSU-Billings College of Technology, and MSU-Great Falls College of Technology and the home campus of Montana State University in Bozeman.

INSTRUCTION
As the land-grant institution for the State of Montana, the University has created an atmosphere of outstanding research effort and adult education services to complement its regular instructional programs. MSU is represented in each of Montana’s 56 counties and seven reservations through Extension offices that work to disseminate information to improve the lives of Montanans. As a land-grant institution authorized by the Morrill Act of 1862, Montana State University derives its support from biennial state legislature appropriations, student tuition and fees, federal land-grant income, and private and public grants.

MSU’S SUSTAINABILITY COMMITMENT
As an institution, Montana State University is committed to reducing its carbon footprint by promoting a forward thinking, conscientious culture across campus and in the greater Bozeman community. From policies to student organizations, significant effort is invested in reducing energy and resource consumption and improving efficiency at all levels. MSU’s President signed the American College and University Presidents Climate Commitment, and established a Campus Sustainability Advisory Council. The ongoing refinement of a comprehensive Campus Sustainability/Energy Policy in MSU’s five-year vision document is a central consideration for all activities. MSU is addressing the challenge in many ways.

Academics
• Recent addition of a degree program in Sustainable Food and Bioenergy Systems
• Leading research related to energy alternatives and food systems

Awareness
• Monthly awareness campaigns bring attention to a variety of topics: Turn Out the Lights, Local Foods, Weatherization, Conscious Consumerism, Water Conservation, Recycle, Gallatin Earth Celebration and Re-use

Initiatives
• Creation of a Campus Sustainability Advisory Council to guide campus efforts
• Various departments provide bikes for campus commutes
• University Food Service has adopted a number of sustainable practices such as the use of Montana made products, promotion of refillable containers, purchase of energy efficient equipment and use of biodegradable to-go containers

Programs
• ASMSU Sustainability Center operates the campus recycling program, builds “green” campus culture through film screenings, lectures and educational outreach, and serves as a resource for students to learn about and get involved in sustainability efforts
• Streamline Bus System provides efficient, free public transportation for students, faculty and staff

Facilities
• MSU developed a long range campus plan to ensure smart growth and responsible practices from protection of open spaces to LEED certifications
• A complete list of MSU’s sustainability efforts, initiatives, programs, resources and research can be found at www.montana.edu/sustainability.

INDIAN EDUCATION FOR ALL
Montana State University is committed to the goal of Indian Education for All because we believe that many social problems cannot be addressed until all citizens have an understanding of the history, culture, and contemporary contributions of Montana’s Indian people. To reach this goal, we continue to develop, implement, and promote programs for all students, staff, and faculty at our institution.

RESEARCH AT MSU
MSU is recognized by the Carnegie Foundation for the Advancement of Teaching as one of 108 research universities with “very high research activity.” The ranking signifies that the opportunities for research, scholarship and creative work at MSU are comparable to those found at other highly prestigious universities. This nationally and internationally recognized research and creative work at MSU provides opportunities for undergraduate and graduate students to link their learning with the discovery of knowledge.

Enrollment by College (2011)
Read about our many research centers, programs, facilities and institutes here or learn more online, at www.montana.edu/wwwvt/.

Agricultural Marketing Policy Center www.ampc.montana.edu/
The Agricultural Marketing Policy Center sponsors research on agriculture and natural resource trade policies and their economic effects. It communicates this information to the public through various media.

American Indian Research Opportunities (AIRO) www.montana.edu/wwwai/
AIRO provides educational and research opportunities for American Indian students in career fields where they are significantly under-represented. AIRO is a consortium of Montana’s seven tribal colleges (Blackfeet Community College, Chief Dull Knife College, Aaniiih Nakoda College, Fort Peck Community College, Little Big Horn College, Salish Kootenai College, and Stone Child College) and MSU-Bozeman.

Animal Resources Center www.montana.edu/wwwarc/
The center is a modern, centralized, laboratory animal facility for the care, use and production of laboratory animals used in teaching, research and testing at MSU.

Aquatic Sciences Laboratory http://watercenter.montana.edu/aquatic-lab/default.htm
The Aquatic Sciences Laboratory is a multipurpose research facility operated by the Montana University system Water Center at Montana State University - Bozeman campus. Originally established as the Wild Trout Research Laboratory in 1996, the facility was dedicated to whirling disease research. Recent major renovation now broadens the range of research that can be conducted at the facility.

Astrobiology Biogeocatalysis Research Center http://abrc.montana.edu/
The MSU Astrobiology Biogeocatalysis Research Center is a multi-investigator and multi-institution research team and partner center in the NASA Astrobiology Institute (NAI). ABRC’s research is focused on early Earth and the catalysts that changed Earth from an abiotic, or non-living, planet to a biological, living world. This work supports NAI’s goals in researching the origin and evolution of life on Earth and elsewhere in the universe.

Barley and Plant Biotechnology programs
The MSU Sequencer Users’ Group, EPSCoR Plant Biotechnology Group, Barley Genetics, P&S 541 and Barley Extension Homepages.

Big Sky Carbon Sequestration Partnership
www.bigskyco2.org/
The Big Sky Carbon Sequestration Partnership is part of the National Energy Technology Laboratory’s (NETL) membership of regional partners that are working to create a nationwide network that will help determine the best approaches for capturing and permanently storing greenhouse gases that contribute to climate change.

Bioinformatics Core Facility http://cores.montana.edu/bioinformatics/main/
The Bioinformatics Core Facility was established, and is largely maintained, through funds provided by Montana INBRE. Additional resources for the Bioinformatics Core have come from a consortium of groups on campus, including IGERT, COBRE, EPSCoR, CBIN, TBI, Department of Microbiology, the Functional Genomics Core Facility, and individual research labs. The mission of the Bioinformatics Core Facility is three-fold: maintain equipment and software for bioinformatics research, promote bioinformatics education on the MSU campus, and provide training and support to biologists implementing bioinformatics tools in their research.

Burns Technology Center http://eu.montana.edu/btc/
The Burns Technology Center, a division of MSU Extended University, strives to create a more accessible and effective university for the 21st Century through public access to lifelong learning, especially for isolated individuals and communities. BTC studies how innovative technologies can enhance teaching and learning; build partnerships between MSU and public/private organizations; and better share MSU’s resources through public outreach.

Center for Biofilm Engineering www.erc.montana.edu/
The Center for Biofilm Engineering (CBE) fosters a new approach to university engineering/ science education. Multidisciplinary research teams find solutions to and applications for bacterial communities called biofilms.

Center for Bio-Inspired Nanomaterials http://chin.montana.edu/
The Center for Bio-Inspired Nanomaterials (CBIN) at Montana State University is a multidisciplinary research and education center focused on utilizing our fundamental understanding of the formation and hierarchical construction of biological materials such as viruses, cells, and biominerals [bones, teeth, seashells, etc].

Center for Bison and Wildlife Health www.montana.edu/wwwcbwh/
The Center for Bison and Wildlife Health is a regional center for information exchange and research on all aspects of the biology and management of the American bison.

Center for Computational Biology http://cns.montana.edu/
This interdisciplinary unit develops and applies complex computer methods to research on biological systems such as nervous systems. A major feature of the Center is its use of advanced, high-speed computer communication channels to the worldwide network.

Center for Native Health Partnerships http://cnhp.montana.edu/
The mission of this center is to create an environment to improve Native American health through community-based participatory research.

College of Nursing Office of Research www.montana.edu/wwwconor/
The College of Nursing Office of Research & Scholarship (CONORS) represents a centralized effort to strengthen research and scholarly productivity within the College.
Complex Biological Systems
montana.edu/CBSprogram/www.hughes.html

The central goal of the Hughes UG Biology program in Complex Biological Systems is to prepare a new generation of biological scientists broadly equipped to exploit advanced experimental and computational techniques to understand complex biological systems.

Energy Research Institute (ERI)
www.montana.edu/energy/index.php

The Montana State University Energy Research Institute is an umbrella for MSU's energy research and education programs, and encompasses more than 170 faculty, staff, and students working in fields such as clean-coal technology, fuel cells, wind, coal-bed methane, and biofuels.

Engineering Experiment Station
www.coe.montana.edu/eng_exp_station.html

The Engineering Experiment Station at Montana State University was created by the State Board of Education in 1924 to improve the economy, efficiency, and safety of engineering activity in Montana; to promote the conservation and utilization of Montana Resources; and to encourage the development of new business activities in Montana.

Experimental Program to Stimulate Competitive Research (EPSCoR)
from NSF
www.mt NSF EPSCoR.org/default.cfm

EPSCoR, the Experimental Program to Stimulate Competitive Research, identifies, develops and utilizes the state’s academic science and technology resources. The program is designed to stimulate local action that will result in lasting improvements to the state’s academic research infrastructure and increased national R&D competitiveness.

Functional Genomics Core Facility

Located in 308 Cooley Lab on the Montana State University campus, the Functional Genomics Core Facility was established with funds provided by the National Science Foundation and the M.J. Murdock Charitable Trust, with ongoing salary support from Montana INBRE. The Functional Genomics Core Facility provides support to academic investigators throughout Montana and the Rocky Mountain west, through instrumentation, applications and services.

High Temperature Electrochemistry Center (HTEC)
www.montana.edu/hitec/

The High Temperature Electrochemistry Center is a multidisciplinary research collaboration funded by the U.S. Department of Energy.

Image and Chemical Analysis Laboratory (ICAL)
www.physics.montana.edu/ical/home/index.asp

ICAL provides analytical facilities for the physical, biological and engineering sciences. These facilities are open to both academic researchers and the general public.

International Programs Office
www.montana.edu/international/

The Office of International Programs seeks to bring international education to the core of the academic and cultural life of MSU. In today’s world, every student, regardless of his or her major, needs to graduate with knowledge of other cultures and languages in order to succeed.

Local Government Center
www.mssqllocalgov.org/

The center strengthens the capacities of Montana's local governments to deliver essential community services efficiently. The Center conducts on- and off-campus training programs, provides direct technical assistance and conducts applied policy research on community issues.

Local Technical Assistance Program (LTAP)
www.coe.montana.edu/ltap/

The Local Technical Assistance Program fosters a safe, efficient, environmentally sound transportation system by improving skills and knowledge of local transportation providers through training, technical assistance and technology transfer.

Montana Agricultural Experiment Station
http://ag.montana.edu/maes.htm

The Montana Agricultural Experiment Station (MAES) conducts research in agricultural and natural resource systems addressing state, regional and national needs from multiple Montana locations: the main station (Bozeman), 7 research centers (Conrad, Corvallis, Creston, Havre, Huntley, Moccasin, Sidney), allied properties and on farms/ranches. Congress passed the Hatch Act of 1887 to bring the latest and most relevant agricultural research to the public and into the classroom through the establishment of a state agricultural experiment station to be run in conjunction with the land-grant institution. The Agricultural Experiment Station is funded cooperatively through a legal partnership between federal and state governments. The Montana Agricultural Experiment Station is a unit of the Montana University System and is administered by the MSU campus.

Montana and Northern Plains Troops-to-Teachers
www.montana.edu/ttt

The Montana and High Plains Region (Idaho, South Dakota, North Dakota, and Wyoming) Troops-to-Teachers Program assists qualified military personnel make the transition from the armed services to service in the classrooms of our schools.

Montana Area Health Education Center (Montana AHEC)
http://healthinfo.montana.edu/

Montana AHEC is one of six regional AHEC Centers of the University of Washington School of Medicine (UWSM). AHECs provide educational programs for health care students and professionals and assistance in improving health care access.

Montana Cooperative Fishery Research Unit
www.montana.edu/mtfbru/

Research at the Montana Cooperative Fishery Research Unit is problem oriented and provides our cooperators (Montana State University, Montana Fish, Wildlife, and Parks, U.S. Geologi-
health care of all rural Montanans

1. ensuring affordable, accessible, high quality health care,
2. facilitating enhanced self-care and supportive care in the rural home setting, and
3. promoting healthy lifestyles that prevent disease, disability and premature death.

The MORH seeks to improve the health care of all rural Montanans through advocacy, networking, partnerships, education, outreach, research, and service.

Montana Manufacturing Extension Center

The Montana Manufacturing Extension Center is a statewide manufacturing outreach and assistance center staffed by full-time professionals with degrees in engineering and extensive experience in manufacturing and business in a variety of industries. MMEC has a proven record of positive impact for client firms and the economy.

Montana Microfabrication Facility (MMF)

The MMF is a shared-use cleanroom laboratory at Montana State University, available to university students and faculty as well as extramural users.

Montana Office of Rural Health - MORH

MORH works to improve the quality of life for all rural Montanans by
1. ensuring affordable, accessible, high quality health care,
2. facilitating enhanced self-care and supportive care in the rural home setting, and
3. promoting healthy lifestyles that prevent disease, disability and premature death.

The MORH seeks to improve the health care of all rural Montanans through advocacy, networking, partnerships, education, outreach, research, and service.

Montana Public Television - KUSM

Montana Public Television is the primary public television provider for the state of Montana. PBS services, instructional and outreach activities are provided to viewers throughout Montana through over-the-air broadcast and cable distribution. Montana Public TV is a service of Montana State University and the University of Montana.

Montana Space Grant Consortium

The consortium enhances aerospace research and education in Montana through research initiation grants, education enhancement grants, undergraduate research grants and a scholarship-fellowship program. The central consortium office acts as a statewide clearinghouse for information on NASA and other aerospace-related programs and takes an active role in alerting consortium faculty about opportunities in research and education with NASA and other space agencies.

Montana Water Center

The Center oversees water research, educates future water professionals and develops training materials for working water professionals. The Center is one of 54 located at land grant universities in each state, authorized by Congress through the Water Resources Research Act of 1964.

Museum of the Rockies

The Museum of the Rockies seeks to understand, preserve and interpret the natural and cultural history of the Northern Rocky Mountain region. It accomplishes its mission through research, collections, exhibits and programs for the education and entertainment of people of all ages.

Northern Plains Transition to Teaching

The Northern Plains Transition to Teaching program moves seasoned professionals with established records of excellence into new careers in public school classrooms.

Northern Rocky Mountain Science Center

The Northern Rocky Mountain Science Center (NRMSC), formed by the U.S. Geological Survey, conducts integrated, interdisciplinary research in support of natural resource management in the Northern Rocky Mountains.

Optical Technology Center (OpTeC)

OpTeC conducts research in the rapidly growing field of electro-optics. Multidisciplinary research teams work with industry and other research centers to find solutions to industry problems and discover new application potentials in optical fields.

Plant Growth Center

The Plant Growth Center includes 29 greenhouses environmentally controlled by microcomputers, an insect quarantine unit, an indoor arboretum, labs and classrooms.

PIRE NSF Partnership for International Research and Education

Wildfire PIRE is an NSF Partnership on International Climate, Fire, and People which focuses on the causes and consequences of fire. This interdisciplinary partnership brings together an array of fire scientists and managers and strives to be a leader in interdisciplinary discovery, education, and engagement focused on wildfire in temperate ecosystems on multiple continents.

Reducing Occupational Disability in Rural Workers

Return-to-work (RTW) programs promote optimal recovery in injured workers; the rationale for RTW programs is based on evidence that proactive management of occupational injuries can significantly reduce the magnitude and duration of work-related disability.
Renne Libraries
www.lib.montana.edu/

The Libraries of Montana State University-Bozeman offer research and information resources to over 10,500 students and 700 faculty members, as well as serving Montana citizens and the state’s business community. The Libraries are a part of the Montana State University System Libraries.

Spatial Sciences Center
http://ssc.montana.edu/

The Spatial Sciences Center (SSC) promotes and supports basic and applied research incorporating geographic information science, remote sensing, global positioning system, and spatial analysis; supports and facilitates undergraduate and graduate courses in spatial sciences offered through departments within MSU; and promotes the application of spatial sciences throughout MSU through outreach to faculty and staff.

Spectrum Lab
www.spectrum.montana.edu/

The Spectrum Lab was established in 1999 to do state of the art research and development in optical electronics, to transition that new technology to Montana corporations and to provide enhanced educational opportunities for undergraduate and graduate students.

TechLink Center
www.techlinkcenter.org/cgi-bin/techlink/index.html

TechLink helps the private sector commercialize NASA, federal laboratory, and university technologies, to solve industry problems, to create or exploit business opportunities, and to stimulate economic development in the five-state region of Montana, Idaho, North and South Dakota, and Wyoming.

Technical Services
www.coe.montana.edu/TechnicalServices/index.htm

MSU Technical Services is a full-service shop that builds/repairs/modifies equipment and apparatus for the university community.

Thermal Biology Institute
http://tbi.montana.edu/

The Montana State University Thermal Biology Institute (TBI) is a multidisciplinary program for studying thermal biology. The long-term goal is to understand how organisms respond and adapt to unique physical and chemical features of the thermal environment.

Western Transportation Institute (WTI)
www.wti.montana.edu/

The Western Transportation Institute forms cooperative alliances of public and private partners interested in implementing ITS technology on rural highway systems. WTI provides a location for research, development, testing, demonstration and deployment of rural ITS technologies and systems.

Women in Research and Teaching
www.montana.edu/wrt

This site highlights the research and instructional accomplishments of women at MSU-Bozeman. It includes updates on grant opportunities for women as well as events, workshops and diversity links.

Zero Emissions Research and Technology (ZERT)
www.montana.edu/zert/index.html

Zero Emissions Research and Technology is a virtual center that researches and develops basic geologic sequestration science. www.montana.edu/zert/index.html

STATEWIDE RESEARCH, EDUCATIONAL OUTREACH AND SERVICE

As a land-grant institution, MSU is committed to state-focused activities with global impacts, while sharing its research discoveries with Montanans through educational outreach and service. These discoveries enhance communities and enterprises throughout Montana. Learn about several of our programs.

Agricultural Experiment Station
http://ag.montana.edu/maes.htm

The Montana Agricultural Experiment Station (MAES) conducts research in agricultural and natural resource systems addressing state, regional and national needs from multiple Montana locations: the main station (Bozeman), 7 research centers (Conrad, Corvallis, Creston, Havre, Huntley, Moccasin, Sidney), allied properties and on farms/ranches. Congress passed the Hatch Act of 1887 to bring the latest and most relevant agricultural research to the public and into the classroom through the establishment of a state agricultural experiment station to be run in conjunction with the land-grant institution. The Agricultural Experiment Station is funded cooperatively through a legal partnership between federal and state governments. The Montana Agricultural Experiment Station is a unit of the Montana University System and is administered by the MSU campus.

Montana Manufacturing Extension Center
www.mtmanufacturingcenter.com

The Montana Manufacturing Extension Center is a statewide manufacturing outreach & assistance center staffed by full-time professionals with degrees in engineering and extensive experience in manufacturing and business in a variety of industries. MMEC has a proven record of positive impact for client firms and the economy.

Engineering Experiment Station
www.coe.montana.edu/eng_exp_station.html

The Engineering Experiment Station at Montana State University was created by the State Board of Education in 1924 to improve the economy, efficiency, and safety of engineering activity in Montana; to promote the conservation and utilization of Montana resources; and to encourage the development of new business activities in Montana.

Extension
http://msuextension.org

Montana State University Extension provides research-based knowledge to strengthen the economic, social, and environmental well-being of Montana families, communities, and agricultural enterprises. Educational programs of MSU Extension are conducted on an informal, non-credit basis.

The Extension Service was created by the federal Smith-Lever legislation enacted in 1914. Its programs are funded cooperatively through a legal partnership among federal, state and county governments. The focal point for MSU Extension programs is the local Extension office. In Montana, these
offices serve 56 counties and seven tribal reservations. Local county and reservation agents are backed by a staff of campus-based faculty who provide direct linkage with current research and a close working relationship with the Montana Agricultural Experiment Station. One of the functions of Extension is to provide input to the University on current Montana problems that are in need of research for their resolution.

Programs of MSU Extension address societal needs in the general areas of agriculture, family living, community and economic development, and youth development. One of Extension’s best known programs is the 4-H youth development program. Another unit of MSU Extension is the Montana Fire Services Training School, which provides training for paid and volunteer firefighters throughout the state. MSU Extension is a unit of the Montana University System and is administered by the MSU campus.

Extended University
http://eu.montana.edu/

Extended University administers and coordinates on-and off-campus instruction in the form of distance-delivered and face-to-face courses, programs, institutes, and conferences that supplement the formal academic curriculum at MSU. Extended University services are organized into three main categories: Montana State Online, Office of Continuing Education, and Burns Technology Center.

GLOBAL CONNECTIONS

With over 100 international partners, an MSU education goes far beyond Montana. Many faculty members collaborate globally to conduct research on various academic projects and topics. These collaborative projects as well as faculty participation on numerous committees and advisory boards worldwide open a host of opportunities for students. To further prepare students for the global marketplace MSU offers opportunities to study at partner campuses around the nation and internationally.

The Office of International Programs
http://www.montana.edu/international/

The OIP seeks to bring international education to the core of the academic and cultural life of MSU. In today’s world, every student, regardless of his or her major, needs to graduate with knowledge of other cultures and languages in order to succeed.

National Student Exchange
http://www.montana.edu/wwwgs/nse.htm

The National Student Exchange, a consortium of 180 state-supported colleges and universities, offers students the opportunity to attend another participating institution for a semester or full academic year. By bringing together students from different parts of the country, the exchange encourages participants to broaden themselves academically, socially, and culturally.

LIBRARY AND INFORMATION RESOURCES

Known for its nationally and internationally recognized scholars, MSU supports academic success through providing the equipment and resources necessary.

MSU Libraries
www.lib.montana.edu

The MSU Libraries offer research and information resources to the institution’s students and faculty, as well as serving Montana citizens and the State’s business community. Conveniently located in the center of campus, Renne Library has a full range of library collections and services for students and faculty, including over 140 public computer workstations, printers, scanners, technology-rich group study rooms, and quiet study areas. Knowledgeable and friendly professional librarians and staff provide assistance using the collections, access to online information resources, and instruction for individuals and groups. The MSU Libraries’ collections support teaching, learning and research at MSU, with particular emphasis in the fields of agriculture, science, health, and technology. The Libraries holds special collections in the areas of Montana agriculture and ranching, Yellowstone National Park and its ecosystem, Montana history, and trout and salmonid fish.

A wealth of information is available around the clock both on and off campus via the Libraries’ Web page, including the online catalog, electronic indexes, and many full-text E-journals and E-books. Personalized one-on-one research assistance is available to students on a drop-in basis at the reference desk, or online via Email or chat. Moreover, the Libraries offer the Research Assistance Program, or RAP: students may make an appointment for a consultation with a reference librarian who will thoroughly explore research options relating to a specific assignment or class.

Computer Facilities

MSU places high priority on the integration of information technology into the educational experience. To help meet this goal, the campus provides a wide variety of computer resources to students and faculty. Within departmental and campuswide computing facilities, students have easy access to nearly 800 microcomputers (mostly Windows), over 200 servers and workstations running the Unix and Windows operating systems, and a number of enterprise servers that meet campus demand for email, World Wide Web services, and other uses. A state-of-the-art, campus-wide, fiber optic network links seventy buildings to the campus network, to networks on other Montana University System campuses, to state government agencies, and to the Internet. Residence Life and Family & Graduate Housing have connected more than 3,200 residence hall rooms and married housing units to the ResNet network (http://www.montana.edu/resnet/). This service enables around-the-clock educational opportunities. Because email is a vital element of campus communication, all MSU students receive email accounts free of charge. An email account will remain active for as long as the student is registered at MSU, so projects can be carried along from year to year.

The Information Technology Center (ITC) operates several computer laboratories that offer over 300 Windows and Macintosh computers for general student use in Reid, Roberts, and Cheever Halls and in two mini-labs in the Renne Library. In each of these locations, students can access any of a wide variety of software packages. Students commonly make use of word processing, spreadsheets, and graphics in preparing their homework. MSU currently provides the latest releases of the Microsoft Office Suite, AutoCAD,
SAS, SPSS, and MCAD, as well as other software for student microcomputer work. Instructors often incorporate these technologies into assignments. For more information see: greewulf.msu.montana.edu/usapage/index.php

Residence Life, the Renne Library, and many academic departments provide similar facilities in other buildings on campus.

ITC also provides over 30 Smart Podiums located in campus classrooms. The Smart Podium incorporates a variety of technologies such as an Internet-ready computer equipped with Microsoft PowerPoint, an overhead video projector, VCR, and DVD players, audio functions, and much more.

**MONTANAPBS - KUSM**

KUSM, Montana PBS, is the public television provider for the state of Montana. Montana PBS is committed to enriching the lives of all Montanans through over-the-air broadcast and cable distribution of quality programming, instruction, and outreach activities.

KUSM is located in the Visual Communications Building, and shares facilities with the School of Film and Photography. Faculty, staff, and students are an important part of the KUSM mission. Programs, productions, and technical operations involve students in every conceivable way: as producers, directors, camera operators, audio technicians, board operators, and lighting technicians. The close association of MSU’s academic programs and KUSM allows students to gain valuable, practical experience that serves them well in preparing for future professional employment.

Support for KUSM comes from active fund raising throughout Montana, state funding, university funding, and a federal grant from the Corporation for Public Broadcasting. More information is available at http://www.montanapbs.org.

**MUSEUM OF THE ROCKIES**

The Museum of the Rockies is a division of Montana State University. Students, faculty, and visiting scholars use its collections and exhibits for classes, research, and other programs. Some museum curators teach on campus and some MSU professors hold appointments at the museum. The Museum houses one of the world’s largest and most important collections of dinosaur fossils. Visitors learn about startling new discoveries in dinosaur research, experience pioneer life at the living history farm, explore the greater Yellowstone region’s Native American heritage, and journey to the stars in the planetarium.

The Museum is most well known for its paleontology program. In the Siebel Dinosaur Complex there are over 10,000 square feet of displays and thousands of fossils. The Complex houses the exhibit Dinosaurs under the Big Sky, based on the work of world-renowned paleontologist and advisor to the Jurassic Park films, Jack Horner. Visitors to the Museum can see the world’s largest T-rex skull, the largest dinosaur skull ever found, and some of the rarest fossils in the world. The Dinosaur Complex features fossils and new research that have made headlines worldwide such as the discovery of 68-million-year-old soft tissue, blood cells and protein in a T-rex femur; and the discovery of one of the first identified female dinosaurs in the world — an ovulating T-rex.

The world-class Taylor Planetarium hosts a variety of presentations including feature shows for children and adults, the majority of which are original productions, as well as school programs, live narrated night sky programs, and laser shows. A restored 100-year-old homestead is the centerpiece for a living history farm. The museum offers a variety of educational programs for people of all ages including tours, classes, lectures, field trips, field schools, and special events. Admission and membership discounts are offered to MSU students.

Students may now pursue an undergraduate minor in Museum Studies through a cooperative effort between the Museum of the Rockies and the Department of History and Philosophy. The 24-credit minor helps prepare students for careers in the museum world or a graduate degree program.

During the summer, the Museum of the Rockies is open daily from 8 am to 8 pm. After Labor Day, the Museum’s fall and winter hours are from 9 a.m. to 5 p.m., Monday through Saturday, and 12:30 p.m. to 5 p.m. on Sundays. For more information visit museumoftherockies.org or call 994-DINO.

The Museum of the Rockies is located at 600 W. Kagy Blvd., on the south side of the Montana State University campus in Bozeman. Visit www.museumoftherockies.org for more information.

**STAY CONNECTED**

MSU offers many ways for alumni, friends and families of current students to stay connected.

**MSU Alumni Association**

http://alumni.montana.edu/

The Alumni Association is committed to building positive relationships among Montana State University, its alumni, students and friends. This mission is carried out by keeping alumni informed through the Collegian, an alumni magazine and tabloid and Montana Statements, a monthly electronic newsletter. Tailgates, class reunions, Homecoming, social gatherings, lectures and receptions are held around Montana and throughout the country bringing alumni together to celebrate Montana State.

**MSU Foundation, Inc.**

www.montana.edu/foundation

The MSU Foundation is an independent, not-for-profit corporation entrusted with raising and administering private, donated funds according to the donor’s wishes and the university’s special needs. The Foundation receives contributions from a variety of sources, including individuals, corporations, and foundations. These gifts from alumni and friends help by supporting special programs such as scholarships, new equipment and facilities, improvements in laboratories and classrooms, professorships, and awards for scholarly achievements.

**MSU Parent/Family Association**

www.montana.edu/pfa

All parents and family members of MSU students are given automatic membership in the MSU Parent/Family Association. No dues are charged. The PFA offers several notable programs and events designed to encourage a strong relationship between families and the university. They include Parent/Family Fall Weekend, Parent Handbook (www.montana.edu/pfa/pfa_handbook.html), Parents Funder and an Advisory Board.
ADMISSION AS AN UNDERGRADUATE STUDENT

Undergraduate students are first-time college students, or have attempted college level credits during high school and/or after graduating high school, or have not been awarded a bachelor’s degree.

Applications for admission to undergraduate programs are processed by the Office of Admissions. The requirements for admission are described in the following sections. There are several options for obtaining application forms to MSU.

Applications are accepted from resident, non-resident, and international students. Eligible undergraduate students may attend full-time or part-time. Montana State University retains the right to establish requirements which will ensure successful scholastic performance.

General Admission Information

Applicants are responsible for submitting applications for admission, financial aid, and housing, must provide verification of immunizations, and must register for the New Student Orientation/Registration program. Applicants should be aware of the following:

1. Applicants are requested to voluntarily provide their social security number, which permits the school to distinguish between individuals with the same or similar names.
2. Students intending to apply for financial aid may obtain appropriate forms from their high school guidance office, online at www.fafsa.ed.gov or by contacting Financial Aid Services, 406-994-2845. MSU’s FAFSA school code is 002532.
3. Students with less than 30 credits of college level coursework are required to live in the residence halls. Additional information about residence life and family housing may be obtained by calling the Residence Life Office, 406-994-2661.
4. Students must submit required immunization records by logging onto the Student Health Service website, www.montana.edu/health and clicking on the “Online Student Health” link. Students must submit proof of required immunizations prior to registration of classes. Questions should be referred to the MSU Student Health Service, 406-994-2311.
5. Students with a health condition or a disability which should be brought to MSU’s attention may submit a confidential letter of need to Disability/ Re-Entry & Veterans Services. Contact the Office of Disability, Re-Entry & Veterans Services, 406-994-2824 with any questions about services for disabled students.
6. All admitted students must attend a New Student Orientation and Registration session prior to the beginning of the semester. Information about Orientation dates will be sent from the Orientation Office after admission has been determined. Questions should be referred to the Orientation Office, 406-994-2827.

When to Apply

Applicants are encouraged to apply at least six to eight months prior to the first semester of attendance. This will allow adequate time for the student to request any academic credentials needed to complete the application file, make housing arrangements, process financial aid materials, and participate in New Student Orientation and Registration.

Applications should be on file in the Office of Admissions according to the following priority dates:
- Fall semester - July 1
- Spring semester - December 1
- Summer session - May 1

Applicants will be notified of their admission status as soon as possible after all necessary credentials to determine a student’s admissions status have been received by the Office of Admissions.

Note: All applications are kept on file at MSU for one full academic year from the original application term (e.g., an application for Fall 2012 may be updated through Fall 2013). A student may defer their term or update their application file during this one year period without having to re-apply. After this one year time period has passed, a new application, application fee and any/all required academic documents must be re-submitted by the student.

To defer or update an application within a year from the original application term, contact the Office of Admissions at 406-994-2452 or 1-888-MSU-CATS or email: admissions@montana.edu.

OBTAINING UNDERGRADUATE APPLICATION FORMS

Several application alternatives are available to students interested in applying for undergraduate admission to MSU in Bozeman. Please choose the one that best fits your situation. For more information on requirements, please see our Undergraduate Admission Requirements page.

For information on applying to graduate programs, please see Applying to The Graduate School. (You must already have a Bachelor’s degree to apply for a Graduate program).

- Online Application Form: https://www.msuadmission.org/application
- Freshmen, Transfer, International, Non-Degree or Second-Degree (post-baccalaureate) students can interactively fill out the appropriate version of the application form for undergraduate admission and submit it directly to MSU in Bozeman.
- Adobe Acrobat Application Forms: Viewing and printing these forms requires the free Adobe Acrobat reader, which you can download from the Adobe site.
- Undergraduate Application Form: www.montana.edu/wwwcat/app.pdf. This is a large pdf file (1.45 MB) which you can download and print on a laser printer. A pdf file of instructions for completing the form is also available.
• **Form to Request Information:** [www.montana.edu/admissions/need-info.shtml](http://www.montana.edu/admissions/need-info.shtml) Using this online request form, you can ask us to mail you a catalog, an application form, and/or information about financial aid, housing, and student services.

**Email:** If your browser doesn’t support any of these forms, please send an email request for more information to admission@montana.edu. Be sure to include your full name, address, and phone number.

### Campus Visitation Opportunities

**Admissions**  
The Office of Admissions provides all types of information about Montana State University to prospective students and their families. Through high school visits, campus tours, and special on-campus events, prospective freshmen and transfer students learn first-hand about an MSU education. Applications for admission are also provided through the Office of Admissions. For more information about Admission to MSU, visit the admission Web site at [http://www.montana.edu/admissions](http://www.montana.edu/admissions).

**Individual Campus Visits**  
Prospective students and their families are encouraged to visit the MSU campus. The Office of Admissions offers individualized campus visits Monday through Friday. Campus visits enable prospective students to become acquainted with on-campus living options, academics, extracurricular activities, campus organizations, faculty, staff, and students. Guided campus tours, individualized appointments, and visits to classes are available on a daily basis.

Prior to visiting campus, students should review the catalog and other informative materials as preparation for meeting with university personnel. Visits should be scheduled two weeks in advance by calling the Office of Admissions (406-994-2452 or toll free: 888-MSU-CATS); this enables Admissions to schedule meetings to accommodate students’ individual interests. For more information go to campus visits at: [http://www.montana.edu/admissions/visit_op.shtml](http://www.montana.edu/admissions/visit_op.shtml)

**MSU Fridays**  
MSU Friday, held three times a year, gives prospective students and their families a chance to meet with faculty and students, explore academic facilities, tour the campus, and investigate possibilities and scholarships. It’s great time to explore MSU! For more details go to MSU Friday at: [http://www.montana.edu/admissions/msufriday.shtml](http://www.montana.edu/admissions/msufriday.shtml)

**New Student Orientation**  
All new students are required to attend an Orientation/Registration Session. Summer Orientation Programs are offered to new freshmen and transfer students who enter in the fall semester. Additional programs for freshmen, transfers, internationals, and graduates are offered prior to each semester.

Orientation assists students in course selection and registration, and the location and use of campus facilities and services. It also highlights University academic assistance and special services as well as recreational and social programs.

Montana State University believes that Orientation assists all new students in their transition to MSU and increases their chances for academic success.

Upon acceptance to MSU, all students receive information about Orientation/Registration. All new freshman and transfer students pay a one-time New Student Fee. This fee is included on the fee statement of the first semester in which a student attends MSU. Contact the Orientation Office at 406-994-2827 or visit [www.montana.edu/admissions/orientation](http://www.montana.edu/admissions/orientation) for more information. International students should contact the Office of International Programs at 406-994-4031.

### Freshmen (First-Time Undergraduates)

Freshmen students are those who have completed high school or its equivalent, and have never attended a college or university. Students that have attempted less than 12 quarter or semester college-level credits at another regionally accredited college or university after high school graduation are considered an incoming freshman. Students who have earned college-level course credit, Advanced Placement or International Baccalaureate credits while still attending high school are also considered incoming freshmen.

**Academic Eligibility**

Students who do not meet all freshman admission requirements listed below are still encouraged to apply for admissions and submit the necessary credentials. Montana State is allowed a number of exemptions to the stated requirements and will examine each student’s credentials on a case-by-case basis for admissibility. Some students who do not meet the requirements below may be admitted regularly and can enroll full time. Others may be admitted as a Pre-University Studies student. In Pre-University Studies, students may take up to 7 credits at Montana State University in Bozeman and up to an additional 7 credits through a partnership with Gallatin College Programs on the Bozeman campus. Students who take a combination of at least 12 credits will qualify for federal financial aid as a full-time student. Once the student has earned 7 MSU credits with a minimum cumulative GPA of 2.0, he/she will be admitted as a full-time MSU student.

**Admission Requirements (Resident and Non-Resident):**

1. Graduation from a high school accredited by the state accrediting agency or a passing score on a General Educational Development (GED) exam. Students who complete their secondary education through home schooling or at unaccredited secondary schools may be admitted as long as they have met satisfactory performance on the ACT or SAT tests.

2. **MSU Academic Requirements:** One of the following:
   - A 2.5 cumulative grade-point average (on a 4.0 scale), OR
   - ACT Enhanced Composite score of 22, OR
   - SAT combined critical reading/mathematics/writing score of 1540, OR
   - Rank in the upper half of the graduating class.

AND

- Minimum Math score of 22 on ACT or 520 SAT, OR
- Minimum Math score between 18-21 ACT or 440-510 SAT (students must enroll in and pass a math course within the first 3 semesters at MSU), OR
· Score of 3 or above on Advanced Placement (AP) Calculus AB or BC exam, OR
· Score of 4 or above on International Baccalaureate (IB) Calculus exam, OR
· Four years of high school Math courses (which include Algebra I, Algebra II, Geometry and courses beyond Algebra II) and three years of science courses with grades of C or better in all courses.

AND
· Minimum Writing score of an 18 on the Combined English/Writing section or 7 on the Writing Sub-score of the ACT Optional Writing Test, OR
· Minimum Writing score of a 440 SAT or a 7 on the Essay, OR
· Score of 3 or above on the AP English Language or English Literature Exam, OR
· Score of 4 or above on the IB English A1 Higher Level Exam, OR
· Score of a 3.5 or above on the Minnesota University System Writing Assessment.

3. Successful completion of a College Preparatory Curriculum. Non-resident applicants who have not completed the college preparatory requirements stated below may satisfy the requirements by providing evidence that they have completed a similar college preparatory program required in their home state:
· Four years of English: Courses should emphasize the development of written and oral communication skills and literature.
· Three years of Mathematics: Courses should include algebra I, geometry, and algebra II (or the sequential content equivalent of these courses). Students are encouraged to take a math course in their senior year.
· Three years of Social Studies: Courses should include global studies (such as world history or world geography); American history; government, economics, Indian history, psychology, sociology, or other third-year courses.
· Two years of Laboratory Science: One year should be earth science, biology, chemistry, or physics, and the other year can be one of the above sciences or another approved college preparatory science.
· Two years of Elective courses: foreign language (preferably two years); computer science; visual and performing arts; or approved vocational education units.

4. The following categories of students are exempt from the admissions requirements above:
· Non-Traditional age students (out of high school more than 3 years)
· Non-Degree undergraduate students

Application Procedure
1. Receipt of the following credentials in the Office of Admissions constitutes a complete application for admission. Requests to have final credentials sent to MSU must be initiated by the applicant. Requests should be made by contacting the high school, the registrar’s office at the college/university, or agency. Credentials must be sent directly from the school to the Office of Admissions. Credentials received from the student are considered unofficial working copies and will not be accepted as official documents.

Be sure to submit the following items (if applicable):
· Admission Application: An application may be submitted online or printed out at www.montana.edu/wwwcat/appopts.html. The application may also be obtained from a high school counselor or from the Office of Admissions.
· Application fee (nonrefundable): $36 online application fee or $30 paper application. Checks should be made payable to Montana State University. The application fee will not be waived, deferred, or refunded. The fee must be paid before the application for admission will be processed.
· Student Self-Report form (included in the Admissions Application): This form, required of all first-time applicants who have been out of high school less than three years, will be used to determine admission status prior to the receipt of the final high school transcript sent after graduation.
· High school transcript: A complete and official transcript must be sent directly from the high school to the Office of Admissions after graduation. Courses completed, GPA (on a 4.0 scale), rank in class, and date of graduation must be posted.
· GED transcript: A complete official General Educational Development (GED) score report/transcript must be sent directly from the Department of Education from the state in which the exam was given to the Office of Admissions.
· ACT/SAT scores: All first-time incoming freshmen are required to take either the American College Test (ACT) or the Scholastic Aptitude Test (SAT). MSU does not accept the SAT Subject Tests (formally SAT II Subject Test) for admissions purposes. The test results are used in determining admission status, awarding certain scholarships and in assisting with academic planning. Applicants who graduated three or more years prior to the semester in which they intend to enroll are not required to submit ACT/SAT test results. Arrangements to take the ACT test on campus may be made by contacting the MSU Testing Service, 406-994-6984.
· College/university transcripts: Applicants who have attended another college or university, whether credit was earned or not, must have an official transcript sent directly from each institution to the Office of Admissions after all final grades have been posted. For more information on how college/university courses will transfer to MSU, refer to the Evaluation of Transfer Credit section.
· Advanced Placement (AP): Applicants who have completed an Advanced Placement Examination should request that the official scores be sent directly to the Office of Admissions. Scores of 3 or higher on an AP Exam will be granted college credit with a Pass grade for the equivalent courses. For more information on how AP courses will transfer to MSU,
refer to the AP Course Equivalencies website: www.montana.edu/admissions/ap/ap.pdf.

i. International Baccalaureate (IB): Applicants who have completed an International Baccalaureate Examination should request that the official scores be sent directly to the Office of Admissions. IB Exams with scores of 4 or higher (Higher Level only) will be granted college credit with a Pass grade for equivalent courses. For more information on how IB courses will transfer to MSU, refer to the IB Course Equivalencies website at www.montana.edu/admissions/ib/ib.pdf.

Freshman Students Denied Admission
Students interested in appealing the admission decision should refer to the section titled Appeal of Admission Decisions.

TRANSFER STUDENTS
A transfer student has graduated high school or its equivalent and completed 12 or more quarter or semester credits in college-level courses at a regionally accredited institution after high school graduation. Students who have previously been awarded a baccalaureate degree who wish to apply as a Second Bachelor’s Degree student (Post-Baccalaureate) are also considered a transfer student. College-level work means those courses that are applicable towards at least an associate degree and does not include remedial or developmental courses. Students who previously attended Montana State University and who are returning after attending another institution should refer to the Former MSU Students section.

Academic Eligibility
Applicants will be considered for admission based on transferrable credits from all regionally accredited colleges or universities previously attended. As determined by the Office of Admissions, a 2.0 (or C) cumulative transferable GPA (on a 4.0 scale) is required in order to be accepted for admission in good academic standing. Transfer students start with a new GPA upon enrolling at MSU.

Students who do not meet the 2.0 cumulative transferable GPA are still encouraged to apply for admissions and submit the necessary credentials. Montana State University will examine each student’s credentials on a case-by-case basis for admissibility. Some students who do not meet the requirements may be admitted on University Probation and will need to earn a 2.0 or higher GPA during the first term attended at MSU to be placed in good academic standing.

Application Procedure
Receipt of the following credentials in the Office of Admissions constitutes a complete application for admission. Requests to have final credentials sent to MSU must be initiated by the applicant. Requests should be made by contacting the registrar’s office at the college/university, or agency previously attended. Credentials must be sent directly from each institution to the Office of Admissions. Credentials received from the student are considered unofficial working copies and will not be accepted as official documents.

Application materials and fees will be retained for one year from the original application term. To apply for a semester other than the one originally intended, notify the Office of Admissions as soon as possible.

Be sure to submit the following items (if applicable):

1. Admissions Application: An application may be submitted online or printed out at www.montana.edu/wwwcat.appopts.html. The application may also be obtained from the Office of Admissions.

2. Application Fee (nonrefundable): $36 online application or $30 paper application. Checks should be made payable to Montana State University. The application fee will not be waived, deferred or refunded. The fee must be paid before the application for admission will be processed.

3. Official college/university transcripts: An official transcript must be sent directly to the Office of Admissions from each regionally accredited college or university attended. This academic information will be used to determine admission status as well as transfer credit. Applicants who are enrolled at a transfer school while applying to MSU will be considered for admission based on an incomplete official transcript showing all academic work completed and posted to date. A final official transcript must be received in the Office of Admissions by the 15th class day of the first term of attendance. Academic eligibility will be reviewed again upon receipt of that final transcript. For more information on how college/university courses will transfer to MSU, refer to the Evaluation of Transfer Credit section.

4. Transfer students follow the Undergraduate Catalog in effect at the time of initial enrollment at MSU. Transfer students from feeder institutions such as the community colleges in Montana and Wyoming as well as the four year colleges in Montana may elect to follow the MSU catalog that was in effect when they began their freshman year at the feeder institution.

5. Advanced Placement (AP): Applicants who have completed an Advanced Placement Examination should request that the official scores be sent directly to the Office of Admissions. Scores of 3 or higher on an AP Exam will be granted college credit with a Pass grade for the equivalent courses. For more information on how AP courses will transfer to MSU, refer to the AP Course Equivalencies website at www.montana.edu/admissions/ap/ap.pdf.

6. International Baccalaureate (IB): Applicants who have completed an International Baccalaureate Examination should request that the official scores be sent directly to the Office of Admissions. IB Exams with scores of 4 or higher (Higher Level only) will be granted college credit with a Pass grade for equivalent courses. For more information on how IB courses will transfer to MSU, refer to the IB Course Equivalencies IB Course Equivalencies website at www.montana.edu/admissions/ib/ib.pdf.

EVALUATION OF TRANSFER CREDIT
(freshman and transfer students)
Requests to have final credentials sent to MSU must be initiated by the applicant. Requests should be made by contacting the registrar’s office at the college, university or agency previously attended. Credentials must be sent
directly from each institution to the Office of Admissions. Credentials received from the student are considered unofficial working copies and will not be accepted as official documents. To see how courses may transfer, please visit our Transfer Course Equivalencies website at https://atlas.montana.edu:9000/ and click on “Transfer Equivalencies”. If a course or institution is not listed it does not necessarily mean the course will not transfer; rather the information is not yet in our database.

1. An official evaluation of transfer credits will be completed after final transcripts from each institution have been received. Upon completion, a copy of the credit evaluation will be sent to the student and to the student’s academic department.

2. All college-level courses from colleges or universities in candidacy status or accredited by any of the six regional accrediting agencies at the time the courses were taken will be accepted for transfer. Courses from non-accredited schools will not be accepted for transfer.

3. The Office of Admissions determines whether or not the transfer work is college-level, the appropriate grading and credit conversions on transfer work and the applicability of transfer credit toward the MSU Core 2.0 requirements. The academic department has the authorization to substitute transfer courses for curriculum requirements. Transfer credit will be given for courses in which passing grades were received.

4. College level courses which do not have an equivalent at MSU will be accepted as an elective or as an elective with Core credit. The academic department will determine if the transfer electives satisfy specific curriculum requirements.

5. Freshman/sophomore level courses taken at another college or university will generally not be evaluated as equivalent to junior/senior level courses at MSU. Also, junior/senior level classes will generally not be evaluated as equivalent to freshman/sophomore courses at MSU. Elective credit will be granted in these cases. If a lower-level elective is substituted for an upper-level course by an academic department, that credit may not be used to fulfill the University upper-level credit requirement.

6. Transfer credit is accepted from vocational technical institutions if the institution is regionally accredited and the courses taken apply toward an associate degree at the institution. MSU does not accept courses that apply solely to a certificate degree.

7. Credit is not granted for continuing education, correspondence, or extension courses.

8. Applicants who have taken Advanced Placement (AP) Exams and/or International Baccalaureate (IB) Exams should request that the official scores be sent directly to the Office of Admissions. AP scores of 3 or higher and IB Exams with scores of 4 or higher (Higher Level only) will be granted college credit with a Pass grade for the equivalent courses. For more information on how AP and IB courses will transfer, refer to the AP Course Equivalencies www.montana.edu/admissions/ap/ap.html or the IB Course Equivalencies at www.montana.edu/admissions/ib.ib.html websites.

9. College Level Examination Program (CLEP) credit may be awarded by the academic department for successful performance in certain subject exams. Credit awarded for the CLEP Exams will not count toward University Core requirements. Official results must be sent directly from the CLEP testing center to the MSU Testing Service at www.montana.edu/ehhd/centers/testing/index.html.

10. Military experience will be considered for credit upon receipt of official military transcripts and will be evaluated as elective credit only. Contact the Office of Admissions for information on documentation requirements.

11. International coursework (except from Canadian institutions where English is the language of instruction) must be evaluated by a foreign credential evaluation company. Contact the Office of International Programs and visit their Website at www.montana.edu/international for further information.

12. Applicants are encouraged to bring personal copies of their transcripts for advising purposes during orientation/registration. Catalogs and course syllabi describing previous coursework may be of assistance to the academic advisor when determining appropriate course placement.

Students who wish to appeal a decision regarding acceptance of transfer credit should address the concern to the Graduation and Admissions Requirements Committee (GARC). Students who wish to appeal the assignment of transfer credit to the University Core requirements should address the concern to the Core Equivalency Review Committee (CERC). Students should contact the Office of Admissions to receive information on the appeal process.

INTERNATIONAL UNDERGRADUATE STUDENTS

Students from countries other than the United States and Canada are encouraged to apply to Montana State University as first-time freshmen or transfer students. Those who have completed secondary school are considered freshmen; those who have completed university-level coursework equivalent to 12 credits or more (a semester of study) beyond secondary school are considered transfer students.

Academic Eligibility

Freshmen

Freshmen will be considered for admission on the basis of their secondary school record and their English proficiency. Applicants who meet a TOEFL score of 525 (iBT 71), IELTS 6, or who successfully complete A.C.E. Language Institute Level 6 (available at MSU) and have a minimum cumulative grade-point average of a 2.5 on a four-point scale will qualify for admission.

Transfer Students

Transfer students will be considered on the basis of their post-secondary education record and their English proficiency. Applicants who meet a TOEFL score of 525 (iBT 71), IELTS 6, or who successfully complete A.C.E. Language Institute Level 6 (available at MSU) and have a minimum cumulative transferable grade-point average of a 2.0 or C on a four-point scale will qualify for admission.
Application Procedures

1. All application materials must bear the official school seal and signature, and be sent directly from the institution or agency to the Office of International Programs. Transcripts and test scores received from students are unofficial and not acceptable. To provide time for evaluation and for notice of acceptance to reach the applicant in a timely manner, the application and required credentials must be received by the Office of Admissions according to the following dates:
   - Fall Semester - May 15
   - Spring Semester - October 15
   - Summer Session - March 1

2. Receipt of the following credentials in the Office of International Programs constitutes a complete application for admission:
   a. International Application for Admission (undergraduate): The online application is available at: https://www.msuadmission.org/application. A paper application form may be downloaded and printed at: www.montana.edu/international/admissions/docs/InternationalApplication.pdf or obtained by contacting the Office of International Programs, Montana State University, P.O. Box 172260, Bozeman, MT 59717-2260 (Ph: +1-406-994-4031, Fax: +1-406-994-1619, email: global-study@montana.edu). Submit the online application or return the completed and signed paper application form to the Office of International Programs.
   b. $36 application fee (online application); $30 application fee (paper application): The fee must be in U.S. currency. The online application fee must be paid by credit card. Checks submitted with paper applications should be made payable to Montana State University and must indicate the U.S. banking codes. The application fee will not be waived, deferred, or refunded. The fee must be paid before the application will be processed.
   c. Official proof of English language proficiency: Official TOEFL scores may be obtained at www.toefl.org. Official IELTS scores can be obtained at www.ielts.org. Proof of completion of A.C.E. Language Institute Level 6 must be submitted from the A.C.E. Language Institute, Montana State University, Bozeman, MT 59717. A list of other options to prove English proficiency can be found at www.montana.edu/international/admissions/englishproficiency.htm.
   d. Evidence of financial support: Montana State University requires certification of financial support from students with non-immigrant visas. A financial documentation form is included on the international application. Admission will not be considered until an International Student Financial Certificate, complete with a signed statement of support is submitted and on file in the Office of Admissions. The Financial Certificate guarantees that the required minimum amount of money, in U.S. dollars, will be available to the student during the academic year. A bank statement is also required.
   e. Secondary school academic records: A complete and official secondary school record listing all courses and grades/marks earned is required of all students applying as first-time freshmen or those who have earned fewer than 12 college/university credits (a semester of study). The record must be sent directly from the secondary school to the Office of International Programs. Alternatively, the student may obtain an official copy from the school, leave it in the school’s sealed envelope and mail it to MSU. Additional official certificates may be required to show completion of secondary school.
   f. College/university transcripts: Official transcripts from each international and U.S. college/university attended are required. The transcript must be sent directly from each institution to the Office of International Programs and must list all courses taken and grades/marks earned. Alternatively, the student may obtain an official copy from the school, leave it in the school’s sealed envelope and mail it to MSU.
   g. Translation of academic records: An English translation is required for all non-English academic credentials.
   h. Evaluation of foreign credentials: MSU reserves the right to require a professional evaluation of non-U.S. academic credentials from applicants who have attended colleges/universities outside the United States and Canada (where English is not the language of instruction) unless MSU has a formal agreement with the post-secondary institution.
   i. Medical records/insurance: All applicants are required to submit a completed immunization record to the Student Health Service. Proof of medical insurance is required prior to registration for classes. Records may be submitted by logging into the Student Health Service website www.montana.edu/health and clicking on the “Online Student Health” link. Questions may be directed to the Student Health Service, Montana State University, P.O. Box 173260, Bozeman, MT 59717-3260 (+1-406-994-2311).
   j. Foreign Student Eligibility to Transfer form: This form must be submitted by all international students transferring from a U.S. college or university. This form should be sent to the Office of International Programs, Montana State University, P.O. Box 172260, Bozeman, MT 59717-2260 (+1-406-994-4031, email: international@montana.edu).
   k. The Office of International Programs will issue the Form I-20 (necessary for obtaining an F-1 student visa) to international applicants who are accepted for admission and whose admission files are complete.
   l. The request to have credentials sent to Montana State University must be initiated by the applicant. Requests should be made in writing directly to the registrar at the former secondary school, college, university, or agency. Credentials must be sent directly to the Office of International Programs.
   m. Application materials and application fee will be retained for one year from the original applied term. To defer admission to a later semester,
the Office of International Programs must be notified well in advance of the intended semester of entry.

Requirements for
International Undergraduate
Non-Degree-Seeking Students

Students interested in taking a limited number of courses at MSU without pursuing a degree may apply for non-degree-seeking status by submitting the following:

1. International Student Application form and $36 (US Dollars) application fee for online applications or $30 (US Dollars) application fee for paper applications.

2. Official proof of English language proficiency: 525 (iBT 71) TOEFL, IELTS 6, or who successfully complete A.C.E. Language Institute Level 6 (available at MSU) or, if a student is coming for a limited period of time on another institution’s I-20, MSU will accept written permission from the instructor(s) of the MSU course(s) the student intends to take.

3. A letter of intent from the student outlining educational objectives, purpose of study, and specific terms and dates of attendance at MSU.

4. Financial Certificate guaranteeing the required minimum funds for the period of study from students to whom MSU will issue an I-20.

Canadian Undergraduates

Students from Canada who have completed grade twelve or thirteen in secondary school are considered freshmen; those who have completed an equivalent of 12 credits or more of post-secondary university-level course work after secondary graduation are considered transfer students.

Academic Eligibility

1. Freshman Students:
Freshman students will be considered for admission on the basis of their secondary school record and scores taken from the ACT or SAT tests. Applicants who have a minimum cumulative grade-point average (GPA) of 2.5 on a 4.0 scale or have an ACT score of 22 or an SAT score of 1540 will qualify for admission. If the applicant’s native language is not English, a minimum TOEFL score of 525 (iBT 71), IELTS 6, or who successfully complete A.C.E. Language Institute Level 6 will be required. A list of other options to prove English proficiency can be found at www.montana.edu/international/admissions/englishproficiency.htm.

2. Transfer Students:
Transfer students will be considered on the basis of their post-secondary education record. A minimum cumulative transferable grade-point average (GPA) of 2.0 or C on a 4.0 scale is required of all Canadian transfer students. If the applicant’s native language is not English, a minimum TOEFL score of 525 (iBT 71), IELTS 6, or who successfully complete A.C.E. Language Institute Level 6 will be required. For a list of other options to prove English proficiency, please use this link: www.montana.edu/international/admissions/englishproficiency.htm.

Application Procedures

All application materials must bear the official school seal and signature and be sent directly from the institution or agency to the Office of International Programs. Transcripts and test scores received from students are unofficial and not acceptable. To provide time for evaluation and for notice of acceptance to reach the applicant in a timely manner, the application and required credentials must be received by the Office of International Programs according to the following dates:
- Fall Semester - May 15
- Spring Semester - October 15
- Summer Session - March 1

Receitpt of the following credentials in the Office of International Programs constitutes a complete application for admission. Requests to have final credentials sent to MSU must be initiated by the applicant. To apply for a semester other than the one originally intended, notify the Office of International Programs as soon as possible.

Office of International Programs:
PO Box 172260, 400 Culbertson Hall, Bozeman, MT 59717 USA,
Phone: +1-406-994-4031,
Fax: +1-406-994-1619.
Email: international@umontana.edu

Be sure to submit the following items:

1. International Undergraduate Application for Admissions: The application form may be downloaded and printed at: www.montana.edu/international/admissions/docs/InternationalApplication.pdf. An online application may be submitted at https://www.msuadmissions.org/application.

2. Application fee (nonrefundable): US $30 online application fee or US $36 paper application fee. The fee must be paid by the student. Checks submitted with paper applications should be made payable to Montana State University and must indicate the U.S. banking code. The application fee will not be waived, deferred, or refunded. The fee must be paid before the application will be processed.

3. Evidence of Financial Support:
MSU requires the International Student Financial Certificate from students with non-immigrant visas. The Financial Certificate guarantees that the required minimum amount of money, in U.S. dollars, will be available to the student during the academic year. A bank statement is also required. Admission will not be considered until the Financial Certificate is completed and is on file in the Office of International Programs. The Financial Certificate is included with the paper application or it can be downloaded with the online application and submitted separately.

4. Secondary school academic records:
Complete and official secondary school transcripts listing all courses and grades/marks earned are required of all students applying as first-time freshmen or those who have earned fewer than 12 college/university credits (a semester of study). The record must be sent directly from the secondary school to the Office of International Programs. Additional official certificates may be required to show completion of secondary school.

5. ACT/SAT scores: All first-time freshmen are required to take either the American College Test (ACT) www.actstudent.org/scores/send/index.
11. Foreign Student Eligibility to Transfer form: This form must be submitted to the Office of International Programs by all international students transferring from a U.S. college or university. This form should be sent to the Office of International Programs, Montana State University, PO Box 172260, Bozeman, MT 59717-2260 (+1-406-994-4031, email: international@montana.edu).

Notification of Admission
Applicants are reviewed for admission when all required final and official credentials have been received at the Office of International Programs. Successful candidates will promptly be issued a letter of acceptance and an I-20 form necessary for obtaining an F-1 student visa. A packet of information regarding orientation, the registration process and other important information will follow directly in a separate mailing.

EARLY ADMISSION
Early Admission (concurrent high school/university attendance) allows a high ability student who has not completed high school to take courses for university credit.

Academic Eligibility
1. Demonstrate ability to do university-level work in at least one academic area.
2. Demonstrate a strong likelihood of success at university-level work in that area.
3. Meet the course requirements for Early Admission set by the departments offering the courses to be attended.
4. Normally such students will have completed the sophomore year in high school and will have a grade-point average of at least 3.25, documented on an official high school transcript.

Application Procedure
Receipt of the following credentials in the Office of Admissions constitutes a complete application for admission. Requests to have final credentials sent to MSU must be initiated by the applicant.

Requests should be made by contacting the high school, the registrar’s office at the college/university or testing agency.

1. Admissions Application: An application may be submitted online at https://www.msuadmissions.org/application/ or printed out at www.montana.edu/wwwcat/app.pdf. The application may also be obtained from a high school counselor or from the Office of Admissions.
2. Application Fee (nonrefundable): $36 online application or $30 paper application fee. Checks should be made payable to Montana State University. The application fee will not be waived, deferred, or refunded. This fee must be paid before the application for admission will be processed.
3. High School Transcript: An official transcript must be sent directly from the high school to the Office of Admissions. The transcript must post all courses completed and a minimum grade point average (GPA) of 3.25 and/or test scores listed below.
4. ACT/SAT scores: An ACT score of a 27 or an SAT score of an 1820. Official ACT/SAT scores should be sent directly to the Office of Admissions from the ACT/SAT testing agency.
5. Coursework: Must have completed the majority of the College Preparatory coursework outlined under Freshmen Admission Requirements.
6. Letters of Recommendation: A letter must be submitted from the high school principal and/or guidance counselor recommending the student for Early Admission.
7. University Professor Recommendation: A letter from a faculty member in the university department in which the course is to be taken must state that the student is apparently prepared to take the course in question and is granted permission to do so.
8. Interview: The MSU Early Admissions Committee must recommend acceptance in the Early Admission program. Applicants and their parents may be interviewed by the committee. Contact the Assistant Director of Admissions to schedule an interview.
SPECIAL UNIVERSITY ATTENDANCE
Special university attendance allows a student of high school age who will not have graduated from high school to be considered for regular admission where a demonstrated extraordinary ability and general maturity warrant such acceptance. Admission will be very selective.

Academic Eligibility
To be eligible for special university admission, the applicant:
1. Demonstrate exceptional ability to do university level work.
2. Demonstrate a strong likelihood of success at university level work.

Application Procedure
1. Receipt of the following credentials constitutes a complete application for admission:
   a. Admissions Application: An application may be submitted online at https://www.msuadmissions.org/application/ or printed out at www.montana.edu/wwwcat/app.pdf. The application form may also be obtained from Montana high school counselors or from the Office of Admissions, Montana State University, P.O. Box 172190, Bozeman, MT 59717-2190 (406-994-2452). Return the completed and signed form to the Office of Admissions.
   b. Application fee (nonrefundable): $36 application fee (online application), $30 application fee (paper application). Checks should be made payable to Montana State University. The application fee will not be refunded. The fee must be paid before the application for admission will be processed.
   c. Letters of recommendation: Letters recommending admission must be submitted by the student’s school principal, guidance counselor, and/or teachers. Letters from teachers who work with gifted and talented students are particularly valued.
   d. Interview: An appointment must be made with the Registrar and Director of Admissions to discuss Special University Attendance.
   e. Evaluation of ability and social maturity: An evaluation of academic ability and social maturity must be requested through the MSU Counseling and Psychological Services.
   f. Non-degree Undergraduate Level: Non-degree undergraduate students are those who have not earned a baccalaureate degree and are wishing to take college courses, but who are not interested in pursuing a baccalaureate degree at Montana State University.

Academic Eligibility
1. Students must have at least a high school diploma or equivalent and have not earned a baccalaureate degree.
2. Students must be in good academic standing at previous or current institution (including current students at MSU).
3. Non-degree students are not eligible for financial aid, family housing, or intercollegiate athletic competition.
4. Credit earned in non-degree status may apply to a future undergraduate degree program. Academic departments determine how or if the credit will meet graduation requirements.

Application Procedure
Receipt of the following constitutes a complete application for admission:
1. Application form: The application form may be submitted online or printed out at www.montana.edu/ wwwcat/appopts.html or obtained from the Office of Admissions, Montana State University, P.O. Box 172190, Bozeman, MT 59717-2190 (406-994-2452). Return the completed and signed form to the Office of Admissions.
2. Application fee, $36 fee (online application) or $30 fee (paper application): Checks should be made payable to Montana State University. The application fee will not be waived, deferred, or refunded. The fee must be paid before the application will be processed.

FORMER MSU STUDENTS
Students are considered former/returning students when they have attended MSU, but not during the immediately preceding term. The Intent to Register Form should be completed and returned to the Registrar’s Office a minimum of 30 days prior to the registration period for the term desired. This form is also available online at www.montana.edu/registrar (use the “Student Forms” link) or at the Registrar’s Office.

Students who have earned a bachelor’s degree at MSU, but are interested in taking additional work not applicable toward an advanced degree should complete and file a Non-Degree Graduate Application with The Graduate School.

The following items are required of each former/returning student:
1. A completed Intent to Register Form.
2. An official transcript from each college or university attended since last attending Montana State University. After registration is complete, an evaluation of transfer credit will be provided.
3. Students submitting an intent should file it with the Registrar’s Office by the following dates:
   a. Fall Semester - July 15
   b. Spring Semester - December 15
   c. Summer Session - May 1

4. Students who have completed a bachelor’s degree at another institution since last attending MSU and are interested in pursuing another bachelor’s degree should file an Intent to Register form, to declare a Second Bachelor’s Degree.
5. Returning international students must contact the Office of International Programs to determine if a new Form I-20 must be obtained to renew a student visa.

For questions or to request the Intent to Register Form, contact the Office of the Registrar at 406-994-6650.

APPEAL OF ADMISSION DECISIONS

Applicants who wish to appeal the decision(s) made in the Office of Admissions relating to admission status, acceptance of transfer credit, granting of University Core designation, or Montana residency status are encouraged to contact the appropriate campus resource. Initial questions regarding admission decisions and transfer credit evaluations should be directed to the Office of Admissions. If an appeal is appropriate, information about the appeal process can be obtained from the Office of Admissions.

Graduation and Admissions Requirements Committee (GARC)

The Graduation and Admissions Requirements Committee (GARC) considers appeals and/or petitions from students seeking waivers of established admission and graduation requirements. For admission appeals, the Committee is composed of the Associate Provost (chairperson), the Registrar, Director of Admissions, and the Assistant Dean of the College in which the student is enrolled.

Core Equivalency Review Committee (CERC)

The Core Equivalency Review Committee (CERC) considers appeals and/or petitions from students seeking re-evaluation of the assignment of transfer credit to meet University Core requirements.

Residency Appeals Committee

The Residency Appeals Committee considers appeals from students seeking reconsideration of Montana residency status for fee purposes based upon the Montana Board of Regents Policy.

All incoming students should contact the Office of Admission regarding the appeal process and submission of required documentation. Continuing or returning students who wish to appeal the initial residency classification should contact the Registrar’s Office and request a Student Guide to Montana’s Residency Policy brochure. The Residency Appeals Committee will review all submitted documentation and determine Montana residency status for fee purposes.
SPECIAL ACADEMIC OPPORTUNITIES

For the most up-to-date catalog information:
www.montana.edu/wwwcat

A.C.E. LANGUAGE INSTITUTE
The Language Institute is sponsored by the American Cultural Exchange (A.C.E.) of Seattle, Washington. This on-campus program provides an English language academic preparation program for students whose native language is not English. Seven-and-a-half week sessions are offered throughout the year and are taught by highly trained instructors. The program offers seven levels of English instruction designed to meet students’ needs at their particular language level. Students who complete the appropriate level and receive a full recommendation from the Language Institute can apply to Montana State University without taking the TOEFL exam.

Language Institute student services include: airport pick-up, homestay placement, academic advising, and help with college and university applications and visa information. The university setting offers Language Institute students the opportunity to meet Americans and to participate in campus activities.

The Institute also offers courses in English as a Second Language for students enrolled in the university, as well as International Teaching Assistant (ITA) training and the TOEFL and SPEAK exams. Students should contact the Language Institute for specific course listings.

For more information, contact:
A.C.E. Language Institute
Montana State University
1106 S. 6th Ave.
Bozeman, MT 59717 USA
Phone: 406-585-9832
Fax: 406-585-9838
e-mail to: msuace@cultural.org

AMERICAN INDIAN RESEARCH OPPORTUNITIES (AIRO)
AIRO, a consortium of Montana’s seven Tribal Colleges and MSU Bozeman established in 1983, is dedicated to increasing the numbers of American Indians entering higher education and career fields where they are significantly underrepresented. AIRO is the umbrella organization for several specialized programs including the Initiative for Minority Student Development (IMSD), the Bridges to the Baccalaureate Program (BRIDGES), and the Montana (High School) Apprenticeship Program (MAP). All programs are funded wholly or in part by the federal government and foundations through such agencies as the National Institutes of Health (NIH), the National Science Foundation (NSF), and the Howard Hughes Medical Institute. The major goal of AIRO is to provide opportunities for American Indian students in science, technology, engineering and mathematics (STEM) career fields. Through AIRO, American Indian students have the opportunity to excel and to serve as role models for other minority students. Descriptions of the programs administered under the consortium of AIRO are as follows:

The IMSD Program focuses on undergraduate students. The program’s major goals are 1) to increase American Indian students’ academic competency in the biomedical fields, 2) to provide laboratory experiences in biomedical research for American Indian college-level students interested in biomedical/allied health careers, 3) to expose American Indian students to a broad spectrum of career opportunities in biomedical/allied health fields, 4) to strengthen facilities and research resources at the Tribal Colleges, and 5) to increase the number of American Indians in biomedical/allied health fields.

The BRIDGES program collaborates with Little Big Horn College, Aaniiih Nakoda College, Salish Kootenai College, Stonechild College, Blackfeet Community College, Chief Dull Knife College, and Fort Peck Community College to increase the number of students successfully transferring from the two-year tribal colleges to MSU and pursuing academic studies in the biomedical and other health-related sciences. BRIDGES activities include 1) conducting research seminars at the tribal colleges by MSU faculty and others in biomedical and behavioral sciences; 2) hosting spring workshops and campus visits to introduce tribal college students to the four-year campuses; 3) providing funds to cover the cost of tuition and fees for MSU course work to tribal college students during the summer months to improve students’ academic competitiveness and confidence; 4) providing students with research experiences in biomedical and related laboratories at MSU; 5) developing mentoring relationships between the student participant and an MSU faculty member in a related discipline; 6) providing tribal college faculty with opportunities for professional development, including support for travel to biomedical and related professional conferences, research supplies, and/or opportunities for collaborative research with MSU faculty; and 7) providing on-campus support after students bridge from one campus to the other, continuing to motivate and guide these students through their completion of a B.S. degree.

MAP is a summer enrichment program on the MSU-Bozeman campus for Native American high school students who are interested in science and math and want to work in a research lab and live on a college campus. Over eighty five percent of the students who have attended MAP in the past twenty three years have gone on to college, many in science, math, or engineering. The
program also provides opportunities for middle and high school math and science teachers who work with Native American students. The teachers spend eight to ten weeks on campus working in research labs and interacting with the MAP students.

For more information contact AIRO, 312 Roberts Hall, 406/994-5567, or send email to joshmori@hotmail.com.

EXTENDED UNIVERSITY

Extended University administers and coordinates on- and off-campus instruction in the form of distance-delivered and face-to-face courses, programs, institutes, and conferences that supplement the formal academic curriculum at MSU. Extended University services are organized into three main categories:

Montana State Online: Looking for an online or distance learning course at MSU? Currently MSU offers several graduate degrees and select undergraduate courses online and via video conferencing. Non-traditional programs are offered in partnership with Extended University and MSU academic departments.

Office of Continuing Education: Continuing education courses extend the educational resources of the University to the citizens of Montana and beyond. Credit and non-credit courses are offered at various locations across the state. Increasingly, instruction is provided through the use of distance learning technologies, such as video conferencing and web-based online courses. Fees for continuing education courses vary and are established on a cost-recovery basis.

Burns Technology Center: The BTC supports a variety of instructional technology classrooms and tools at Montana State University. The BTC provides training and support services for faculty, students, and private organizations on a contract basis. In addition, the BTC participates in pilot and demonstration programs that explore and enhance information and communication technologies to benefit education and society.

Organizations, professional groups, and interested individuals are invited to contact Extended University for additional information concerning credit and non-credit courses and instructional technology programs.

DIVISION OF HEALTH SCIENCES

Montana State University has a strong commitment to and focus on health professions education. To promote, support and expand the institutional capacity to meet health related needs of the people of Montana, the Division of Health Sciences (DHS) was created and many of the health related activities on campus are united under the DHS. Notably, the Division houses the Health Professions Advising Office which offers guidance to students interested in pursuing careers in Medicine, Dentistry, and other health related fields. The DHS is the home of the Montana WWAMI Medical Education Program, a cooperative partnership with the University of Washington School of Medicine that admits 20 Montana residents into the program leading to the degree of Doctor of Medicine. Montana WWAMI students spend their first year of medical school on the MSU campus.

The DHS encompasses several important outreach organizations, including the Montana Area Health Education Center (AHEC) and the Montana Office of Rural Health (MORH). The AHEC and the MORH work with Montana communities in many capacities, including programs to interest K-12 students in health care professions, programs that address wellness issues in rural communities and programs that focus on communities' needs regarding health issues. The Montana Family Practice Residency program, the “cousin” to the WWAMI medical program that provides training for new physicians in primary care, is affiliated with the DHS. The DHS extends into the biomedical research arena by fostering integration of biomedical research activities at MSU, where there are strong programs in biotechnology, neurobiology, immunology, cell biology, molecular biology, microbiology, proteomics and genomics. Many of these programs support undergraduate research and introduce students to biomedical research. The American Indian Research Opportunity (AIRO) program is a well-established program within the DHS that provides opportunities for Native American students to do research in laboratories at Montana State University while taking classes at MSU. Also housed within the DHS is the Montana Medical Laboratory Scientist training program. Medical Laboratory Scientists (also known as Medical Technologists or Clinical Laboratory Scientists) are important health care providers that perform laboratory analyses used in the diagnosis and treatment of disease and maintenance of health.

For further information see the DHS web site at http://www.montana.edu/dhs, contact the DHS Executive Director by calling 406-994-4411, or send email to jshelby@montana.edu.

Health Professions Advising

Montana State University is committed to health professions education. The Health Professions Advising (HPA) office builds MSU’s capacity to meet Montana’s health-related needs by supporting graduate and undergraduate students, as well as alumni, as they prepare for careers in health care.

Prospective students are encouraged to meet with the Health Professions Advisor to learn about MSU’s HPA services. Then, beginning at orientation, students who aspire to health-related careers receive guidance related to professional preparation. In addition, students may take a one-credit course to explore a range of health-related professions and academic opportunities at MSU. Many academic departments at MSU support pre-health career majors, including Cell Biology and Neuroscience, Engineering, Microbiology, Chemistry and Biochemistry, Ecology, Psychology, and Immunology and Infectious Disease. In addition, clinical observation courses, including Introduction to Dentistry, help students decide which health profession to pursue. As they apply to health professional school, students are strongly encouraged to attend detailed application workshops. Also during this critical time, the Pre-Professional Health Advisory Committee (PPAC), comprised of faculty from across campus, conducts interviews, provides personal statement and interview coaching, and formulates a Committee Evaluation Letter that is included with applications. During the application year, the HPA office supports student applicants and provides individualized guidance.

Pre-professional clubs, including the only Montana chapter of the national pre-health honors society Alpha Epsilon Delta, host presentations that intro-
duce students to practical aspects of health-related careers. Students are also encouraged to join the HPA electronic mailing list to stay abreast of events and opportunities. The success rate of MSU students applying to medical and dental schools is substantially higher than the national average.

For further information, visit the Health Professions Advising website at www.montana.edu/hpa, or contact us by email at hpa@montana.edu or phone at 406-994-1670.

**WWAMI Medical Program**

Montana State University is one of six universities participating in a program to decentralize medical education in five states: Washington, Wyoming, Alaska, Montana, and Idaho (WWAMI). The WWAMI Program is supported by the State of Montana and guarantees that 20 qualified students can be admitted to the University of Washington School of Medicine each year.

Sponsored by the University of Washington School of Medicine at Seattle and leading to an M.D. degree from that institution, the program is designed to make medical education available to citizens of the Northwest and to educate medical students in a way that will encourage them to practice primary care medicine in areas that lack a sufficient number of physicians.

Montana students receive the first year of their medical education at Montana State University. The curriculum is similar to and compatible with the University of Washington School of Medicine curriculum which emphasizes an integration of the basic and clinical sciences.

Course subject matter at Montana State University includes human gross anatomy, histology, human physiology, medical biochemistry, introduction to clinical medicine, musculoskeletal anatomy, immunology, infectious diseases, behavioral systems and the nervous system. A clinical preceptorship program has been developed, which involves the students with local physicians for several hours each week and for four weeks during the summer.

Following this first year of study at Montana State University, students join the portion of the class that began their studies in Seattle at the University of Washington as well as students from the other WWAMI regions (Eastern Washington, Wyoming, Alaska and Idaho).

At the conclusion of the first two years, students enter the clinical phase of their education, which includes required clerkships in family medicine, pediatrics, internal medicine, surgery, OB/GYN, neurology, psychiatry, chronic care, and emergency medicine. During this phase, students receive a portion of their training at the University of Washington School of Medicine and a portion of their clinical education from physicians in communities across the WWAMI region. There are 14 clinical clerkship sites in Montana, located in Billings, Bozeman, Butte, Dillon, Great Falls, Havre, Helena, Kalispell, Lewistown, Libby, Miles City, Missoula, Shelby and Whitefish.

To be eligible for the Montana State University WWAMI Program, the prospective medical student must be a legal resident of Montana for one year prior to application and must satisfy the admission requirements of the University of Washington School of Medicine. It is not necessary for a student to complete his or her premedical (undergraduate) education at Montana State University in order to be eligible for the WWAMI Program. Students admitted to the program are selected by the Admissions Committee at the University of Washington School of Medicine and are regarded as members of the freshman medical class there, although they register as resident students at Montana State University for the first year of the program.

For further information see the WWAMI web site at www.montana.edu/wwami, contact the Montana WWAMI Director at MSU by calling 406-994-4411, or send email to wwami@montana.edu.

**Montana Area Health Education Center (AHEC)**

Until the fall of 2007, Montana was a regional AHEC for the University of Washington WWAMI Program, along with other states in the WWAMI system. The Montana AHEC at MSU was allowed to apply for funding through the College of Nursing in collaboration with the Montana WWAMI Program in the Division of Health Sciences. This new grant has allowed Montana to create its own AHEC system, with four regional centers and the Program Office which is located at Montana State University in Bozeman. The first center is in Billings and is hosted by Yellowstone City County Community Health Center, home of the Montana Family Practice Residency Program and the 3rd Year WWAMI Program. The second is located in Dillon, hosted by the Montana Hospital Association. A third center is located in Western Montana, in conjunction with the 3rd Year WWAMI Program in Missoula.

In the fall of 2009, a center was established in North Central Montana. Each center has up to six years of funding that will total approximately $1.5 million. After six years of start-up funding, the centers receive a more modest grant and are expected to be self-sufficient. The purpose of the regional centers is to connect health professions education to rural and underserved communities. Programs developed at the centers will focus on creating a pipeline of health professionals; placing WWAMI students and other health professions students in rural rotations; and continuing education programs for health professionals. AHECs are designed to strengthen the healthcare workforce and improve health by forging connections between health professions, education and communities.

The mission of the Montana Area Health Education Center is:

- To improve the supply and distribution of health care professionals, with an emphasis on primary care, through community/academic educational partnership, to increase access to quality health care.

The mission is accomplished by pursuing goals, objectives and activities which are common to all AHECs. These are changed and/or modified each year in response to decisions made by the federal granting agency. The following guidelines are used in establishing annual goals, objectives and activities:

- Form productive linkages between healthcare units to the benefit of underserved and rural communities.
- Foster and encourage collaborative community-based health programs.
- Serve as a resource, clearinghouse and disseminatory of health information.
Montana Office of Rural Health

The Montana Office of Rural Health is funded through the Federal Office of Rural Health Policy. MORH is a resource for information on rural health issues, data, research and funding opportunities. MORH participates in 3RNet, a multi-state rural health professions recruitment program; manages the Small Hospital Improvement Program; and provides technical assistance to rural communities on rural health projects.

The mission of the MORH is “to serve its communities through: (1) collecting and disseminating information within the state, (2) improving recruitment and retention of health professionals into rural areas, (3) providing technical assistance to attract more federal, state, and foundation funding for rural health, and (4) coordinating rural health interests and activities across the state.”

All of the SORH are required to conduct activities which will accomplish three core and two additional functions:

- Establish and maintain a State clearinghouse for collecting and disseminating information on rural health care issues, research findings related to rural health care, and innovative approaches to the delivery of health care in rural areas.
- Coordinate activities carried out in the state that relate to rural health care; including providing coordination to avoid duplication in such activities.
- Identify Federal, State and non-governmental programs regarding rural health and provide technical assistance to public and nonprofit entities regarding participation in such programs.
- Encourage recruitment and retention of health professionals in rural areas.
- Participate in strengthening State, local and Federal partnerships in rural health.

For further information, see the MORH web site at http://healthinfo.montana.edu/, contact the MORH office at MSU by calling 406-994-6003, or send email to kjuliar@montana.edu.

Medical Laboratory Scientist Training Program

The Montana Medical Laboratory Scientist training program was created to help alleviate the critical need for medical laboratory scientists in the state of Montana, especially in rural communities. The program is a cooperation between Montana State University-Bozeman, the University of Montana and Montana State University-Billings. Key Aspects of MSU’s MMLS Program:

- Program trains up to 15 students each year, the next class starting in May of 2009.
- Students train during the summer at MSU and then move for fall and spring semesters for clinical rotations at nine major hospitals in Montana.
- Students also do a two week rural rotation near the end of their clinical training.
- Students can complete their training in four years and become certified Clinical Laboratory Scientists and work in clinical laboratories throughout Montana.
- Funding to develop the program was obtained in 2007 with appropriations from the state legislature and donations from 16 hospitals in the state.
- This will help alleviate a critical healthcare workforce need in Montana and nationally.

For further information visit www.montana.edu/wwwmb/index.php?page=medical-laboratory or send email to microbiology@montana.edu.

INTERNATIONAL PROGRAMS

Office of International Programs

Responding to fundamental trends which pull the United States and Montana into the global marketplace and put us into daily contact with other nations, Montana State University seeks to bring international education to the core of the academic and cultural life of the campus. The Office of International Programs (OIP), located in Culbertson Hall (Fourth Floor), offers a full range of international programs and services to MSU students, faculty, and staff. OIP provides quality educational opportunities abroad for MSU students at 240 universities in fifty countries. OIP also offers services and programs which make MSU accessible to capable students from around the world and ensure they have worthwhile academic experiences.

At the faculty level, OIP assists faculty to pursue their fields at the global level. OIP provides information and assistance to members of the faculty wishing to engage in international research, participate in a faculty exchange program, or develop international dimensions to their courses. In addition, OIP assists departments and offices in obtaining visas and making other arrangements necessary to host visiting scholars from abroad. OIP is also responsible for developing and maintaining international institutional relationships between MSU and selected universities throughout the world. At present, MSU maintains active relationships with over 40 universities throughout the world, and more sister institution relationships are under development.

OIP reports to the Office of the Provost and works closely with the MSU International Programs Committee in conducting its programs.

Global Studies Minor

Montana State University-Bozeman offers a Global Studies Minor (GSM) administered through the Office of International Programs. The minor is intended to provide students with the fundamental international and intercultural skills they need to succeed in the “borderless careers” they will enter in virtually any career path they choose.
The concept of the minor is to draw curricular resources together into a defined program that can provide a strong foundation in international studies, foreign languages, and intercultural communication for MSU graduates. To fulfill the minor, students must complete three requirements. First, students must complete three GSM support courses and 14 hours of approved electives. Second, students must complete at least the first semester of the second year in a modern language or demonstrate equivalent proficiency. Third, students must fulfill an education abroad requirement by earning at least six credit hours on an approved study abroad program. This requirement can also be fulfilled through approved academic internships, service learning, or faculty supervised research abroad.

Study Abroad
www.montana.edu/international/studyabroad

MSU encourages students to study abroad, both to build the international skills which are increasingly needed in all professions, and for the intrinsic educational value of studying outside one’s home country.

In addition to hundreds of study abroad options for individual students, numerous special programs are developed by MSU faculty members which allow groups of MSU students to travel and study abroad. Students earn full credit while participating in MSU sponsored study abroad programs, and in most cases can maintain regular progress toward their MSU degree while studying abroad. Some MSU approved study abroad experiences also satisfy the University Core Curriculum Multicultural/Global or Diversity requirement. These decisions will be made on a case-by-case basis.

Fees for many study abroad programs are based on MSU tuition rates, enabling students to study abroad for little additional cost than remaining on the Bozeman campus. In addition, students eligible for financial assistance may apply their aid package to meet study abroad costs.

OIP’s International Opportunities Resource Center, located on the fourth floor of Culbertson Hall, offers students professional study abroad advising services and extensive reference materials on MSU-sponsored and non-MSU-sponsored study abroad programs.

International Institutional Partners

MSU maintains sister-institutional relationships with many specially selected universities around the world. With these institutions, MSU offers student and faculty exchanges, conducts collaborative research activities, and provides other cooperative programs. Current sister institutions abroad are listed below. Additional international partnerships are under development to meet the growing need for international educational opportunities for MSU students and faculty.

Australia
- Flinders University, Adelaide
- Macquarie University, Sydney
- University of Southern Queensland, Toowoomba
- University of Western Australia, Perth
- University of Wollongong, Wollongong
- University of Western Sydney, Sydney

Costa Rica
- Universidad Veritas, San Jose
- University of Sheffield, Sheffield

France
- Euromed Marseille Ecole de Management, Marseille
- Universite Paul Valery (Montpellier III), Montpellier

Germany
- Eberland-Karls-Universitat, Tubingen
- Martin-Luther-Universitat, Halle
- Free University, Berlin
- Technische Universitat, Berlin
- University of Applied Sciences Fachhochschule Ravensburg, Weingarten
- University of Mannheim, Mannheim

Ireland
- National University of Ireland - Galway, Galway

Japan
- Kansai Gakuin University, Osaka
- Kumamoto University, Kumamoto
- Kumamoto Gakuen University, Kumamoto
- Perfectural University of Kumamoto, Kumamoto

Mexico
- Universidad Autonoma de Baja California

Morocco
- Al-Akhawayn University, Ifrane

Netherlands
- University of Amsterdam, Amsterdam

New Zealand
- Massey University, Palmerston North
- University of Canterbury, Christchurch
- University of Waikato University, Hamilton

Northern Ireland
- University of Ulster, Ulster

Norway
- Norwegian University of Science & Technology, Trondheim
- Norwegian University of Life Sciences, As
- University of Oslo, Oslo
- University of Bergen, Bergen

Republic of Korea
- Yonsei University, Seoul

South Africa
- University of Stellenbosch, Stellenbosch

Spain
- Letra Hispanica, Salamanca
- Universidad Politonica de Valenica, Valencia
- Universidad Publica de Navarra, Pamplona

Sweden
- Jonkoping International Business School, Jonkoping

Turkey
- Yeditepe University, Istanbul
- Kadir Has University, Istanbul

United Kingdom
- Kingston University, London
- Lancaster University, Lancaster
- University of Exeter, Exeter
- University of Plymouth, Plymouth

International Students

MSU encourages qualified students from other nations to enroll in its programs on a degree-seeking, non-degree, or exchange basis. International students enrich the MSU campus, exposing MSU students to the diverse cultures and traditions of other nations. In order to enable international students to succeed at MSU and to have a positive experience on the campus, the Office of International Programs offers a program of quality international student advising on cultural adjustment, immigration regulations, and academic and personal matters; programs to integrate international students into the campus and the Bozeman community; and instruction in English as a Second Language through the A.C.E. Language Institute.

National Student Exchange
www.montana.edu/wwags/nse.htm

The National Student Exchange, a consortium of 190 state-supported colleges and universities, offers students the opportunity to attend another participating institution for a semester or full academic year. By bringing together students from different parts of the country, the exchange encourages participants to broaden themselves academically, socially, and culturally to experience personal growth. To qualify for participation in the NSE program, a student must 1) be a full-time student, 2) have a minimum cumulative grade point average of 2.5, 3) be a student in good standing academically, financially, and, socially, and 4) have completed at least 24 credits. Students with Montana residency (in-state) are able to enroll at their host institution with the same financial benefits enjoyed by in-state students. Nonresident students (out-of-state) may attend schools that allow them to continue to pay their tuition at Montana State University.

Colleges and universities participating in the National Student Exchange program include:
### SPECIAL ACADEMIC OPPORTUNITIES

- Adams State College (Colorado)
- Alabama A&M University
- Alabama State University
- Arkansas State University
- Ball State University (Indiana)
- Binghamton University (New York)
- Bishop’s University (Canada)
- Boise State University (Idaho)
- Boston State University (Maryland)
- Bridgewater State College (Massachusetts)
- California Polytechnic State University-San Luis Obispo
- California State Polytechnic University-Pomona
- California State University-Bakersfield
- California State University-Chico
- California State University-East Bay
- California State University-Fresno
- California State University-Los Angeles
- California State University-Monterey Bay
- California State University-Northridge
- California State University-San Bernardino
- California University of Pennsylvania
- Cape Breton University (Canada)
- Central Washington University
- Cleveland State University (Ohio)
- College of Charleston (South Carolina)
- Colorado State University-Pueblo
- East Carolina University (North Carolina)
- East Stroudsburg University (Pennsylvania)
- East Tennessee State University
- Eastern Connecticut State University
- Eastern Illinois University
- Eastern Oregon University
- Ferris State University (Michigan)
- Florida International University
- Fort Hays State University (Kansas)
- Fort Lewis College (Colorado)
- Gamblin State University (Louisiana)
- Howard University (District of Columbia)
- Humboldt State University (California)
- Idaho State University
- Illinois State University
- Indiana University of Pennsylvania
- Indiana University-Purdue University at Fort Wayne
- Indiana University-Purdue University at Indianapolis
- Inter American University of Puerto Rico, Barraquitas
- Inter American University of Puerto Rico, San German
- Iowa State University
- Jackson State University (Mississippi)
- Johnson State College (Vermont)
- Kansas State University
- Keene State College (New Hampshire)
- Kent State University (Ohio)
- Kutztown University of Pennsylvania
- Louisiana State University
- Louisiana Tech University
- Marshall University (West Virginia)
- Massachusetts College of Liberal Arts
- Mesa State College (Colorado)
- Michigan Technological University
- Minnesota State University, Mankato
- Minnesota State University, Moorhead
- Mississippi State University
- Missouri State University
- Morehead State University (Kentucky)
- Murray State University (Kentucky)
- New College of Florida
- New Mexico Institute of Mining and Technology
- New Mexico State University
- North Carolina Central University
- North Carolina State University
- Northern Arizona University
- Northwestern State University (Louisiana)
- Oklahoma State University
- Oregon State University
- Plymouth State University (New Hampshire)
- Polytechnic University of Puerto Rico
- Portland State University (Oregon)
- Prairie View A & M University (Texas)
- Queens College, City University of New York
- Ramapo College of New Jersey
- Rhode Island College
- Rutgers School of Arts and Sciences (New Jersey)
- San Jose State University (California)
- Sir Wilfred Grenfell College (Canada)
- Skidmore College (New York)
- South Carolina State University
- South Dakota State University
- Southern Oregon University
- Southern University (Louisiana)
- Southern Utah University
- St. Mary’s College of Maryland
- Stony Brook University (New York)
- Suffolk University (Massachusetts)
- SUNY College at Buffalo (New York)
- SUNY College-Plattsburgh (New York)
- SUNY College-Potsdam (New York)
- Tennessee State University
- Texas A & M University
- Texas State University-San Marcos
- The College of New Jersey
- Towson University (Maryland)
- Universidad Autonoma de Cozumel (Mexico)
- Universidad de la Laguna (Tenerife)
- University of Alabama
- University of Alabama at Birmingham
- University of Alaska-Anchorage
- University of Alaska-Fairbanks
- University of Alaska Southeast-Juneau
- University of Arizona
- University of California-Santa Barbara
- University of Colorado at Boulder
- University of Colorado at Colorado Springs
- University of Connecticut
- University of Delaware
- University of Georgia
- University of Guanajuato
- University of Hawaii-Manoa
- University of Houston
- University of Iowa
- University of Kansas
- University of Kentucky
- University of Kentucky-Louisville (Kentucky)
- University of Maine at Farmington
- University of Maine at Presque Isle
- University of Massachusetts at Amherst
- University of Massachusetts-Boston
- University of Memphis (Tennessee)
- University of Minnesota-Morris
- University of Minnesota-Twin Cities
- University of Missouri
- University of Montana
- University of Nebraska-Kearney
- University of New England (New Hampshire)
- University of New Orleans (Louisiana)
- University of North Carolina at Asheville
- University of North Carolina at Wilmington
- University of North Texas
- University of Northern British Columbia (Canada)
- University of Northern Colorado
- University of Northern Iowa
- University of Oregon
- University of Puerto Rico (Bayamón, Caguas, Mayagüez, and Río Piedras)
- University of Regina (Canada)
- University of Rhode Island
- University of Saskatchewan (Canada)
- University of South Carolina-Columbia
- University of South Dakota
- University of Southern Maine
- University of Southern Michigan
- University of Tennessee-Knoxville
- University of Tennessee-Martin
- University of Texas-San Antonio
- University of the Virgin Islands at St.Croix
- University of the Virgin Islands at St.Thomas
- University of Utah
- University of Wisconsin
- University of Wisconsin-Eau Claire
- University of Wisconsin-Green Bay
- University of Wisconsin-La Crosse
- University of Wisconsin-Oshkosh
- University of Wisconsin-Plattsville
- University of Wisconsin-River Falls
- University of Wisconsin-Stout
- University of Wisconsin-Superior
- University of Wisconsin-Whitewater
- University of Wyoming
- Virginia State University
- Washington State University
- West Chester University of Pennsylvania
- West Virginia University
- Western Oregon University
- Western State College of Colorado
- Westfield State College (Massachusetts)
- Wichita State University (Kansas)
- William Paterson College of New Jersey
- Winthrop University (South Carolina)

For more information about the National Student Exchange, visit www.montana.edu/ wwwgs/nse.htm or contact University Studies, 418 Reid Hall, 406-994-5352, or email karensteele@montana.edu.

### MONTANA SPACE GRANT CONSORTIUM
http://spacegrant.montana.edu/

The Montana Space Grant Consortium (MSGC) was established in 1991 as a component of NASA’s National Space Grant College and Fellowship Program. The Montana program is one of a national network of 52 consortia, working to strengthen aerospace research and education in the United States. Montana State University is the Lead Institution of MSGC, which has eighteen additional academic affiliates across Montana, as well as other educational and industrial members.

MSGC offers a variety of programs to support students and faculty wanting to pursue activities consistent with NASA’s interests.

#### Fellowships, Scholarships and Student Research

Each year MSGC offers graduate fellowships and undergraduate scholarships to students pursuing NASA-related studies. Applications are available early in the spring semester and are due April 1st of each year.

In addition to fellowships and scholarships, the Montana Space Grant Consortium offers support for under-
graduate research at MSU throughout the year through the Undergraduate Scholars Program (USP). Stipends and fee waivers are available through this program and may be requested by submitting a research proposal to the USP office.

Program Opportunities for Students
The Montana Space Grant Consortium supports a number of programs at MSU, which provide opportunities for students from all majors to participate in NASA-related work. The BOREALIS high altitude ballooning program flies student-designed and built scientific experiments to altitudes over 100,000 feet above Montana, to the edge of space. MSGC, together with MSU’s Space Science and Engineering Laboratory, offers undergraduate and graduate students the chance to design, build, fly, and operate real spacecraft, including MEROPES, the first satellite built in Montana, and Explorer 1 [Prime], the next-generation of MEROPES. Explorer 1 [Prime] is slated to be on the first NASA launch of student-built satellites. MSGC’s Space Public Outreach Team offers MSU undergraduates the opportunity to become involved in outreach efforts of major NASA Space Science missions. MSGC also coordinates opportunities for students at NASA Academy and other internship programs at NASA Centers around the country. Seven MSGC student teams, selected in national competition, have flown with their experiments on NASA’s “Vomit Comet” astronaut training aircraft, at the Johnson Space Center in Houston, Texas.

Campus Wide Programs
MSGC funds a variety of faculty-proposed research and education enhancement programs across the MSU campus and throughout the state of Montana. These efforts allow students to work with faculty on cutting edge research and also provide opportunities for faculty to develop projects which share aeronautical and space sciences and engineering with diverse audiences. Funding for innovative, NASA-related programs is awarded annually through a competitive proposal process.

For more information, please visit http://spacegrant.montana.edu or contact the Montana Space Grant office at msgc@montana.edu or 406-994-4223.

THE SPACE SCIENCE AND ENGINEERING LABORATORY
http://www.ssel.montana.edu/

MSU’s Space Science and Engineering Laboratory (SSEL) is a center of expertise with faculty, staff, and facilities for space research and space technologies. The charter of the laboratory is to bring together students and faculty in the science and engineering disciplines to conduct space flight experiments within an interdisciplinary research and student training environment. As described below the program has involved building the capability at MSU to conceive, design, build and operate sounding rocket payloads and small satellites. A fundamental tenet of the organization is to pursue state-of-the-art research while focusing strongly on student involvement, education and training in experimental space science. Upon graduation, participants in this program can enter the workforce with direct experience in space technologies.

Our hardware projects are space science motivated while simultaneously directed at major involvement by students at the undergraduate and graduate levels. Students undertake major responsibilities for design, engineering, development, testing, and flight operation, thereby gaining the essential beyond-the-classroom experience of working in an interdisciplinary team environment.

SSEL students develop necessary workforce skills through hands-on experience gained by building complex systems requiring formal documentation, configuration management, and adherence to schedule and budget. The students encounter and solve systems engineering challenges beyond those usually presented through the standard engineering and science curriculum. This deep involvement provides the extra experience that prepares these students to embark immediately on highly productive positions upon entering the workforce.

Students interested in becoming involved in the programs of the Space Science and Engineering Laboratory should contact the Director, Dr. David Klumper. For more information, including details of current and past projects, go to http://www.ssel.montana.edu/

DEPARTMENT OF
NATIVE AMERICAN STUDIES

Montana State University has an American Indian enrollment of approximately 546 students. There is an active American Indian Student Council (AISC) as well as chapters of the American Indian Science and Engineering Society (AISES) and the Society of American Indian Graduate Students (SAIGS). The Department of Native American Studies (NAS) houses the Native American Student Center and the MSU counselor and advisor for Native students who provides academic advising, counseling, and mentoring. The Student Center offers tutorial assistance, telephone and internet access, and a computer lab.

The Department of Native American Studies was established to provide and advance quality education for and about American Indians of Montana, the region, and the nation. In fulfilling this mission, the Department is committed to meet the changing needs of Montana’s Indian tribes and all Montana citizens through excellence in teaching, research, and service.

The Department of Native American Studies offers both a Master of Arts (MA) degree in Native American Studies with an interdisciplinary approach, and an Online Graduate Certificate in Native American Studies. The program allows each graduate student the opportunity to select a course of study that combines Native American Studies and a student’s particular area of interest (e.g., history, business, literature, political science). The 12-credit Graduate Certificate is suitable for those who wish to augment their knowledge of Native American Studies. The 31-credit MA program is designed so that each graduate student could complete the program within three to four semesters of concentrated work. Students will be expected to attend at least two full semesters on campus. The program’s mission, purpose, and objective emphasis is to graduate, in a timely manner, knowledgeable professionals and academicians well grounded in Native American issues and scholarship.

The Department, through its research and other creative efforts, actively pursues interdisciplinary scholarship in the field of Native American Studies. At the same time, the faculty seeks opportunities to develop
programs which address the needs of its campus and off-campus constituencies. In its service function, the Department has a special responsibility to Indian tribes, communities, and organizations to assist self-directed educational, socioeconomic, cultural, and community development. In addition to fulfilling the traditional role of an academic unit, Native American Studies also assumes a commitment to the educational advancement of Indian people and in doing so, the Department performs a vital student service function to increase the academic achievement and retention of Native American students at Montana State University.

For additional information visit www.montana.edu/wwwnas/.

PRE-LAW AT MSU

Many students at MSU are interested in exploring possible careers in law and every year MSU students are accepted at excellent law schools across the country. MSU offers a variety of resources and advising to students who wish to pursue a career in law after graduation. These resources include:

• FAQs about law school, available at www.montana.edu/wwwprov/lawfaq.html
• Personal law school advising by faculty members and administrators who are experienced attorneys
• Legal career and law school information sessions scheduled several times during the academic year
• Courses about and/or relating to law, including:
  • AGBE 337--Agricultural Law
  • BGEN 361--Principles of Business Law
  • HDCF 425--Family Law and Public Policy
  • NASX 476--American Indian Policy and Law
  • PSCI 210--Intro to American Government
  • PSCI 306--Legislative Process
  • PSCI 434--International Law
  • PSCI 461--Administrative Law
  • PSCI 471--American Constitutional Law
  • SOCI 313--Principles of Criminal Law and Procedure
  • SOCI 357--Occupational and Corporate Crime
  • SOCI 358--Crime and Inequality
  • SOCI 359--Crime, Justice and Media
  • SOCI 435--Law and Society
  • SOCI 436--Law and Inequality
• Many other courses that help students acquire the knowledge and skills necessary to be successful in law school and in a legal career
• Law School Admission Test (LSAT) administration at MSU three times per year

Because there is no required or preferred set of courses for law school, MSU does not offer a formal pre-law curriculum. In fact, although Political Science is a common major for law school applicants, many law schools are delighted to see applicants who have majored in such apparently non-law related fields as engineering, biology and nursing because law schools seek variety and diversity in their applicants. What a student majors in is far less important than developing the skills necessary for a successful career in law, including critical thinking, logical reasoning, and excellent written and oral communication skills. All of these skills can be acquired and strengthened in any major a student chooses.

For more information about pre-law resources at MSU, please visit www.montana.edu/wwwprov/lawfaq.html.

PRE-MEDICAL ENTRY MAJOR AT MSU

Students interested in attending medical, dental, pharmacy, physician assistant, optometry, or chiropractic school are encouraged to participate in the Pre-Medicine Entry Major. In the entry major, program-associated advisors support students as they explore academic- and health care-related opportunities. Students are then poised to choose an academic major by the beginning of their sophomore year. Along with departmental advisors, the HPA office provides information, professional advising and counseling to all MSU students interested in becoming health care professionals. In particular, the office provides guidance as students apply to health professional schools. Students are encouraged maintain contact with the Health Professions Advising Office while at MSU and after they graduate. Students are invited to participate in the pre-health professions club, the pre-dental club, the American Medical Student Association, and/or the pre-health professional honor society (Alpha Epsilon Delta). Students become eligible for membership in Alpha Epsilon Delta during the sophomore year.

Contact Information:
Health Professions Advising
Montana State University
315 Leon Johnson Hall
Bozeman, MT 59717
hpaprograms@montana.edu
Phone: 406 994-1670
Fax: 406 994-4398

PRE-VETERINARY MEDICINE PROGRAM

http://iid.montana.edu/undergrad/prevet.htm

Montana State University-Bozeman has the largest number of pre-veterinary medicine students in the Montana University System. The pre-veterinary program is distinguished by its dedicated pre-vet advisor who works with all students in the program to assist them in preparing to apply for admission to schools of veterinary medicine.

MSU’s pre-veterinary curriculum is not a degree. Rather, it is an advising program coupled with a series of required undergraduate classes that prepare students for admission into schools of veterinary medicine. It is recommended that students choose a major in Biotechnology-Animal Systems, Animal Science, Microbiology, Organismal Biology, or Biochemistry, while simultaneously completing the course work necessary for an application to veterinary school.

Since Montana does not have a veterinary school, the State of Montana contracts with veterinary schools in Colorado, Washington, and Oregon to accept applications from Montana students under a Professional Student Exchange Program (PSEP) within the Western Interstate Commission for Higher Education (WICHE). Montana students who are selected may attend one of the WICHE veterinary schools and pay the in-state resident tuition of that school. The State of Montana sends a support fee to the school to offset the cost of educating Montana residents.
At this time, the state of Montana supports nine Montana students each year in veterinary school, which makes this a very competitive program at the undergraduate level. Currently at MSU there are approximately 290 students enrolled in various areas of undergraduate study intending to pursue a career in veterinary medicine. In the past five years, 62% of the Montana students accepted into a WICHE veterinary school completed their undergraduate education at MSU. The students in veterinary school who completed their undergraduate course work at MSU are ranked in the top half of their veterinary school classes.

SERVICE LEARNING AT MONTANA STATE UNIVERSITY
www.montana.edu/comminv/involvement/academic

Service Learning courses provide Montana State University students with the opportunity to link academic study with community involvement. Students use information from these courses to address real needs of local and global communities. Student learning and service to the community are essential elements of these educational experiences. Through critical reflection, students integrate the knowledge and skills they are learning in class with applications in the real world.

Service learning courses enhance academic learning by helping students develop work-related skills, enhance their sense of civic responsibility, clarify their academic goals/aspirations, and increase awareness of moral and ethical issues while providing valuable assistance to non-profit community organizations. For many students, service learning enlivens the course and further engages them in meaningful understanding of academic content. Courses which utilize the service learning instructional method are designated as a Service Learning Course in each semester’s Schedule of Classes.

MONTANA CAMPUS COMPACT
www.mtcompact.org

The Montana Campus Compact (MTCC) is a statewide coalition of college presidents and chancellors committed to renewing the public purposes of higher education by promoting campus and community collaborations and civic engagement activities. Since 1993, these campus leaders have represented two and four-year, public, private, religiously affiliated, community and tribal colleges across Montana. MTCC supports and encourages activities such as volunteering, community service, and service learning through its programs, which include:
- Campus Corps Stipended and Non-Stipended Programs
- MTCC VISTA Project
- Raise your Voice Campaign
- MTCC Community Service Scholarship
- Montana Athletes in Service
- Jimmy and Rosalynn Carter Partnership Award for Campus Community Collaboration

For information on MTCC programs and projects available at Montana State University, please contact Kathryn Tanner in the MSU Office for Community Involvement (OCI) at 994-6902, or via email to community@montana.edu or visit OCI in room 330 Culbertson Hall. For more information regarding MTCC member benefits and services please contact the MTCC headquarters office at (406) 243-5177 or visit www.mtcompact.org.

SUMMER SESSION
www.montana.edu/summer

The MSU Summer Session program is committed to providing a variety of classroom, outdoor, and online opportunities for students to advance or complete their educational goals.

Summer Session offers an exciting mix of courses designed to meet the needs of a diverse audience. For example:
- Students who work, or leave Bozeman for the summer, can still begin or continue their MSU education by enrolling in one or more online courses.
- Incoming freshmen can jump-start their college careers by fulfilling a core requirement or two.
- Students looking for something different can earn college credit while studying subjects such as photography, wildlife, music, and more.
- Post-baccalaureate students planning to apply to medical or dental school can explore a series of science and mathematics courses designed to meet the special academic needs of pre-med students.
- Summer master’s degree programs, designed to be completed in three to four summer sessions, enable students to earn master of science degrees in mathematics education or science education.

And when not in class, students enjoy a variety of activities in and around Bozeman, including cultural events in the city and outdoor recreational opportunities in the nearby mountains.

Spend a summer at MSU—and make it a season of learning, adventure, and discovery!

For more information, contact: Office of Summer Session (406) 994-7136 summer@montana.edu www.montana.edu/summer

THE SPECTRUM LAB
www.spectrum.montana.edu

The Spectrum Lab charter comprises three missions: 1) develop multispectral optical concepts into prototype systems that provide computational, communication, sensor, or measurement capabilities that exceed state-of-the-art capabilities; 2) provide an educational environment for graduate and undergraduate students that prepares them directly for the goal-oriented, time-critical, team project emphasis of corporate research; and 3) establish corporate partnerships to transition emerging applications to commercial products, boosting economic growth and infrastructure in Montana. To accomplish these goals, multidisciplinary teams from diverse technical areas assemble to pursue specific development projects. Optical and electronic laboratory facilities support research efforts complemented by departmental programs, drawing on the combined expertise of Spectrum Lab personnel and affiliated faculty. A 32-processor SGI Origin 2000 supercomputer, shared with the Center for Computational Biology, provides superb scientific modeling capability.

Several projects are ongoing. An all-optical correlator project will process signals continuously at 10 Gbit/sec. One application consists of identifying patterns in multiple-probe data
from neural bundles to establish their adaptive cooperative function. More generally, this correlator can contribute to iterative computation, used in adaptive imaging. Cache memory for a next generation (petaflops-scale) supercomputer will be built using all-optical technology. Application of this concept extends to buffer memory for data routing in communication networks. Supplemenating this capability, all-optical routing switches are being devised with intended application in storage area networks - large distributed data banks, regionally interconnected. Frequency references for spectroscopic measurement and clocks have been demonstrated in compact implementations, and their application in precision-timing measurement instruments is under development.

The common thread throughout these projects is the exploitation of the spectral attributes of optical fields to provide either immense bandwidth in information processing or exquisite precision in oscillator stability. A spectroscopic discipline called spectral hole burning (or optical coherent transients) sustains much of the technology development. Other core techniques include ultra-short optical pulse shaping for data multiplexing, and the development of optical micro-resonators for wavelength discrimination and switching devices.

The Spectrum Lab staff consists of research scientists and engineers as well as postdoctoral fellows. It currently recognizes faculty affiliates in Physics, Electrical and Computer Engineering, and Chemistry and Biochemistry. Collaborations with Computer Science and Mathematical Sciences are anticipated. The Spectrum Lab has close connections with other MSU centers: the Optical Technology Center (OpTeC), the Center for Computational Biology (CCB), and the Center for Biofilm Engineering (CBE).

Both graduate and undergraduate students are supported to participate in Spectrum Lab projects. Research that contributes to these projects, pursued under the supervision of either Spectrum Lab research professor staff or affiliated departmental faculty, can partially satisfy educational requirements or serve as the independent work toward advanced degrees.

For more information, go to www.spectrum.montana.edu or call (406) 994-7596.

**UNDERGRADUATE SCHOLARS PROGRAM**
www.montana.edu/usp

The Undergraduate Scholars Program (USP) encourages and facilitates undergraduate research in collaboration with faculty mentors by awarding grants and/or academic credit. Research projects may include any scholarly or creative activity ranging from traditional scientific experimentation to the creation of new artistic works, and can stem from a faculty mentor's research or a student's original idea.

A quick glance at the focus of some recent projects highlights the range of opportunities supported by USP: geology of underground coal beds, characteristics of biofilm, nursing stereotypes, bioprospecting in Yellowstone National Park, and an unusual exhibit of original photography. Projects are selected according to scholarly standards of the relevant disciplines(s).

For more information about the Undergraduate Scholars Program, visit the USP Web site at www.montana.edu/usp, email to: usp@montana.edu, or call (406) 994-3561.

**UNIVERSITY HONORS PROGRAM**
www.montana.edu/honors

University life serves many ends, but an essential component of higher education is to prepare students to better understand themselves, others and the increasingly complex world around them. Undergraduate education in particular has the goal of helping students become, in time, their own best teachers. At Montana State University, the University Honors Program addresses this goal by providing academically motivated students with unique opportunities to undertake interdisciplinary course work and undergraduate research leading to a university honors degree. Such studies, in addition to courses within their chosen discipline, provide extraordinary preparation for professional and technical careers, or graduate and advanced studies.

Entering students have the opportunity to undertake innovative studies during their freshman year. Texts and Critics: Knowledge and Imagination are both semester-long seminars that address fundamental issues in the humanities, social sciences, natural sciences, and the fine arts through critical reading and analysis of seminal texts which serve as a foundation for advanced studies in major disciplinary fields. Instructed by faculty representing every college at the University, Texts and Critics earns University Seminar and Inquiry-Humanities core credits. In addition, the Honors Program annually offers a variety of upper-division interdisciplinary seminars. These seminars employ Socratic methodology through which faculty and students engage in critical discussion of issues spanning a diverse range of academic interests. Such engagement also fosters the development of analytic and critical communication skills. These seminars, typically taught by the most respected and stimulating professors on campus, carry university core credit in all core designation categories.

Special Honors sections of departmental courses in Chemistry, Physics, Math, Music, English, Biology, Sociology, Spanish and Economics are also offered. Limited enrollment in seminars and classes permits lively discussion and interactive study among faculty and students.

**Great Expeditions** is an annual Honors course that involves two-weeks of international travel following a semester of study pertinent to the expedition theme. After travel is completed, students present a public symposium highlighting the results of their journey.

**Mentoring Gifted Students**, a service learning course, enables students to work with gifted and talented students in public schools.

Additional opportunities for independent study are available through Honors contracts, which are offered primarily at the upper-division level. Contracts often prepare students to accept the special challenges and benefits of an Honors thesis. Upper-class students may also qualify to undertake supervised tutorial study.

Honors students have been remarkably successful in earning other scholarships for further study, both in the United States and abroad. Special attention is given to preparation for professional and graduate schools.
Extracurricular, outdoor, and social activities are an important feature of the daily life of the program.

Enrollment in University Honors Program courses is restricted to students officially admitted to the program. Admission is normally limited to students in the upper ten percent of their high school class and who have high ACT or SAT scores, or to those already enrolled in the University who have demonstrated academic achievement and personal initiative.

To maintain good standing in the program, students must demonstrate significant and continuing progress toward their specific degree in addition to satisfying the particular standards of Honors course work or research. Graduation in the program requires the accumulation of a specific number of Honors credits as determined by the category of Honors degree the student pursues. All such credits may be acquired through successful completion of Honors courses; a minimum 3.5 overall grade-point average; and one-year (or its equivalent) of a foreign language. To graduate with Highest Distinction, a thesis and a minimum cumulative 3.7 GPA are required. Students with energy, self-reliance, and imagination should discuss their interest with the Director.

For details about admission and graduation requirements, contact the University Honors Program Office by calling 406-994-4110, or by sending an email to honors@montana.edu. In addition, we encourage you to visit the Honors website at www.montana.edu/honors.

UNIVERSITY STUDIES PROGRAM

www.montana.edu/wwwgs

The University Studies Program fulfills a variety of interests and needs at MSU. Most typically, freshmen choose University Studies when they are uncertain about a major field of study or want to explore a variety of curricula before making a final choice. Approximately one-third of entering freshmen choose University Studies as their initial curriculum.

Based on the student’s interests, goals, and academic background, a University Studies academic adviser assists the student in the preparation of an individualized program to explore various areas and at the same time fulfill course requirements or electives in any curriculum. Required University Core courses are particularly well-suited for this purpose.

University Studies students have the opportunity to enroll in First-Year Seminar. This academic Core course focuses on helping students reach their academic and intellectual potential through a concentration on critical thinking, verbal and written communication, and collaborative learning.

Undergraduate students may take up to 60 semester credits (through the sophomore year) in University Studies before declaring a major, although they are encouraged to select a suitable degree plan well before the 60-credit limit.

The program also serves students who plan to pursue specialized degrees at other institutions but wish to take basic courses at MSU for one or two years before transferring.

Transfer students may enter University Studies to fulfill requirements and explore MSU degree programs before declaring a major.

For more information about University Studies, visit www.montana.edu/wwwgs, email us at advising@montana.edu, or give us a call at (406) 994-3532.
Students head to classes at the Bozeman campus.
Photo by Kelly Gorham.
STUDENT LIFE

For the most up-to-date catalog information:
www.montana.edu/wwwcat

HOUSING

Residence Halls
Montana State University offers convenient and affordable on-campus housing for up to 3,200 students. The Residence Life Department is committed to providing an environment which is socially stimulating while enhancing the academic experience of the students who live on campus.

Application for Housing
Apply online at www.montana.edu/reslife.
To request a paper application contact:
Residence Life and University Food Services
Montana State University
Hedges Complex
P.O. Box 172080
Bozeman, MT 59717-2080
Email: housing@montana.edu
Phone: 406-994-2661

Students with fewer than 30 earned credit hours (while in a residence hall setting) are required to live in the residence halls.
Prospective students are urged to submit an application at the earliest possible date since assignments are made in the order they are received based on the date of receipt. A limited number of private rooms are available.

Exemptions from On Campus Living
All incoming freshmen with fewer than 30 credits earned in a residential setting are required to live on campus for their first two academic semesters. However, there are some criteria that, if met, may qualify a student for an exemption from living on campus.
Qualifications for exemption are as follows: (1) Married; (2) Single Parent; (3) Have completed one full academic year at MSU; (4) Have completed one full academic year at another college/university; (5) Have a special hardship; (6) Will be living at home with an immediate family member (mother, father, brother, sister); (7) Will be taking fewer than six credit hours; or (8) Have other extenuating circumstances.
To initiate the exemption process, you must submit the required written documentation. This must be received by the Residence Life Office prior to the academic period requested. Exemptions received after the start of any term will be considered, but rarely approved.
Part time students (3 - 11 credits) wishing to live on campus may be granted a waiver. Please contact the Residence Life Office at 406-994-2661 for more information.
The specific opening/closing dates for the residence halls will be sent to students with their room assignments. If this information is needed earlier, please contact the Residence Life Office at 406.994.2661, housing@montana.edu or www.montana.edu/reslife.
The residence halls will be closed during Thanksgiving Break, Winter Break, and Spring Break. Students may request University housing during break periods for an additional fee.
Roskie Hall, Johnstone Hall, and the North Hedges Suites will remain open to accommodate students requesting break housing. Students not currently living in one of the previously mentioned halls will be required to move to an unoccupied room in one of the breaking housing halls. Other halls will only remain open based on the discretion of the Residence Life Administration. Guests are not allowed during break periods.
Prepayment
A $200 prepayment is required when submitting a Residence Hall Application. The University will not process housing requests until the student has submitted a completed housing application and the $200 nonrefundable prepayment. The $200 will be applied to the total housing costs upon payment of fees.

- 31

STUDENT LIFE

For the most up-to-date catalog information:
www.montana.edu/wwwcat

HOUSING

Residence Halls
Montana State University offers convenient and affordable on-campus housing for up to 3,200 students. The Residence Life Department is committed to providing an environment which is socially stimulating while enhancing the academic experience of the students who live on campus.

Application for Housing
Apply online at www.montana.edu/reslife.
To request a paper application contact:
Residence Life and University Food Services
Montana State University
Hedges Complex
P.O. Box 172080
Bozeman, MT 59717-2080
Email: housing@montana.edu
Phone: 406-994-2661

Students with fewer than 30 earned credit hours (while in a residence hall setting) are required to live in the residence halls.
Prospective students are urged to submit an application at the earliest possible date since assignments are made in the order they are received based on the date of receipt. A limited number of private rooms are available.

Exemptions from On Campus Living
All incoming freshmen with fewer than 30 credits earned in a residential setting are required to live on campus for their first two academic semesters. However, there are some criteria that, if met, may qualify a student for an exemption from living on campus.
Qualifications for exemption are as follows: (1) Married; (2) Single Parent; (3) Have completed one full academic year at MSU; (4) Have completed one full academic year at another college/university; (5) Have a special hardship; (6) Will be living at home with an immediate family member (mother, father, brother, sister); (7) Will be taking fewer than six credit hours; or (8) Have other extenuating circumstances.
To initiate the exemption process, you must submit the required written documentation. This must be received by the Residence Life Office prior to the academic period requested. Exemptions received after the start of any term will be considered, but rarely approved.
Part time students (3 - 11 credits) wishing to live on campus may be granted a waiver. Please contact the Residence Life Office at 406-994-2661 for more information.
The specific opening/closing dates for the residence halls will be sent to students with their room assignments. If this information is needed earlier, please contact the Residence Life Office at 406.994.2661, housing@montana.edu or www.montana.edu/reslife.
The residence halls will be closed during Thanksgiving Break, Winter Break, and Spring Break. Students may request University housing during break periods for an additional fee.
Roskie Hall, Johnstone Hall, and the North Hedges Suites will remain open to accommodate students requesting break housing. Students not currently living in one of the previously mentioned halls will be required to move to an unoccupied room in one of the breaking housing halls. Other halls will only remain open based on the discretion of the Residence Life Administration. Guests are not allowed during break periods.
Prepayment
A $200 prepayment is required when submitting a Residence Hall Application. The University will not process housing requests until the student has submitted a completed housing application and the $200 nonrefundable prepayment. The $200 will be applied to the total housing costs upon payment of fees.

- 31

STUDENT LIFE

For the most up-to-date catalog information:
www.montana.edu/wwwcat

HOUSING

Residence Halls
Montana State University offers convenient and affordable on-campus housing for up to 3,200 students. The Residence Life Department is committed to providing an environment which is socially stimulating while enhancing the academic experience of the students who live on campus.

Application for Housing
Apply online at www.montana.edu/reslife.
To request a paper application contact:
Residence Life and University Food Services
Montana State University
Hedges Complex
P.O. Box 172080
Bozeman, MT 59717-2080
Email: housing@montana.edu
Phone: 406-994-2661

Students with fewer than 30 earned credit hours (while in a residence hall setting) are required to live in the residence halls.
Prospective students are urged to submit an application at the earliest possible date since assignments are made in the order they are received based on the date of receipt. A limited number of private rooms are available.

Exemptions from On Campus Living
All incoming freshmen with fewer than 30 credits earned in a residential setting are required to live on campus for their first two academic semesters. However, there are some criteria that, if met, may qualify a student for an exemption from living on campus.
Qualifications for exemption are as follows: (1) Married; (2) Single Parent; (3) Have completed one full academic year at MSU; (4) Have completed one full academic year at another college/university; (5) Have a special hardship; (6) Will be living at home with an immediate family member (mother, father, brother, sister); (7) Will be taking fewer than six credit hours; or (8) Have other extenuating circumstances.
To initiate the exemption process, you must submit the required written documentation. This must be received by the Residence Life Office prior to the academic period requested. Exemptions received after the start of any term will be considered, but rarely approved.
Part time students (3 - 11 credits) wishing to live on campus may be granted a waiver. Please contact the Residence Life Office at 406-994-2661 for more information.
The specific opening/closing dates for the residence halls will be sent to students with their room assignments. If this information is needed earlier, please contact the Residence Life Office at 406.994.2661, housing@montana.edu or www.montana.edu/reslife.
The residence halls will be closed during Thanksgiving Break, Winter Break, and Spring Break. Students may request University housing during break periods for an additional fee.
Roskie Hall, Johnstone Hall, and the North Hedges Suites will remain open to accommodate students requesting break housing. Students not currently living in one of the previously mentioned halls will be required to move to an unoccupied room in one of the breaking housing halls. Other halls will only remain open based on the discretion of the Residence Life Administration. Guests are not allowed during break periods.
Prepayment
A $200 prepayment is required when submitting a Residence Hall Application. The University will not process housing requests until the student has submitted a completed housing application and the $200 nonrefundable prepayment. The $200 will be applied to the total housing costs upon payment of fees.

Prepayment Forfeiture
Failure to occupy the room or cancellation of the contract before or during the contract period will result in the forfeiture of the $200 prepayment.

Residence Hall Association (RHA)
All students residing in the residence halls are members of the Residence Hall Association. Organized on floor, hall, and interhall levels with programming, judicial, and governmental committees, RHA strives to uphold and promote the interests of students residing in the residence halls and to provide an active voice in residence hall administrative policy and operating procedures.

Living Options
There are many living options available that encompass academic and social enrichment for our residents; however, living options do change from year to year, based on student need, academic interest areas, and national trends. Our current living options are listed below:
1. Male Hall (Langford)
2. Female Hall (Hapner/Hannon)
3. 21 and older building (Johnstone)
4. Co-ed Hall: Co-ed living environments are comprised of both men and women living on either separate floors or wings of the same hall (Mullan, South and North Hedges, Roskie, Johnstone.)
5. Freshmen Year Experience Floor: Housed in South Hedges, this co-ed option is open to students enrolled in the University Studies program. Resident Advisors integrate course curriculum into floor activities and programs.
6. Outdoor Pursuits: Housed in Roskie, Hapner and Langford, these floors provide an excellent living environment for students interested in experiencing additional outdoor recreational opportunities.
7. Academic Theme Floors: Dedicated to academic success, Residence Life offers floors designed to assist students with common majors. Currently, Nursing, Business, Arts and Architecture, Science, and Engineering floors are scattered throughout all seven halls.

8. Double as Single Floors: Designed for students who have already experienced the roommate living arrangement, double as single floors offer students a more private atmosphere.

9. Deluxe Floors: Roskie Hall is the home of two newly remodeled sophomore and above floors. These floors consist of single rooms with the same square footage as a double room in Roskie.

10. Sophomore and Above Floors: This quiet, yet active, living option provides an opportunity for those students who want a change of pace from the traditional freshmen energy.

11. Sophomore Year Experience: Designed to meet the needs of all second year students by creating programs that deal directly with the issues they are currently facing.

Please visit the Residence Life web site www.montana.edu/reslife, contact the Residence Life Office at 406.994.2661 or email housing@montana.edu for the specific halls and floors which provide the living options outlined above.

Residence Hall Visitation Policy
Members of the opposite sex may visit in the privacy of individual rooms. Cohabitation is prohibited. • Definition of a resident, as it pertains to this policy: A student who has contracted with the university to live in a specified hall/room for a designated period of time.

• Definition of visitor: Visitors are in the room for less than overnight periods. They may use the facilities in a manner in which they would not be considered regular hall residents. They do not sleep in the room. Visitors are subject to university regulation.

• Definition of guest: Guests pay room rental fees and are provided facilities and sleeping accommodations for a period not to exceed three (3) days. Guests are considered hall residents for the duration of their stay and are subject to university regulations.

In an effort to accommodate a variety of student lifestyles, the residence halls offer twenty-four hour visitation, in which residents may have visitors at their discretion and with the consent of their roommate.

Board Charges and Meal Plans
All residence hall students are required to participate in a meal plan. Meals are not served in the residence halls during Thanksgiving Break, Winter Break and Spring Break; which is reflected in the meal pass charges. Meal plans available for residents living in the halls are outlined below.

Meal Plan Options: Residence Hall students have two meal plans from which to choose. The meal plans are designed to offer students the flexibility and freedom to eat when, where, and what they want while on campus. Both plans allow unlimited entry into the dining rooms and unlimited food servings. The dining rooms are open from 7 a.m. to 7 p.m. daily, and residence hall students can come in whenever they want, whether it is for a full meal or just a snack. In addition, students have a food cash account of $100 (Flex Money) that comes with their meal plan (unless they opt out of it). By using this food cash account at any of the food service locations on campus, students receive a 10% discount on their purchases.

Choosing A Meal Plan: Students can choose either a 7-day or a 5-day meal plan. Both plans offer the same options and services except the 5-day plan does not allow students to use the dining rooms on the weekends. The 7-day plan offers the greatest value to students.

Semester Charges
Prices for the current academic year/semester can be obtained through the Residence Life web site www.montana.edu/reslife.

In addition to these meal plans, off-campus students (only) have the option to purchase a variety of meal plans with five, seven, ten, or fourteen meals per week.

Pricing for additional room options are available at the Residence Life Office and University Food Service Office.

Note: Charges listed are estimates for the academic year/semester and are subject to change without notice.

Payment of Charges
Room rent, board, ResNet and the RHA social fee are paid in full at the beginning of each semester during fee payment. Installment payments for room and board must be arranged in advance with the Office of Student Accounts. There are no deductions for room or board for late arrivals (at the beginning of the semester) or for early departures (at the end of the semester).

Work Opportunities
For students needing to work while attending Montana State University, there are a number of employment opportunities available in residence halls, at front desks, and with the various food services on campus. Information regarding employment may be obtained by contacting the Residence Life Office and University Food Service. Work study/financial aid status is not necessary to qualify for student employment.

Facilities: Room Equipment and Furnishings
All rooms have closets, single beds, chests of drawers, study desks, waste baskets, chairs, and window coverings. The University supplies study lamps for students assigned to South Hedges, North Hedges, and Roskie. Each room is wired for cable television. A mattress pad and a pillow are provided for each student. Also, a linen service is available for residents, providing sheets and a pillow case. These items can be exchanged once a week for a clean set of linens. It is the responsibility of the residents to maintain order and cleanliness in their rooms.

ResNet
www.montana.edu/resnet

MSU ResNet is a campus network that provides a dedicated network connection for students living in the Residence Halls and Family & Graduate Housing. The direct network connection allows access to the Internet and campus resources easier and faster (about 300 times faster) than through conventional modem, without tying up the phone line. If you own a computer or plan to purchase one, you'll be able to browse the Web from the comfort of
your own room. ResNet is available as part of your room and board plan. For those residents not bringing a computer to school, ResNet also provides computing facilities with ResNet access, Microsoft Office software and high speed printing in six computer labs located in the Residence Halls.

Laundry
Laundry rooms exist in every hall with the exception of the North Hedges Suites and are equipped with Cat Card operated automatic washers and dryers. Ironing boards and a limited number of irons are available at the hall desks.

Refunds of Room and Board Payments
Students who terminate class registration during a semester will receive a prorated refund of their board and room payments.

There are no refunds for early departures at the end of the semester or late arrivals at the beginning of the semester. Rooms are held until the first hour of classes on the first class day of the semester.

A student who is absent from his/her residence hall for one or more weeks of consecutive meals due to his/her own illness or participation in University-sponsored activities will be refunded board at $2 per meal, provided the student notifies the University Food Services Meal Pass Office in advance of the University-sponsored activity. Requests for refunds based on absence due to illness must be submitted to the Residence Life Office, accompanied by a statement from the Director of Student Health Services, or the student’s own doctor, indicating required hospitalization or home care.

Personal Funds and Property
Students are urged to help safeguard their personal funds by establishing local checking accounts. All other valuable personal property should be adequately protected. Montana State University is not insured nor responsible for the loss or destruction of any personal property of students. Students are encouraged to carry their own personal property insurance. Montana State University has strict regulations regarding firearms on campus; contact the Office of Residence Life for details.

Family & Graduate Housing
The Family & Graduate Housing Office is pleased to offer convenient affordable housing as a service to enable families, married couples, graduate students, second degree undergraduates, single parents, single upper classmen with 75 credits or more, and those in a legally dependent relationship to continue their education.

Family & Graduate Housing consists of 704 units in one, two, and three bedroom apartment/house configurations in eight different communities, located both on campus and within walking distance to all campus buildings and amenities. While each apartment complex varies, available options include: smoking and nonsmoking units, washer/dryer hookups, free laundry (in apartment complexes without washer/dryer connections), ResNet connection, dishwashers (in several Julia Martin and Branegan units), storage areas, playground equipment, picnic tables, barbecues, and cable Television.

Apartments rent for considerably less than the “current market rate” in Bozeman. In addition, basic utilities are included in all units except McIntosh, Paisley, and the West Side Houses. Water, sewer, and garbage are included in the rental price of all units.

As a benefit to our residents, the Family & Graduate Housing Office offers a variety of services to assist with making the transition to campus-life: a newsletter is published twice-monthly to inform residents of upcoming campus and community events; a computer lab is available; a staff of part-time student community assistants (CAs) are available to answer questions; a full-service Day Care Center is available for children 2-1/2 years through kindergarten within walking distance of ASMSU Daycare; a mediation program is available to assist with conflict resolution; children’s seasonal events are planned throughout the year; a staff of skilled craftsmen are available to assist with any maintenance problems; a 24-hour call-out service is available to assist with emergencies.

To receive a brochure, application, or to inquire about Family & Graduate Housing’s eligibility requirements, please contact:

Family & Graduate Housing Office
1502 West Garfield
Bozeman, MT 59714
406-994-3730

Email: fgho@montana.edu
www.montana.edu/fgh

MSU Family & Graduate Housing provides an equal housing opportunity. Discrimination based on race, color, national origin, religion, creed, physical or mental disability, gender, marital status, familial status, or age is prohibited.

STUDENT ACTIVITIES AT MSU

Student Activities Office
The Student Activities Office (SAO) is located in 282 SUB (406-994-3591) and on the Web at www.montana.edu/vo/vo/stuac. SAO’s mission is to provide assistance and advice to the individual student, approximately 180 registered student organizations, the ASMSU Campus Entertainment staff, and the ASMSU Homecoming chairpersons. Assistance is available in planning and developing programs and activities directed toward meeting the wide variety of interests of the students and the University community.

Day of Student Recognition
Day of Student Recognition is a campus-wide awards ceremony recognizing students for outstanding achievements in both scholarship and leadership. Awards and scholarships presented at this program are sponsored by MSU academic departments, on- and off-campus organizations, alumni and friends of the University, and Student Activities. For further information contact the Student Activities Office.

Student Organizations
On average, there are over 180 student organizations at MSU which reflect a myriad of facets of campus life. Student organizations register each year with the Student Activities Office. Approved registration permits an organization to hold meetings in the Strand Union and to use its facilities for fundraising events. The Director of Student Activities serves as a resource to campus student organizations.

University-Wide Scholastic Honorary
Alpha Lambda Delta is a national scholastic honor society for freshmen whose grade-point average is 3.5 or better.
Mortar Board is a national senior honorary. Members are elected in the spring of their junior year. Scholarship, leadership, and participation in activities are the basis for election.

Phi Kappa Phi is a national honor society for faculty and students. Senior students are elected to membership on the basis of scholarship and leadership attainments. Top ranking junior students are also eligible.

Golden Key National Honor Society honors academic excellence.

Septemvari is a local honor organization of seven top seniors selected on the basis of grades, activities, and contributions to the university during their junior year.

Other Honor Societies

There are a number of national honor societies whose membership is limited to students in specific fields of study: Alpha Kappa Delta (sociology), Alpha Zeta (agriculture), Kappa Kappa Psi (band), Kappa Delta Pi (education), Phi Alpha Theta (history), Sigma Lambda Chi (construction), and Sigma Theta Tau (nursing).

Service Organizations

Circle K: Sponsored by the Kiwanis Club, Circle K serves the campus and community. Membership is open to all interested MSU students.

Arnold Air Society: This nationally affiliated service organization offers services to the campus and community. Male and female students enrolled in Air Force ROTC are eligible for membership.

Social Sororities and Fraternities

The international/national women’s sororities at Montana State University are Alpha Gamma Delta, Alpha Omicron Pi, Chi Omega, and Pi Beta Phi.

International/National men’s fraternities include Alpha Gamma Rho, Kappa Sigma, Pi Kappa Alpha, Sigma Alpha Epsilon, Sigma Chi, and Sigma Phi Epsilon.

The Interfraternity Council for men and the Panhellenic Council for women, composed of representatives from each sorority/fraternity organization, serve to coordinate activities of the Fraternity and Sorority Community.

A student is eligible for recruitment who 1) has been officially admitted to MSU in good standing, or 2) has attended MSU or another institution and obtained twelve credits with at least a 2.0 grade-point average the previous semester. Individual sororities and fraternities may set higher requirements.

Sororities and fraternities hold recruitment at the beginning of fall semester. Informal recruitment continues during each academic term.

ASMSU Administration and Student Government

About ASMSU

www.montana.edu/asmsu

The Associated Students of Montana State University (ASMSU) provides numerous services to its student members, who pay the student activity fee. ASMSU is the voice for student concerns to the MSU Administration, the Montana University System, the Board of Regents, the Montana Governor and Legislature.

The Senate, the legislative governing body, consists of twenty-one students. The Senate annually allocates the student activity fee moneys to twenty programs. The programs are administered by an elected student body president and vice-president, and a business manager, who is appointed. ASMSU hires approximately 250 students a year. An educational experience in responsible management of student funds, knowledgeable decision making, and representation of student concerns, as well as experience in working with people, may be acquired through involvement in ASMSU.

The ASMSU Office is located in Room 221 Strand Union Building (SUB) and provides a variety of services to students such as notaries, various pamphlets, and information about our programs. For more information about all the programs, call 406-994-2933 or visit our website at www.montana.edu/asmsu.

ASMSU Legal Services

www.montana.edu/asmsu/legal.html

A full-time attorney is retained by ASMSU to provide legal advice, some limited representation and referral on student issues outside of MSU, such as traffic tickets, landlord/tenant disputes, divorces, name changes, and simple wills at a reasonable cost. Legal Services is located in the ASMSU office. For information and to make an appointment, call 406-994-2933.

ASMSU Sustainability Center www.montana.edu/greenasmsu

The student government office for sustainability at MSU engages students in the process of making the university more environmentally and socially responsible. The Center offers student employment and internship opportunities developing outreach programs, events, and strategic initiatives in addition to ongoing services, such as recycling.

Streamline Transit www.streamlinebus.com

A public bus system provided through a student fee. Commuter route buses arrive throughout the day in front of the Strand Union Building. Shuttle route buses also provide transportation to the downtown business area and the Main Mall. Schedules are available at the ASK-US Desk and the ASMSU Office. For further information, call 406-587-2434 or visit www.streamlinebus.com.

Streamline Latenight

This program coordinates with Streamline Transit to provide late night transportation Thursday, Friday and Saturday from 8 P.M. to 3 A.M. For further information call 406-994-5800 or visit www.streamlinebus.com.

ASMSU Day Care Center www.montana.edu/asmsu/daycare.html

The Day Care Preschool is supported by ASMSU and the University. It is located in the Family and Graduate Housing Louise Shunk Daycare Community Center. Children aged 2 ½ until entrance into kindergarten, of MSU students, staff and faculty are eligible, with priority given to students. Applications are available in SUB 221, on the ASMSU website or call the Day Care Center at 406-994-4370 for more detailed information.
ASMSU Exponent
http://msuexponent.com/

The ASMSU Exponent, an independently student-run newspaper, is published weekly during the academic year. The ASMSU Exponent and is produced by and for the students of Montana State University. Student positions offer experience in publication design, professional editing, journalistic writing, advertising, and web page design, and professional management. Call 406-994-2224 or email the editor at editor@exponent.montana.edu for more information.

Homecoming

A highlight each autumn is the Homecoming celebration. The ASMSU Homecoming committee, advised by the Office of Student Activities, organizes the student barbeque, morning parade and king-queen competition as well as several other events.

Spirit

The Spirit chair helps organize the Homecoming celebration and Cat/Griz events. Homecoming and Cat/Griz events include the student barbeque, the bonfire, the Saturday morning parade and king-queen competition as well as several other events. Spirit also works with Service Saturdays, helps with the Red Cross and United Blood Services blood drives to provide service opportunities on campus.

Recreational Sports and Fitness
www.montana.edu/wwwimrec

The ASMSU Intramurals and Recreation office is located in 202 Shroyer Gym. Objectives of the program are to provide activities which promote physical fitness, social contact, improved self-esteem, and foster a permanent interest in wellness through organized recreation. The program provides opportunities for participation in both team and individual sports, offering about seventy different activities throughout the academic year. Currently over eighty percent of the student body takes advantage of this program! Call 406-994-5000 for more information or check out our Web page at www.montana.edu/wwwimrec.

The ASMSU Recreational Sports and Fitness program is located in room 120 in the newly remodeled Hosaeus Fitness Center (HFC). Students taking 7 credits or more may access the HFC and participate in the Intramural Sports and Open Recreation Programs with no additional fees. Other programs include Personal Training, Group Fitness (75 classes per week), and the Instructional Program. The HFC features 6 gymnasiums, 9 racquetball courts, 4 Group Fitness rooms, a combatives room, a 14,000 sq. ft. fitness area with 70+ cardio machines, a running track, a bouldering gym and more. For more information, please call 994-5000.

ASMSU KGLT
KGLT fm is a non-commercial, alternative public radio station broadcasting from the campus of Montana State University since 1968. KGLT offers diverse, music-based programming with a staff of 80+ volunteer DJs comprised of students, staff and community members and provides DJ opportunities by offering an apprentice class three times per year. KGLT produces 2,000 public service announcements yearly and is the Emergency Alert System for Gallatin County. The station is supported by ASMSU, Federal and Private Grants, listeners and local businesses. More information on the web at www.kgltnet.

ASMSU Outdoor Recreation Center
www.montana.edu/outdoorrecreation

The ASMSU Outdoor Recreation Program offers a variety of services including equipment rental, group outings, resource area, bicycle & ski workshop, non-credit instructional classes and other activities. The Outdoor Recreation Center is located on West Lincoln Street, adjacent to the Rosie Hall parking lot and the Intramural Fields. Further information may be obtained at 994-3621 or www.montana.edu/outdoorrecreation.

ASMSU Campus Entertainment

Campus Entertainment (CE) is located in Room 282B SUB (406-994-4839). The mission of ASMSU Campus Entertainment is to enhance the social, cultural, and educational opportunities for students and the University community through innovative and entertaining activities and programs. Serving as a programming resource for the University, Campus Entertainment often partners with campus organizations and departments to sponsor a variety of events and activities. Committed to the development of leadership and citizenship among students, Campus Entertainment strives to promote excellence in student activities programming.

ASMSU Campus Entertainment offers the following services:

- ASMSU Concerts: is a committee designed to provide MSU students, staff, and faculty with a wide range of professional music and entertainment, including major recording artists and local talent. Phone 406-994-5821 for more information.
- ASMSU Comedy Spotlight: is responsible for laughter! Shows range from stand-up comedy routines and big-name comedians to FUN interactive events that have been successful in the past. Take a break from studying and come join us for a few laughs! Phone 406-994-1829 for more information.
- ASMSU Lively Arts/Lectures: provides culturally oriented entertainment ranging from solo classical instrumentalists to modern theater and dance companies. Local, regional, and national acts with a variety of performance styles are showcased. Several nationally and regionally known speakers are sponsored each year. Activities may range from forums on controversial issues to educational and fun lectures. This committee’s purpose is to broaden the horizons of the students of MSU. Phone 406-994-5828 for more information.
- ASMSU Art/Events: is the committee in charge of promoting student art shows and events on campus. Art shows are designed to provide MSU students, staff, and community groups to display paintings, photographs, and sculptures of locally, regionally, and nationally known artists in the Exit Gallery (student run and funded) in the North West entrance at the base of the steps in the SUB. In addition, the committee also provides workshops and lectures by visiting artists and Upheaval, the student art show and sale during the spring semester. For more information contact exhibits@montana.edu or 406-994-1828.
- ASMSU Films: The Procrastinator Theater is MSU’s student-run second run theatre located in SUB 287. The Procrastinator shows movies six nights a week (closed Wednesdays for student and community groups to use the theatre) during the academ-
ic year, with two films nightly. All movies are $2. For more information on theater rental, contact MSU Conference Services in room 280F of the Strand Union Building or by phone at 406-994-3081. Or you can contact the Procrastinator Theatre director at: films@montana.edu. The “Movie Hotline” number is 406-994-3312.

- ASMSU Technical Services: provides lighting and sound reinforcement equipment and a technical work force to ASMSU programs, university functions, and to anyone else affiliated with the University who may need such equipment or expertise. Phone 406-994-5823.

ASMSU Public Relations

ASMSU Public Relations has the purpose of increasing the communication between ASMSU, the community and the students we serve. PR provides informational advertising for ASMSU on the pack page of the Exponent, promoting ASMSU at MSU Fridays during the school year. The committee’s main purpose is to convey ASMSU awareness and inform the student body of the operations of ASMSU. The PR Committee is located in 325 SUB, 406-994-5824.

ASMSU State Legislature Committee

ASMSU ensures that student voices and concerns are heard and acted upon by the MSU administration, the local community, the Board of Regents, and the State of Montana. The ASMSU State Legislature committee exists primarily to lobby the state legislature. Student input is always welcomed, particularly during state legislative sessions. Students interested in serving on this committee should contact the ASMSU Senate Office in 281 SUB, 406-994-2933.

ASMSU Community Outreach

An awareness group run by students for students, Wellness offers information on date rape, drug and alcohol abuse, as well as opportunities for student involvement. Community Outreach also helps organize multiple blood drives throughout the year and works with the Gallatin County DUI task force. Many Wellness employees and volunteers receive college credit. Peer Education Internships are also available. For more information call 406-994-5800.

ASMSU Leadership Institute

www.montana.edu/leadership

The Leadership Institute is charged with providing leadership opportunities and inspirations to MSU students. The Institute works towards developing leaders and problem solvers who effectively empower both self and others. Our objective is to work on a system wide basis providing, coordinating, planning and organizing leadership opportunities for students, faculty, staff and community members throughout MSU and Montana. For more information call 406-994-7275 or visit www.montana.edu/leadership.

INTERCOLLEGIATE ATHLETICS

www.msubobcats.com

Montana State University Department of Intercollegiate Athletics strives to foster excellence in academic and athletic performance while providing excitement and pride on-campus and among all who support the University. MSU sponsors 16 sports and is a NCAA Division I member institution, with football competing in the Football Championship Sub-Division (FCS). The department offers a variety of ways for all students to enhance the college experience through supporting the Bobcats, either as a participant or a fan.

Montana State is an active member of the Big Sky Conference where it has the opportunity to participate in the following Championships: Football, Men’s and Women’s Basketball, Women’s Volleyball, Men’s and Women’s Cross Country, Men’s and Women’s Indoor Track & Field, Men’s and Women’s Outdoor Track and Field, Men’s and Women’s Tennis, and Women’s Golf. Men’s and Women’s Nordic and Alpine Skiing participate in the Rocky Mountain Intercollegiate Skiing Association. Bobcat Athletics also sponsors Spirit Squad and has teams in both cheer and dance.

Montana State University is committed to promoting student-athlete well-being, ethical conduct, sportsmanship, equal opportunity, and financial responsibility while striving to be the best in the Big Sky Conference. Traditionally, MSU hosts the largest home crowds within the conference supported by both the student body and the Bozeman and statewide community and annually finishes near the top of the Big Sky Conference’s All Sports Trophy which acknowledges the best overall athletic program in the Big Sky by measuring athletic and academic success.

In pursuit of athletic excellence, Bobcat Football was Big Sky Conference Co-Champions in the sport of Football in 2010 and 2011. Women’s Basketball finished as Big Sky Conference runners-up in 2010 and Men’s Cross Country finished second at the Big Sky Championship in 2011.

Student-Athletes and the entire department are strongly committed to giving back to the community. Student-athletes can often be found in the local schools and at community organizations and events promoting local causes.

Bobcat Athletics strives to develop campus leaders and engaged student-athletes. The department provides support programs designed to enhance the student-athlete experience by supporting the academic, athletic, and personal growth of all student-athletes. The department has an Athletic Academic Center, Strength and Conditioning program, and Sports Medicine Program designed to assist student-athletes in these areas.

To learn more about Bobcat Athletics, please visit www.msubobcats.com. Students may attend Bobcat Athletic home events for free by presenting a valid one-card. GO CATS!

MUSIC

www.montana.edu/wwwmusic

Opportunities exist for all interested students to participate in a variety of ensembles and classroom activities in the Department of Music. Many music courses are specifically designed for non-majors and several satisfy University Core requirements.

Department of Music concert ensembles are open to all university students, some through audition. Three choral ensembles—The Montanans, Chorale, and University Chorus—provide performance opportunities for vocalists. Instrumentalists may choose from five performing bands—Wind Ensemble, Symphonic Band, Marching Band, Jazz Lab I, and Jazz Ensemble II; two orchestras—Chamber Orchestra and the Bozeman Symphony Orchestra; a
performed by one of our two offices, SUB 286 or 331 Culbertson Hall, or check us out on the web at www.montana.edu/community. We love to work with and support students in service to others.

COMMUNITY INVOLVEMENT
www.montana.edu/community

Did you know that MSU is designated by the Carnegie Foundation for Teaching and Learning as a Community Engaged Campus? This is a big deal and means that we take our role as a community resource very seriously. Each year the OCI helps to connect thousands of MSU students with volunteer, internship and work-study opportunities in the Bozeman area non-profit community, across the state of Montana and the nation. The annual “Community Involvement Fair” event held each September brings up to 40 non-profit organizations to campus to solicit student assistance in addressing an array of pressing community needs. In addition the Office for Community Involvement:

- Coordinates the MSU America Reads*America Counts tutoring program in pre-K through 8th grade classrooms working with and supporting area youth to achieve and succeed academically.
- Sponsors a Fall Kick-Off Trails Project for the “M” Restoration on Mount Baldy.
- Hosts monthly Service Saturdays so that students can serve 2-4 hours with local non-profit groups to meet one time needs.
- Helps MSU students prepare to become a part of the AmeriCorps program. In AmeriCorps, students become a part of a movement, learning and serving in their community and becoming eligible for an education award upon successful completion that can be used to help finance their higher education pursuits.

By taking the time to become engaged with the community while studying at MSU, students meet other amazing students and community members, have the opportunity to hone your leadership skills, are able to explore career options and apply their classroom knowledge in the real world.

If you’d like more information about any of the programs described here or the office in general please contact the MSU Office for Community Involvement by calling 994-6902, email us at community@montana.edu, come to one of our two offices, SUB 286 or 331 Culbertson Hall, or check us out on the web at www.montana.edu/community.

STUDENT SERVICES

Office of the Dean of Students
www.montana.edu/wwwds

The Dean of Students office acts as an advocate for students, consults and works with individual students and student groups, and works with other campus offices in creating a sense of community at MSU. Assistance is available on a “drop-in” basis or by appointment. A few of the services available are:

- Processing withdrawals from the university
- Consulting with students to help mitigate conflicts on campus
- Supporting MSU’s fraternities and sororities
- Supporting MSU’s parent and family relationship program
- Coordinating conduct hearings
- Providing general information or assistance
- Administering and interpreting the Student Conduct Code

The Office of the Dean of Students is located in SUB room 174. Call 406-994-2826 for more information.

Diversity Awareness Office
www.montana.edu/diversity

The Diversity Awareness Office (DAO) provides information and support to the entire university community in the areas of multicultural awareness and community building, prejudice education and practical resources relating to diversity issues. In its outreach programs the DAO sponsors, produces and promotes events that encourage and foster diversity awareness around issues of gender, class, religion, sexual orientation, and ethnicity. Awareness of diversity is examined through lectures, movies, discussion groups, and social events. The DAO provides a safe supportive environment where students can begin to understand the diversity they face on campus as well as the larger global community.

THEATRE ARTS
www.montana.edu/art

Generally two mainstage productions and two student-produced Underground Theatre productions are presented each academic year through the theatre arts production program. In addition, MSU provides the home base for Montana Shakespeare in the Parks during the summer months.

Theatre Arts is under the direction of an academically and professionally qualified faculty. Any enrolled student is eligible to participate in theatre arts productions regardless of major, providing the student has the interest, ability, and sufficient time. For students who are interested in pursuing theatre arts on an academic basis, a Bachelor of Arts in Film and Photography is offered. Information regarding the theatre arts production and academic programs can be obtained from the department office in the Visual Communication Building, 406-994-2484 or visit www.montana.edu/art.
Part of the vision of the DAO is to also foster and support the growth of understanding and tolerance of difference throughout the university and in the surrounding community. We see the existing diversity as a valuable resource towards this goal, and seek to involve students in all steps of the process. From this, we hope to add to the leadership skills of those students interested in the processes of educating and raising visibility and understanding of difference and multiple perspectives.

Working with students groups, departments and community members, the DAO sponsors lectures, activities and events to address issues of diversity on campus, within the state and in the world at large. The office also coordinates the Safe Zone program at MSU. For more information, please visit www.montana.edu/diversity or visit us in Strand Union room 284.

Women's Center
www.montana.edu/wwwwomen

The Women's Center is open to all students, faculty and staff, and community members considering returning to school, and facilitates student and academic success at MSU through involvement with educational co-curricular programs and services. Located in room 372 of the Strand Union Building, the Center is open 9 a.m. to 4 p.m., Monday through Friday when school is in session. Services and resources include: weekly Sack Lunch Seminars, events celebrating National Women’s History Month, the Women and Their Futures film series, the Shannon Weatherly Memorial Lecture Series, a quarterly newsletter, a lending library with resources addressing women’s and gender concerns, career and scholarship information, and various other resources and programs. The Women’s Center also offers volunteer and internship opportunities.

New Student Orientation
www.montana.edu/admissions/orientation

All new students are required to attend an Orientation/Registration session. Summer Orientation Programs are offered to new freshmen and transfer students. Programs for freshmen, transfers, and graduates are offered prior to each semester. Orientation assists students in course selection and registration, and location and use of campus facilities and services. It also highlights University academic assistance and special service programs as well as recreational and social programs. We believe that Orientation assists all new students in their transition to MSU and increases their chances for academic success.

Upon acceptance to MSU, all students receive information on the Orientation Program. All new students pay a one-time New Student Fee of $65. All new transfer students pay a one-time New Transfer Student Fee of $50. This fee is included on the fee statement of the first semester in which a student attends MSU. Contact the Orientation Office at 406-994-2827 or visit www.montana.edu/admissions/orientation for more information.

Counseling and Psychological Services
www.montana.edu/wwwcc

Counseling & Psychological Service (CPS) provides free, confidential counseling to eligible MSU students. CPS see approximately 900 students each year for a variety of concerns, including adjustment difficulties, academic struggles, depression, anxiety, relationships, substance use, eating disorders, current/past trauma or abuse, problematic behaviors, identity concerns or sexual health/safety issues and couples/relationship counseling.

In addition to counseling services, CPS staff is available to speak on an array of topics of general interest to the college population, such as time/stress management, wellness, healthy relationships, and awareness/prevention of depression, anxiety, substance use and suicide. They also provide consultation and training to student organizations, faculty and staff.

CPS is staffed by licensed psychologists and counselors, as well as advanced graduate students. On campus for over 20 years, the agency is accredited by the International Association of Counseling Centers and the training program is accredited by the American Psychological Association. For more information, see their website at www.montana.edu/wwwcc.

Strand Union
www.montana.edu/sub

The Strand Union Building (SUB) is truly the center of campus activity at MSU. The SUB provides daily services, amenities and out-of-the-classroom opportunities for informal interaction among members of the MSU community. The Strand Union strives to provide students with a space for personal development and fulfillment through opportunities in student government, community service groups, and employment as well as recreational events and activities. The SUB also fills the role of conferencing center for hundreds of meetings and conferences every year.

Focused on serving the needs of students, faculty, staff and guests to the university, the SUB offers two student managed, student staffed service centers: the Ask Us Desk and the Recreation Center. The Ask Us Desk is the information center for the building, connecting people to campus information, handling lost and found, stamps sales, affordable fax services, and is a Tickets West ticket sales outlet. Visit www.montana.edu/askus for MSU events and schedules, and other information.

The Recreation Center provides a social gathering place and stress relief with bowling, billiards, foosball, shuffleboard, big screen TVs, special late night events, Wii and Playstation 2, and of course, snacks! A limited number of lockers in the SUB are available for rental through the Rec Center. Each semester, bowling and billiard classes are offered and can be registered for through the Health and Human Development Department. For more information and hours, visit www.montana.edu/subrec.

The SUB Building offers meeting rooms (seating from 10-1,350) through Conference Services, and houses the MSU Bookstore, full-service banking, student lounges and a variety of ATMs. There are also copy and postal services and a FedEx drop box in the building. Strand Union Food Services include sandwiches and wraps at Avogadro’s Number, burgers and pizza from the Bobcat Court, delicious espresso drinks from S.R.O., treats and smoothies from The Sweet Shop and Freshens, a variety of other meal choices from the Union Market, and University Catering for special events.
The SUB is also home to the Associated Students of Montana State University (ASMSU Student Government, Campus Entertainment, the Exit Gallery, Student Legal Services, the Leadership Institute, KGLT Community Radio), Admissions, the MSU Veteran’s Center, the Office of Community Involvement, the Cat Card Office, Financial Aid, Copy Cats, the VOICE Center and the Procrastinator Theater. The Division of Student Success has the following offices and departments located in the SUB: The Vice President for Student Success, Dean of Students Office, Office of Students Success, Career Internship Services, First Year Initiative, Disability, Re-entry and Veteran Services, the Office of Student Activities, The Women’s Center and the Diversity Awareness Office.

The Strand Union Administration Office, located in room 223 (directly behind the Ask Us desk), houses the offices of the Director, the Marketing Manager and the SUB Administration Office Manager. Visit www.montana.edu/sub or call 406-994-3082 for more information.

**Cat Card**
www.montana.edu/catcard

The Cat Card is your MSU Student ID, an optional on-campus debit card, and after hour access card to the residence halls. The Cat Card also serves as a meal pass card and is used to gain entrance to Marga Hosaeus H&PE Center and student functions such as athletic events.

The magnetic strip on the back of the Cat Card contains information about the student’s current status. When swiped at various locations on campus, this information determines, if the student is permitted to participate in the services or activities at a specific location.

Deposits can be made at the Cat Card and Meal Pass Offices to use the card as an on-campus debit card. You can also manage your account and make deposits online at www.montana.edu/catcard. The Cat Card can then be used to make purchases in all food areas, MSU Bookstore, Health Service, Dental Service, Strand Union retail areas, copy machines, laundry machines in the residence halls, various vending machines, parking areas, and other areas on campus that accept Cat Cards.

Your Cat Card is your “key” to the campus. For more information about the Cat Card visit the Cat Card Office in the lower level of the Strand Union Building or call 994-CARD. You may also visit our Website at www.montana.edu/catcard.

**Career, Internship, and Student Employment Services**
www.montana.edu/careers

The Career, Internship, and Student Employment Services (CISES), located in the lower level of the Strand Union Building (177 SUB), offers a full range of career planning and employment services to students, alumni, the campus community, and employers. A primary goal of the office is to help students identify purposeful and fulfilling career paths and to gain experience and career skills which will clarify goals and facilitate entry into the job market. Students concerned about choice of major or career, have questions on career options, need job searching, or have graduate school questions should visit the office. To learn more about CISES you can also visit www.montana.edu/careers or call 406.994.4353. Main services are listed below.

**Career Fairs** - Annually, the office hosts at least four career fair events on campus. These include: Student Employment Job Fair, Fall Career Fair, “Almost” Spring Job and Internship Fair, and Montana Educators Fair. These career fairs offer networking opportunities for students and alumni in order to building relationships with employers and organizations.

**Workshops and Events** -The office offers a range of various events and workshops preparing students for the world of work by identifying their interests and matching them to exciting opportunities and career choices. Workshops and events include:
- Margaret Alderson Etiquette Dinner
- Careers in Demand Workshops
- Resume Critiques
- Resumes for Federal Jobs
- Discover Your Best Career
- Diversity Coffee
- What can I DO with a Major in…?
- Get Savvy with Your Job Search
- Help! I’m Still Undecided! Finding a Career That Matches Your Skills and Interests
- Mock Interviews

**Career Coaching** - Our professional and experienced career coaches assist individuals with choice of major, career opportunities, job search preparation, and career changes. The coaches utilize Career Assessments such as career interest inventories, computerized guidance systems and personality indicators in order to prepare the students for the world of work.

**Career Library** - A career library with job listings, an annual career survey of MSU graduates, career information, employer directories, literature, and graduate school information is available for use at our office. Students have access to public computers in the office where they may find online career information and employment resources.

**MyCatCareers.com** - This free job and internship portal is exclusively for MSU students and alumni where they may search for employment, internships, and other interesting opportunities. Employers access MyCatCareers.biz to post job openings and opportunities for students and alumni.

**Internships** - Through office resources, students are able to view and apply for internships in a variety of fields. In addition to listed opportunities, Graduate students interested in the career planning field may apply for an internship through the office. It is recommended that students complete an internship before graduation. Surveys conducted through the office indicate that the number one reason why a graduate gets a job is because of the valuable experiences they earned while interning in their area of interest.

**On-Campus Interviews** - The office also hosts on-campus interviews for summer opportunities, internship, and career positions with a variety of employers in business, industry, government, and education.

**Credential Files** - Teachers and graduate school candidates may set up credential files which contain personal, educational, and employment data as well as letters of recommendation. They may access and update this information for future employment and educational opportunities.
Office of Student Success  
www.montana.edu/success  

The Office of Student Success believes in students and their potential. Students who visit our office learn to take an active role in owning and directing their education and future. The Office of Student Success offers several programs and services aimed at helping students achieve success at MSU. These programs and services include:

First Year Initiative (FYI) - Through the FYI program, the Office of Student Success strives to make contact with all first year students through orientation information sessions, one-on-one advising meetings with our Student Success Advisors, workshops, our free tutoring program (SmartyCats Tutoring), and several grand scale campus events such as Legend of the Bobcat and the ChampChange Auctions. For more information visit www.montana.edu/success/fyi.php.

Second Year Initiative (2YI) - For some students, there may have been a few bumps on the road to success during their first year at MSU. 2YI is here to help second year students navigate through any rough spots they may have experienced in their freshman year, and get them “dialed-in” to the numerous campus resources available to support their academic careers. For more information visit www.montana.edu/success/2yi.php.

Beginning College Survey of Student Engagement (BCSSE) - Every entering freshman is required to take this survey, administered by the Office of Student Success, at their orientation session. We strongly suggest that students set up an appointment with a Student Success Advisor to interpret the results of this survey in order to learn how they can maximize their academic performance. Our Student Success Advisors will help students learn what it takes to be a successful MSU student.

Student Success Advisors - Our Student Success Advisors are expert learning strategists who meet one-on-one with students to teach them the tools they can use to improve their academic performance. Topics covered in meetings include:

- guidance on how to get organized  
- time management  
- how to improve grades  
- how to prioritize and meet deadlines  
- and many other areas that help keep students on the path to graduation

Students who meet with our Student Success Advisors are more self-aware of how they learn and how they can better themselves to ensure a successful academic career. Our Student Success Advisors are committed to assisting students and helping them get connected to the campus resources they need to utilize to be successful MSU students.

Student Early Alert System - Students are referred to our office a number of different ways, but the most often used mechanism is the Early Alert System. When faculty members are concerned about individual student’s classroom performance, attendance, or course progress, they can submit student names to our office through the Early Alert System. The Office of Student Success personally connects each referred student with their Student Success Advisor who will provide each student with tools to improve their performance and help them formulate a success plan for the remainder of the semester. Advisors can also answer questions about how academic performance may affect financial aid, living arrangements, and academic standing and get students pointed towards the right resources to address those concerns and achieve greater success at MSU.

Workshops - The Office of Student Success provides students with free workshops that will help them get organized, learn the ins and outs of MSU, and connect them to other students. These workshops include:

- Getting the Most Out of Lecture  
- Writing at the University Level  
- The Five Keys of Learning in College  
- Reading College Text  
- Managing Your Time and Study Environment  
- Conventions of U.S. Academic Writing  
- Listening, Note-taking, and Using Visual Organizers  
- Successful Communication Strategies with Your Faculty  
- Test Anxiety  
- And many more!

ChampChange - ChampChange is a program that rewards first time freshman and sophomore students for engaging in events and programs at MSU and the Bozeman community. Students can earn points by attending lectures, going to the Math or Writing Center, working out at the Fitness Center, attending a Residence Hall program, meeting with a Career Coach or Student Success Advisor, attending an MSU sporting event, voting in ASMSU elections, volunteering for service projects sponsored by the Office of Community Involvement, playing intramural sports, and meeting with a SmartyCats tutor. For a full list of ways to earn ChampChange, please visit www.ChampChange.com. At the end of each semester, freshman and sophomore students can participate in the ChampChange Auction for great prizes such as $1,000 tuition scholarship, TVs, mattresses, coffee makers, laptops, printers, cameras, game consoles, MSU apparel, and much more. For more information visit www.champchange.com.

SmartyCats Tutoring - The Office of Student Success offers FREE one-on-one and small-group tutoring to MSU students through the SmartyCats Tutoring Program for numerous courses including challenging courses such as Calculus, Statistics, and Anatomy & Physiology. Our SmartyCats Tutors offer an invaluable resource for students who need extra help in passing courses required for their programs and career goals. SmartyCats Tutors help students clarify points from lectures, labs, discussions, and assigned readings. Drop-in tutoring sessions are also available at convenient campus locations in key courses throughout the semester and prior to finals. To learn about our free tutoring program, please visit www.msusmartycats.com.

Return to Learn - Return to Learn is a program designed for students seeking re-admission to MSU after taking a leave of absence. Our Student Success Advisors will help these students navigate arranging financial aid, meeting with an academic advisor, re-registering for classes, finding tutoring, and much more. Student Success Advisors are assigned to each Return to Learn student and will periodically check in with them throughout the process, developing a relationship to ensure that their return to MSU is simple and seamless. For more information visit www.montana.edu/success/returntolearn.php.
Legend of the Bobcat - This freshman-only event is held every year at the beginning of the fall semester and is designed to welcome first year students and get them excited about their new community and home. The event begins with an exciting performance followed by a Montana Country Fair that is filled with fun games and activities where students can win prizes and mingle with their fellow MSU community members. Freshmen will not want to miss this event.

ChampChange Auction - First-time freshman and sophomore students can earn ChampChange points throughout each semester that they are eligible, and then can “spend” those points at the ChampChange Auction for prizes such as TVs, laptops, bikes, coffee makers, gaming consoles, cameras, and many other great items. The event is divided into two parts; the first is a silent auction followed by an exciting and fast paced live auction culminating with the grand prize of a $1,000 scholarship tuition gifted by the Office of Financial Aid.

MSU 101 - For students who know they can and want to do better; MSU 101 offers valuable insights on how to "turn lemons into lemonade." This workshop is offered several times each semester with the purpose of providing students with the tools they need to succeed at MSU. Faculty and staff members share their tips on how to reach goals – both inside and outside the classroom. Students will learn the necessary steps of getting back on track and are encouraged to take an active role in achieving their goals. We believe strongly in the usefulness of the MSU 101 experience, so much so that we will pay students to attend and participate in the event. To find out more, visit www.montana.edu/msu101.

We encourage students to stop by our office to learn more about all of the ways we can help them make the most of their time here at MSU. The Office of Student Success is located at 177 Strand Union Building. We can also be reached by calling 406-994-ROAR (7627), or by emailing us at success@montana.edu. We are a dedicated and knowledgeable resource ready and willing to support students at all points in their academic careers.

DISABILITY, RE-ENTRY, AND VETERAN SERVICES

Disabled Student Services
www.montana.edu/usuores/disability

Disabled Student Services personnel determine eligibility for specific disability accommodations, assure the provision of approved accommodations, and provide direction, advice, and referral services for persons with verified disabilities. Students seeking accommodations for a disability must request services through Disabled Student Services, 180 Strand Union Building. Voice phone - 406-994-2824, TDD - 406-994-6701, fax - 406-994-3943, email - DRV@montana.edu or byork@montana.edu.

Re-entry Student Services
www.montana.edu/usuores/reentry

Non-traditional-age students (25 and over) can find direction, support, and assistance in this office. Consumer information is available. Re-entry Student Services is located in 180 Strand Union. Voice phone - 406-994-2824, TDD - 406-994-6701, Fax - 406-994-3943, email - DRV@montana.edu or byork@montana.edu.

The Veteran Support Center
www.montana.edu/usuores/veteran

The Veteran Support Center provides service and assistance for veterans, dependents, and members of the guard and selected reserve who receive educational benefits from the U.S. Department of Veterans’ Affairs (DVA). DVA educational benefits recipients must have school enrollment certified each term by the MSU’s certifying official. Applications for the MUS Honorable Discharged Veteran Fee Waiver (see Special Exemptions for full fee waiver information) are also reviewed by the certifying official for approval. The Veteran Support Center is located in 185 Strand Union Building. Voice phone - 406-994-3661, TDD - 406-994-6701, Fax - 406-994-3943, email - vets@montana.edu or byork@montana.edu.

STUDENT HEALTH SERVICE
www.montana.edu/usuores

The Swingle Student Health Center is located at the east end of the Strand Union Building. The Student Health Service provides a wide range of outpatient medical care and health promotion services for MSU students and spouses. In addition to routine health care, the Student Health Service has a clinical laboratory, x-ray, pharmacy, and nutrition services. The Student Health Service is accredited by the Accreditation Association for Ambulatory Health Care and is a member of the American College Health Association. All MSU students who carry seven or more credits are charged the health fee each semester and are eligible for care at the Student Health Service. Students carrying fewer than seven credits and non-student spouses may also receive care at the Student Health Service if they pay the health fee. For more information call 406-994-2311.

Immunizations

All MSU students are required to show proof of current immunizations against the following vaccine-preventable diseases: measles, mumps, rubella (two doses of each unless born before 1957). New students must also complete the Student Health Service’s tuberculosis screening form. Students identified by the screening process as high risks for tuberculosis must be tested. Students will not be permitted to register for classes until the Student Health Services receives verification of immunizations, screening, and (if required) tuberculosis testing.

Medical Insurance Plan

Montana State University students who carry four or more credits are required to carry health insurance. Health insurance is available for all MSU students through a university-sponsored health insurance program. Students who have adequate health insurance may waive participation in the University plan.

Dental Clinic

The Dental Clinic is located at the south end of the Swingle Student Health Center. The Dental Clinic is a preventive and urgent care facility. Services include: check-ups, cleaning,
emergency treatment, consultations, and referrals. Some limited routine services can be provided as time permits. Treatment is by appointment only, except for emergencies which can be seen on a walk-in basis. Students who have paid the Health Service fee are eligible to utilize the clinic. Part time students taking fewer than seven credits may pay this fee optionally. For appointments or more information, phone 406-994-2314.

**Health Promotion**

The student Health Promotion program is a comprehensive set of evidence-based programs, activities and campaigns designed to enhance the academic, social and personal health of MSU students. Health Promotion utilizes a public health approach and works to create a safe, healthy and learning-conducive environment via policy, research, education, marketing and programming that focuses on known health risks among college students. Objectives include the reduction of harm associated with heavy alcohol, tobacco and drug use, violence, unsafe sexual practices and unhealthy eating. Efforts also involve promoting mental health, protective behaviors and healthy norms within the student population. Health Promotion involves students as paid interns and volunteers, and works collaboratively with other campus and community entities. For more information, call 406-994-7337.

**The VOICE Center**

[www.montana.edu/voice](http://www.montana.edu/voice)

This program is part of MSU Health Promotion with the goal of providing free confidential support, advocacy, and referral services to survivors of rape, sexual assault, relationship violence, and stalking. Trained student advocates and professional staff work with faculty, other campus professionals, and the Bozeman community to provide campus-wide advocacy and education. Services include walk-in hours as well as a 24-hour crisis line. Students of any age or gender are invited to stop in or call for information: 406-994-7069.

**GRAPHIC AND MEDIA SERVICES**

Several agencies on the University campus provide photography, design, printing, and copying services.

**Graphic Services**

Complete professional graphic design, typesetting, print production, photography, and darkroom services are available from MSU Creative Services, 427 Culbertson Hall, a branch of University Communications. Graphic and web design, scanning, and color output services are also available from Strand Union Graphics.

**Copying Service**

The Renne Library has a copy service in the basement and coin-operated copiers in lobby areas. Copy Cats and University Printing Services (see below) also offer complete copy services. Links: [www.montana.edu/copycats](http://www.montana.edu/copycats) and [www.montana.edu/cpa/printshop](http://www.montana.edu/cpa/printshop).

**Computer Services**

For student use, the Information Technology Center operates microcomputer facilities in Reid, Roberts, and Cheever Halls. A wide variety of software packages are available, including word processing, spreadsheets, database managers, and drawing and design packages.

**University Printing Services**

Located in the basement of Culbertson Hall, University Printing Services provides copying and a large variety of specialized printing services for all university departments, faculty, staff, students, and university organizations. University Printing Services strives to provide the highest quality printing and copying in a timely fashion at a price below on- or off-campus services. See [www.montana.edu/cpa/printshop](http://www.montana.edu/cpa/printshop) for more information.

**Audiotape Duplication**

The Multimedia Language Center in the Department of Modern Languages and Literatures can duplicate audiotape cassettes, provided the requestor has copyright permission to do so and supplies the proper cassette materials. Generally, there is one-day copy service.

**Audio Video Listening and Viewing**

The Renne Library has facilities for listening to audio cassettes, phonograph records, and compact discs, as well as viewing video cassettes and slides.

**Campus Post Office**

[www.montana.edu/wwwmail](http://www.montana.edu/wwwmail)

A full-service post office is located at Culbertson Hall on Harrison Street. All services are available Monday through Friday from 8:30 a.m. to 4:00 p.m. Stamp sales and a letter drop are available at ASK-US in the Strand Union; weekday pickup is at 8:45 a.m. and 2:00 p.m. A USPS mailbox with 3:00 p.m. Monday - Saturday pickup is located outside the Strand Union south entrance. Priority Mail, stamp sales, and a letter drop are available at Cards ‘N’ Copies, which has a 2:00 p.m. weekday pickup.

**Testing Service**

[www.montana.edu/wwwpare centers/testing](http://www.montana.edu/wwwpare centers/testing)

The Testing Service coordinates the scheduling and administration of national testing programs such as the College-Level Examination Program (CLEP), the ACT, Proficiency Examination Program (PEP), the General Educational Development Program (GED), Graduate Record Examination (GRE), Law School Admission Test (LSAT), Medical College Admission Test (MCAT), and the Graduate Management Admission Test (GMAT). The Testing Service proctors the High School Days scholarship test, correspondence course exams, and exams for professors and resource students with disabilities who qualify for special test considerations. Contact Testing Services at (406) 994-6984.

**UNIVERSITY REGULATIONS**

**Student Academic and Conduct Guidelines**

Montana State University expects each student to maintain acceptable standards of behavior on campus and in the community and to manifest a serious purpose by maintaining a satisfactory scholastic standing in the courses undertaken. No student who shows persistent unwillingness or inability to comply with these requirements will be permitted to continue his or her affiliation with the University.

A complete statement of the guidelines and procedures concerning academic integrity and student conduct is contained in the pamphlet titled: “Conduct Guidelines and Grie-
Montana State University to levy fines

The Board of Regents has authorized fines for conduct or scholastic reasons. Student use or possession of vehicles on campus, including bicycles, is not considered a criminal offense. The University reserves the right to revoke permits for vehicles operated or parked on the campus. The University is not responsible for the loss or destruction of any of the personal property of students.

Vehicles

All persons operating vehicles on the University campus should be familiar with MSU vehicle regulations, copies of which are available at the University Police Department, Roy Huffman Building, 7th and Kagy. Students, faculty, staff, and visitors must register any motor vehicles they park on the university campus for any reason.

The regulations are considered to be part of the terms and conditions of enrollment for students and of employment for staff members. Students must register their vehicles within one week after classes begin; faculty and staff must register within one week after beginning employment. A vehicle registration fee is payable at the time each vehicle is registered.

Registration is not considered complete until the registration decal is mounted on the left side of the rear bumper so that it is plainly visible from the rear. The registration decal designates areas in which the vehicle may be legally parked on campus.

All visitors are required to have a parking permit to park at Montana State University Monday through Friday, 6:00 a.m. to 6:00 p.m. Parking permits may be purchased at the Visitor Information Booth located at 7th and Grant or the University Police Department at 7th and Kagy.

Montana State University assumes no responsibility for the care or protection of any vehicle or its contents while operated or parked on the campus. The University reserves the right to revoke student use or possession of vehicles for conduct or scholastic reasons. The Board of Regents has authorized Montana State University to levy fines against students, faculty, and employees for violations of parking, traffic, or vehicle registration regulations. These fines and penalties are listed in the vehicle regulations.

Bicycles must be registered if they are used on campus. They should be operated in a prudent manner and parked only in racks provided, except in the campus family housing area. Violators are subject to fine. Bicycles must be walked, not ridden, though designated areas in the central campus.

All matters concerning parking and traffic should be referred to the University Police Department. The University Police are sworn peace officers of the State of Montana and have authority as vested in these officers by law.

Alcohol/Drug/Tobacco Policy

Montana State University is an environment where inappropriate use of alcohol and the use of illicit substances are prohibited. This belief shall be reflected in this University policy and in an institutionally-supported commitment to provide requisite resources for assessment and education with respect to drugs (alcohol, nicotine, and illicit substances) and enforcement of related policies.

The standards set forth will be upheld with described sanctions imposed where appropriate. Refer to the Schedule of Classes booklet (issued each semester) or consult with the University Police Department regarding complete policies, procedures, and annual crime statistics. The Campus Crime Report is also available on the Internet. Copies of the Campus Safety & Security Handbook are available at several locations on campus including Admissions and New Student Services and the University Police Department.

Sexual Assault Policy

Montana State University recognizes the need for a safe and secure environment, an informed student population, and specialized services and assistance to support student wellness, personal growth, and academic success.

The university’s sexual assault policy meets with both the spirit and intent of its philosophy toward student victims and complies with the Federal Crime Awareness and Campus Security Act of 1990. Under this Higher Education Act (HEA), the university’s policy includes: education, a range of sanctions, procedures for the victim and the institution to follow in the even of an incident, procedures for on-campus disciplinary action, the student’s option to notify law enforcement, existing campus and community assistance and services, and options for the victim relevant to academic course and living modifications.

Refer to the Dean of Students’ Office at 406-994-2826 and/or the V.O.I.C.E. (Victim Options In the Campus Environment) office at 406-994-7069 for policy and professional assistance.

Right of Appeal and Grievances

Student Grievances

Student grievances are handled by approved university procedures. Grievances may be of at least four types: 1) academic, 2) student conduct, 3) discrimination or sexual harassment, or 4) other non-academic grievances.

1. Academic Grievances: Academic grievances are grievances involving coursework, grades, etc. All such grievances are to be handled in accordance with approved university guidelines and procedures. Copies of the approved procedures are

Refer to the Schedule of Classes booklet (issued each semester) or consult with the University Police Department regarding complete policies, procedures, and annual crime statistics. The Campus Crime Report is also available on the Internet. Copies of the Campus Safety & Security Handbook are available at several locations on campus including Admissions and New Student Services and the University Police Department.

Sexual Assault Policy

Montana State University recognizes the need for a safe and secure environment, an informed student population, and specialized services and assistance to support student wellness, personal growth, and academic success.

The university’s sexual assault policy meets with both the spirit and intent of its philosophy toward student victims and complies with the Federal Crime Awareness and Campus Security Act of 1990. Under this Higher Education Act (HEA), the university’s policy includes: education, a range of sanctions, procedures for the victim and the institution to follow in the even of an incident, procedures for on-campus disciplinary action, the student’s option to notify law enforcement, existing campus and community assistance and services, and options for the victim relevant to academic course and living modifications.

Refer to the Dean of Students’ Office at 406-994-2826 and/or the V.O.I.C.E. (Victim Options In the Campus Environment) office at 406-994-7069 for policy and professional assistance.

Right of Appeal and Grievances

Student Grievances

Student grievances are handled by approved university procedures. Grievances may be of at least four types: 1) academic, 2) student conduct, 3) discrimination or sexual harassment, or 4) other non-academic grievances.

1. Academic Grievances: Academic grievances are grievances involving coursework, grades, etc. All such grievances are to be handled in accordance with approved university guidelines and procedures. Copies of the approved procedures are
available from offices of department heads, college deans, the Provost’s Office, and the Dean of Students’ Office.

2. **Student Conduct Grievances:** Student conduct grievances are those which do not involve academics or alleged discrimination or sexual harassment. Copies of university conduct guidelines and appeals procedures for conduct grievances at the Dean of Students’ Office.

3. **Discrimination or Sexual Harassment:** Montana State University guarantees the right to file a grievance on grounds of discrimination to all students, employees, or applicants for admission or employment. Any student who believes he or she may have experience unlawful discrimination on account of race; sex; color; national origin; religion; age; veteran, parental, or marital status; or physical or mental disability should visit the Affirmative Action Office to discuss his or her concerns and to initiate any formal grievance procedure. In addition, Montana State University prohibits all forms of sexual harassment of employees by coworkers or superiors, or of students by peers, staff, faculty, or administrators. Students seeking advice on or wishing to file a grievance related to alleged sexual harassment should contact the university affirmative action/human resources officer. A copy of the university-approved policy and procedures regarding sexual harassment is available from that officer.

4. **Other Non-Academic Grievances:**
   a. **Traffic Violation Appeals:** The Traffic Appeals and Regulations Committee handles appeals of traffic violation citations. This committee is composed of four students, three faculty, three classified staff, and three professional non-faculty members. The University Police Director is an ex-officio non-voting member. The decision of the committee is final on all appeals. Contact the University Police Department for appeal forms and additional information.
   b. **Student Financial Aid Appeals:** Appeals of actions of the Financial Aid Services Office, which relate to financial aid awards, may be
d. **Student Athletic Grievances:** Student athletes who have grievances should contact the Director of Athletics. Regulations and requirements are published by the Athletics Department as well as by the directors for each sport.
e. **Residence Life Grievances:** Grievances related to living in the residence halls can be made through the residence hall judicial system. This is described in detail in the Residence Hall Handbook, which is available from the Residence Life Office. Family housing residents should contact the Family Housing Office if they have grievances.

**Nondiscrimination Policies and Procedures**

Montana State University does not discriminate on the basis of race, color, national origin, sex, sexual preference, marital status, age, religion, creed or political belief, mental or physical disability, or status as a veteran in admission, access to, or conduct of its educational programs and activities nor in its employment policies and practices.

Montana State University is committed to providing a working environment for all employees and an educational environment for all students that supports and rewards career and academic goals on the basis of ability and work or academic performance. Harassment based on race, color, national origin, religion, sex, gender, sexual orientation, age, or disability is a form of discrimination and is prohibited.

The University is committed to a program of affirmative action in the recruitment, hiring, training, and promotion of persons in all classes of employment to help overcome the present effects of past discrimination and prevent underutilization of qualified women and minorities, persons with disabilities, and disabled veterans. In addition, Montana State University assumes particular responsibility for providing opportunities for education and training for the state’s Native American peoples in the various disciplines and professions that are characteristic of this land-grant university. The university’s Affirmative Action Plan is available in the Human Resources/Affirmative Action Office.

Employees or students who commit or supervise who knowingly condone or fail to report incidents of discrimination are subject to disciplinary actions when instances of discrimination are identified and confirmed. Knowingly filing false complaints of discrimination or knowingly providing false testimony will likewise result in disciplinary or corrective action when instances of such conduct are identified and confirmed. Retaliation against persons who file complaints or serve as witnesses is also a violation of laws prohibiting discrimination and will lead to appropriate disciplinary action against offenders.

Montana State University affords any student, employee, applicant for employment or admissions, or person who
STUDENT LIFE

believes he or she was discriminated against by the University, the right to file a grievance on grounds of discrimination. As a condition of their employment and enrollment, employees and students are expected to cooperate in formal investigations of complaints of discrimination. Failure to cooperate will result in disciplinary action.

The person responsible for the University’s compliance efforts is Diane Letendre, Human Resources/Affirmative Action Director, Room 118 Hamilton Hall, Montana State University, Bozeman, MT 59717-2430, 406/994-2042; Fax 406/994-7999.

Complaints of discrimination, including harassment on the basis of race, color, national origin, sex, gender, sexual orientation, religion, age, or disability should be reported to the Human Resources/Affirmative Action Office. The complete Non-Discrimination policy is available electronically at www2.montana.edu/policy/affirmative_action or in print copy or alternate formats from the address above.

Sexual Harassment

Sexual harassment is a form of sex discrimination prohibited by Title IX. Sexual misconduct includes unwelcome sexual advances, requests for sexual favors, and other physical or verbal conduct of a sexual nature, when:

• Submission to such conduct is made either explicitly or implicitly a term or condition of academic participation or otherwise, such as the basis for employment or academic decisions that affect the individual;

• Such conduct is so pervasive or severe that it has the purpose or effect of unreasonably interfering with an individual’s work or academic performance or limiting participation in University programs;

• The intent or effect of such pervasive or severe conduct is to create an intimidating, hostile, or offensive academic or work environment.

Sexual Misconduct

Sexual misconduct is any non-consensual physical contact of a sexual nature. Sexual misconduct may vary in its severity and consists of a range of behavior(s) or attempted behaviors that may be grounds for action under University policy. Prohibited conduct under the Sexual Misconduct includes:

Non Consensual Contact: Any intentional sexual touching however slight, with any object by a man or woman upon a man or woman, without consent.

Non Consensual Intercourse: Any sexual intercourse (anal, oral or vaginal), however slight, with any object by a man or woman upon a man or woman, without consent.

Forced Sexual Intercourse: Unwilling or nonconsensual sexual penetration (anal, oral or vaginal) with any object or body part that is committed either by force, threat, intimidation or through exploitation of another’s mental or physical condition of which the perpetrator was aware or should have been aware.

Sexual activity includes intentional contact with the breasts, buttock, groin or genitals or touching another with any of these body parts, or making another touch you or themselves with or on any of these body parts; any intentional bodily contact in a sexual manner, though not involving contact with/of/by breasts, buttocks, groin, genitals, mouth or by a penis, object, tongue or finger, anal penetration by a penis, object, tongue or final and oral copulation (mouth to genital contact or genital to mouth contact).

Consent: Effective consent cannot be given by minors, mentally disabled individuals or persons incapacitated by drugs and/or alcohol.

Sexual Exploitation: Occurs when a person takes nonconsensual or abusive sexual advantage of another for his/her own advantage or benefit, or to benefit or advantage anyone other than the one being exploited and that behavior does not otherwise constitute one of the other sexual misconduct offenses. Examples of sexual exploitation include, but are not limited to:

• Relationship violence (intimate relationship violence or domestic abuse)

• Prostituting another person

• Nonconsensual video or audiotaping of sexual activity

• Going beyond the boundaries of consent (such as letting friends hide in the closet to watch sexual intercourse)

• Engaging in voyeurism

• Knowingly transmitting an STD or HIV to another person.
Sexually Explicit Materials in the Workplace

In keeping with the university’s policy on sexual harassment, Montana State University desires to create a working environment for employees and a learning environment for students which is free of sexual harassment and intimidation. Materials such as calendars, posters, post cards, photography and cartoons that contain sexually explicit images or language can create an intimidating, hostile, or offensive environment and may subject persons of either sex to humiliation, embarrassment, or discomfort because of their gender. Such materials are inappropriate and should be removed from the workplace.

This policy applies to space provided by the University such as offices, shops, classrooms, hallways, lounges and study carrels.

This policy does not apply to: 1) libraries, resource rooms or research collections; 2) materials related to course content or assignments used in the educational setting; 3) displays and exhibits in galleries and museums; or 4) private rooms or family housing units rented from the University.

Consensual Relationships

A consensual romantic relationship in which one party is in a position to evaluate the work of the other is a potential conflict of interest. When such a potential conflict of interest results between employees or an employee and a student, the employee(s) shall disclose the potential conflict of interest to his or her supervisor. The supervisor and the employee shall take steps to ensure that there is no conflict of interest.

The employee’s failure to disclose such a potential conflict of interest may require appropriate resolution.

Disability Non Discrimination

The University is committed to eliminating disability-based discrimination against qualified persons with disabilities and making reasonable accommodation for any known disability that interferes with an applicant’s ability to compete in a selection process, an employee’s ability to perform the essential functions of a job, a student’s ability to meet the essential requirements of an academic program, or a person’s ability to benefit from a University service or participate in a University sponsored or hosted event.

Applicants, employees, students or participants with a disability seeking an accommodation shall contact the appropriate person identified under the university’s Access for People with Disabilities. For more information see http://www.montana.edu/accessibility/

University Compliance Officer

The person responsible for the University’s compliance efforts is:

Diane Letendre
Human Resources/Affirmative Action Director
Room 114 Hamilton Hall
Montana State University
Bozeman, MT 59717-2430
Phone: 406-994-2042
TDD: 406-994-4191
Fax: 406-994-2893
Email: dletendre@montana.edu

Alternate Formats

This and other University policies and procedures are available in alternate formats upon request.
EXPENSES

For the most up-to-date catalog information: www.montana.edu/wwwcat

The Board of Regents of Higher Education approves all student fee charges. Fees are subject to change at any time.

Student charges and refunds are posted under the student’s name, not the parent’s. Therefore, all fee statements and bill notifications are emailed to the student, not the parents. Refund checks are mailed to the student. (Exception: Refund checks generated as a result of a Parent PLUS loan are mailed to the parents unless the Financial Aid Office has written authorization to disburse the funds to the student.)

Students are personally responsible for meeting their financial obligations at the times stated in the term calendar. A student’s registration is not complete until all fees are paid.

All students are urged to safeguard their personal funds by establishing checking accounts. It is most helpful for a student to be able to write checks for exact amounts for fees, board and room, and other necessary expenses. A local bank account is also good identification while on campus.

A check presented to MSU which is subsequently returned by the bank for insufficient funds or other reasons may cause the cancellation of a student’s registration, reporting to federal agencies, and/or a request to terminate registration, reporting to federal agencies, and/or a request to terminate.

Academic Year Cost Estimates

The expenses shown below reflect estimated costs for a student carrying a full-time load (12 or more credits) for fall and spring semesters, 2010-2011. These expenses include fees and other charges. Actual fees may vary based on specific course fees or the number of credits carried each semester. These figures are subject to change at any time and should be regarded as estimates only.

<table>
<thead>
<tr>
<th>Category</th>
<th>Semester</th>
<th>Academic Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition/Fees</td>
<td>$3,085</td>
<td>$6,170</td>
</tr>
<tr>
<td>Room/Board**</td>
<td>$3,600</td>
<td>$7,200</td>
</tr>
<tr>
<td>Books/Supplies***</td>
<td>$565</td>
<td>$1,130</td>
</tr>
<tr>
<td>Personal/Transportation****</td>
<td>$7,250</td>
<td>$14,500</td>
</tr>
</tbody>
</table>

Undergraduate Non-Resident Students

<table>
<thead>
<tr>
<th>Category</th>
<th>Semester</th>
<th>Academic Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition/Fees</td>
<td>$9,145</td>
<td>$18,290</td>
</tr>
<tr>
<td>Room/Board**</td>
<td>$3,600</td>
<td>$7,200</td>
</tr>
<tr>
<td>Books/Supplies***</td>
<td>$565</td>
<td>$1,130</td>
</tr>
<tr>
<td>Personal/Transportation****</td>
<td>$13,310</td>
<td>$26,620</td>
</tr>
</tbody>
</table>

Exemptions from Payment of Certain Fees

- **Tuition**: Undergraduate students holding high school honor, merit, or Indian scholarships and Montana citizens sixty-five years of age or older are exempt from tuition. Undergraduate students with dean’s or advanced honor scholarships may be exempted from the tuition, in amounts to be determined by the scholarship committee depending upon funds available for this purpose.
- **Professional staff and nonprofessional staff** employed at least three-quarter time are exempt from tuition for six credits only.
- **Dependents of employees** with five or more years of service employed at least three-quarter time are exempt from 50% of their tuition when seeking a first undergraduate degree.
- **Student Activity and Health Service Fees**: Students who are required by the university to complete their entire semester’s work off campus and more than fifty miles from Bozeman are exempt from Student Activity and Health Service Fees as are professional staff and non-professional staff employed at least three-quarter time.
- **In Absentia**: Students registered in absentia pay only the registration fee.

Fall/Spring Fee Schedules

Please go to the following websites for the most up-to-date information:

- **Undergraduate fees**: http://www.montana.edu/catalog/Fee%20Forms/F12_S13%20UG_PB.pdf
- **Graduate fees**: http://www.montana.edu/catalog/Fee%20Forms/F12_S13%20Grad.pdf
- **Post Baccalaureate fees**: http://www.montana.edu/catalog/Fee%20Forms/F12_S13%20UG_PB.pdf
- **Course fees**: http://www.montana.edu/catalog/expenses/FeeCourse.html
- **Fee descriptions**: http://www.montana.edu/catalog/Fee%20Forms/Fee%20Descriptions.pdf

Other Charges

The following fees are in addition to those listed in the fee schedule. Fees are subject to change at any time. Non-matriculated students pay the same fees as regularly enrolled students. See also Course Fees.

- **Ski Fee**: (does not include transportation, lift fees, or equipment rental)
  - Alpine: 95.00
  - Nordic: 104.00
- **Residence Hall Social Fee, per semester**: 10.00
- **Late Payment assessed the first day after regular payment**: 40.00
- **Additional late fee after 15th day of class**: 40.00
Nursing Students
Uniforms and shoes (estimate) .......... 200.00
College of Nursing pin (estimate) .......... 45.00
Upper division petition deposit .......... 200.00
Program Fees ........................................ Consult the college
Extended Studies, per credit hour (minimum)
Undergrad ........................................... 222.10
Graduate ............................................. 266.80
Doctoral Dissertation, for microfilming
and publication of abstract in
"Dissertation Abstracts" ...................... 55.00
Exams given by special request .......... 2.50 to 55.00
(May include Graduate Record,
College Entrance and Placement, GED,
Miller Analogies, Doppelt, and Minnesota
Engineering exams.)
Course Materials Fee ........ consult the department
(For materials furnished in some courses
offered by Departments of Animal and Range
Science, Health and Human Development,
Medical Science, Earth Sciences, Nursing,
Physics, Education, Biology, Architecture,
Microbiology, and Music.)
Field Trip Fee ................................ consult the department
Program Fees ........................ consult the department or college
(Architecture, Art, College of Business,
Engineering, MTA, Nursing, Math)
Returned Check Service Charge ........ 25.00
I.D. Card Fee ........................................ 15.00
Duplicate I.D. .................................... 15.00
Vehicle Registration for Students and Staff
Varies per lot; minimum annual fee .... 159.00
Transcript Fee, charge per copy ............. 3.00
Intensive English Language Fee
(per credit) ........................................... 243.35
Foreign Student Administrative Fee,
per semester (including summer) ........ 125.00
Graduation Fee ................................... 50.00
New Student Orientation Fee
Freshman ............................................ 65.00
Transfer ............................................. 50.00
Graduate ........................................... 50.00
In Absentia Registration Fee .............. 30.00
Challenge Fee (per credit) ................. 30.00
Distance Learning Fee
(per credit) varies by course/program
Residence Hall Prepayment ................. 200.00
Student Teaching fees ........ consult the department

Special Fees and Charges
Application Fee
A $30 application fee must
accompany all applications for
admission. This fee is not refundable
nor is it applied toward the payment
of any other fee. The application fee
is honored for one year from the
semester for which the student is
applying.

Additional Fees Paid by Graduate
Students
Graduate students will be
charged fees at a higher rate than
undergraduates. (Please see the Fee
Schedule.)

Additional Fees Paid by Out-of-State
Students
Resident or non-resident status for
fee purposes is determined by Montana
statutes and regulations of the Board
of Regents. A copy of these regulations
may be obtained by visiting or writing
the Office of Admissions.

Students of legal age and minors
whose parents have not established
residence for fee purposes are
required to pay the non-resident fees.
See Residency Requirements for Fee
Purposes.

Non-matriculated Fees
An adult not regularly enrolled at
Montana State University may, with
permission of the instructor, register
for a non-laboratory class upon the
payment of the same fees as students
enrolled for credit. The person so
registering may not participate in
class discussion or take examinations.
Applications for non-matriculated
enrollment should be made through
the Registrar, who will provide a form
for approval by the instructor.

Auditor’s Fee
Regularly enrolled students who
register for courses without credit pay
the same fees as students enrolled for
credit.

Extended Studies
Extended Studies courses are open
to regularly enrolled MSU students as
well as non-MSU students. Courses of
particular interest to MSU students are
listed along with their fees on a special
page in the Schedule of Classes. Many
of these courses are offered during the
evening hours to accommodate student
schedules. For information contact the
Office of Extended Studies at (406) 994-
6683, email at outreach@montana.edu
or online at btc.montana.edu/outreach

Testing Fees
The Montana State University
Testing Service administers certain
testing and examination programs
for which fees are charged. The fees
are established by testing agencies
(companies) other than MSU.

Nursing Students
Nursing students are charged a
program fee each semester which
covers such costs as mandatory liability
insurance while taking clinical courses,
pre-NCLEX testing fees, fingerprinting
costs, specialized equipment and
distance delivery support.

Costs for board, room and
transportation will vary in relation to
the facilities available in the community
where assigned for upper division. If
a students does not have a car, she/
he must make arrangements for
transportation.

Health Insurance
Students carrying four or more
credits are automatically enrolled
in the student insurance plan each
semester. Students carrying fewer than
four credits, spouses, and dependents
must contact the Student Insurance
Office if they desire coverage. Students
wishing to apply for exemption from
the insurance plan must do so online.

Complete information on student
insurance may be obtained from
the Student Insurance Office in the
Swingle Student Health Center.

Special Fees and Charges
for Foreign Students
An additional administrative fee will
be charged to all foreign students who
come to the University.

Special Exemptions
Honorably Discharged Veteran
Fee Waiver
A veteran who meets all of the
following conditions is eligible for a
waiver of tuition:
1. “Honorable” discharge (“General
Under Honorable Conditions” will
not be accepted) from any branch
of the U.S. Armed Forces for service
on active duty for other than train-
ing purposes.
2. Bonafide resident of Montana for
tuition and fee purposes.
3. At some time eligible for VA educa-
tion benefits but benefits were
exhausted or have expired (VEAP
eligible veterans who withdrew a
portion of their VEAP contribution
before benefits expired are not
eligible for the tuition waiver).
4. Qualifies under one of the following:
   a. Served anytime prior to May 8, 1975. Waiver available to all otherwise qualified undergraduate and graduate students.
   or
   b. Working on initial undergraduate degree and has been awarded an Armed Forces Expeditionary Medal;
   or
   c. Working on initial undergraduate degree and received the Southwest Asia Service Medal for service in the Persian Gulf between August 2, 1990 and April 11, 1991;
   or
   d. Working on initial undergraduate degree and has been awarded the Kosovo Campaign Medal; or served in a combat theater in Afghanistan or Iraq after September 11, 2001, and received either the Global War on Terrorism Expeditionary Medal, the Afghanistan Campaign Medal, or the Iraq Campaign Medal.

Qualified recipients must maintain satisfactory academic progress. Application for this waiver must be made through the MSU Office of Veterans’ Affairs, Montana State University, P.O. Box 173960, Bozeman, MT 59717-3960 at least two weeks before fee payment for the semester in which the recipient expects to qualify. Phone 406-994-3661 for additional information.

State Benefits
The tuition is waived at any of the units of the Montana University System for children of members of the United States armed forces who served on active duty during World War II, the Korean, Vietnam, Iraq or Afghanistan conflicts and who, at the time of entry into service, had legal residence in Montana and who were killed in action or who died as a result of injury, disease, or other disability incurred while in the service. Children who desire to study under the “War Orphans” educational law must enter any of the Montana University System institutions before the age of twenty-five to be eligible for waiver of tuition. Application for the waiver of tuition must be made, well in advance of the date of anticipated enrollment, to the Commissioner of Higher Education (2500 Broadway, Helena, Montana 59620-3101), who will determine eligibility and notify the student and the Office of Financial Aid Services of the institution.

American Indian Tuition Waiver
Persons of one-fourth American Indian blood or more who are Montana residents are eligible for a tuition waiver upon demonstration of financial need. Contact Financial Aid Services for more information.

Senior Citizen Tuition Waiver
In state tuition may be waived for Montana citizens who are (65) sixty-five years of age or older. The application for Senior Citizen Tuition Waiver may be found at www.montana.edu/wwwfa/forms.html or at Financial Aid Services located in Room 183 Strand Union Building (SUB). Submit the completed application and supporting documentation to Financial Aid Services for processing. A completed application is required for each semester of attendance.

Staff Members
Professional and non-professional staff employed at least three-quarter time for the entire term may, as employees of MSU, be exempt from payment of the user fees, and tuition on the first six credits. The Faculty & Staff Tuition Waiver Request form may be downloaded at www.montana.edu/wwwfa/forms.html. These forms are also available for distribution.

Refund of Fees
Drop/Add
Students dropping courses during the first fifteen class days are currently given a full refund for those courses. Fees for courses dropped after the fifteenth class day will not be refunded. The drop refund policy is subject to change. For summer term, please see the refund schedule located here.

The health, dental, and athletic activity fees will not be refunded to students dropping to a credit load of less than seven credits if services have been provided.

University Withdrawal
Fees except those listed below will be refunded based upon the following schedule, unless otherwise required by the Higher Education Act of 1965 as amended. The Dean of Students’ Office records will establish the date used for refunding. Refunds will not be granted for withdrawals after the completion of the term.

Non-refundable fees are: registration fee, ID fee, orientation fee, late fee, deferred installment fees, social fees, foreign student fee, dorm deposit, new student fee, and transfer student fee.

If health and/or dental services have been provided, NO refunds of those fees will be given.

If health and/or dental services have NOT been provided, the refund amount will be based upon the following schedule:

<table>
<thead>
<tr>
<th>Days of Instruction</th>
<th>Percent Refunded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Day</td>
<td>100</td>
</tr>
<tr>
<td>1-5</td>
<td>90</td>
</tr>
<tr>
<td>6-10</td>
<td>75</td>
</tr>
<tr>
<td>11-15</td>
<td>50</td>
</tr>
<tr>
<td>16on</td>
<td>0</td>
</tr>
</tbody>
</table>

Financial Aid and Student Employment
Office of Financial Aid Services
The Office of Financial Aid Services at Montana State University administers federal, state, and institutional aid programs designed to help eligible students pay for their educational expenses. Amounts of awards vary and depend upon the student’s demonstrated and verified financial need as well as the amount of funds available for distribution.

To apply for financial aid, students and parents of dependent students must file the Free Application for Federal Student Aid (FAFSA) each year. The FAFSA can be filed electronically at www.fafsa.gov, or by mailing the paper application. Paper applications can be requested from the Department of Education at: 1-800-433-3243.

To be eligible for financial aid, an individual must be a citizen or permanent resident of the United
States and have applied for admission to the University as a degree-seeking student. Priority consideration is given to students who apply by MSU’s financial aid priority filing date, which is March 1 of the preceding year (e.g., March 1, 2010 for the academic year beginning in September 2010).

Students applying for financial assistance are considered for all aid programs for which they are eligible. Assistance is offered in the form of grants, scholarships, tuition waivers, long-term loans that must be repaid after leaving school, and work opportunities.

Publications describing the different programs, eligibility criteria, satisfactory progress, and application procedures are available via the Internet at www.montana.edu/wwwfa/, or at the Office of Financial Aid Services, 183 Strand Union, P.O. Box 174160, Bozeman, MT 59717-4160. Our telephone number is: (406) 994-2845.

Both undergraduate and graduate students may apply for aid. Assistance to graduate students is generally limited to long-term loans and work opportunities. Information on graduate fellowships, scholarships, and assistantships may be obtained from The Graduate School.

Although student expenses will vary according to differences in courses of study, residency status, housing arrangements, transportation costs, and other factors, the table of estimated expenses may be used to determine the projected cost of education for a school year (two semesters). In estimating costs, between-semester expenses should not be overlooked.

Please remember that policies and procedures governing financial assistance at MSU are subject to change at any time, without prior notification or publication, due to changes in university, state, and/or federal guidelines and regulations.

The Office of Financial Aid Services is open Monday through Friday from 8:30 AM to 4:30 PM or as otherwise posted. Our phone lines are open Monday through Friday from 8:00 AM to 5:00 PM. The office is located in Room 183 in the Strand Union Building which is equipped with an elevator for disabled students.

**Fee Descriptions**

**Registration Fee** is a flat non-refundable processing fee of $30.00 charged to each student.

**The Tuition and Fees** on the student bill is the total of the tuition fee, registration fee, building fees, information technology fee, computer fee, student equipment fee, health and dental fees, ASMSU fees, athletic fee, and SFEP fee. The Tuition and Fees for more than 12 (twelve) credits is the same as for 12 (twelve) credits.

**Tuition** is a mandatory per credit hour fee based on the number of credits selected and the status of the student (resident, non-resident, Western Undergraduate Exchange Program, or graduate). On the fee chart, the Non-Resident Tuition Fee consists of the Resident Fee (paid by resident students) plus the Non-Resident Fee, which is the portion of the Tuition Fee covered on behalf of resident students by Montana state taxes.

**Building Fees** are mandatory per credit hour fees and are used to repay bonds that financed the construction and/or remodeling of university buildings. Students have also voted to continue paying some building fees for major maintenance needs after the bonds have been repaid. The Building Fees for state resident students include: Student Building Fee; Academic Building Fee; PE Complex; Health Operations; Strand Union Operations; and PE Building Fee. The Building Fees for non-resident students include all of those for resident students plus the Non-Resident Building Fee. The Non-Resident Building Fee is that portion of bonds that are covered on behalf of resident students by Montana state taxes.

**Computer Fee** is a mandatory per credit hour fee used to provide and enhance student computer labs and access.

**Student Equipment Fee** is a mandatory per credit hour fee used to provide and enhance classroom and student lab equipment.

**Information Technology Fee** is a mandatory per student fee for partial funding of the student administrative software.

**Health and Dental Fees** are mandatory fees charged to all students registered for seven (7) credits or more. These fees are for maintaining the Student Health and Dental Clinic.

**The Associated Students of Montana State University (ASMSU) Fees** are mandatory fees charged to all students registered for seven (7) credits or more. ASMSU Fees are set by student vote.

**ASMSU Activity Fee** provides for the operation of the student government (ASMSU) and its committees.

**ASMSU Intramural Fee** contributes to the operational cost of the intramural facilities and programs.

Payment of the ASMSU Activity Fee and the ASMSU Intramural Fee entitles the student to participation in ASMSU student government and use of gym, swimming, weight room facilities, day care facilities, legal aid, tutoring, and other sponsored activities.

**ASMSU Bus Fee** funds a local bus system for students.

**ASMSU Student Sustainability Fee** contributes to the promotion and implementation of sustainable practices.

**ASMSU Student Organization Fee** supports registered student organizations.

**Athletic Fee** is a mandatory fee charged to students registered for seven (7) credits or more that is used to support the Bobcat Athletic program.

**SFEP Fee** includes funds pledged for debt service on the Student Facilities Enhancement Project, as well as Operations & Maintenance fee for the Health & PE Complex.

**Student Medical Insurance Fee** is a mandatory medical insurance program (by ASMSU vote) for all students registered for four (4) credits or more. Students may waive the insurance if they have other medical insurance. Dependent coverage is available by contacting the Student Insurance Office at 104 Swingle or 994-3199.
GENERAL CURRICULAR REQUIREMENTS

For the most up-to-date catalog information:
www.montana.edu/wwwcat

CATALOG AND CURRICULUM

Catalog in Effect
MSU-Bozeman undergraduates may elect to follow the catalog in effect when they began their freshman year at MSU, or any subsequent catalog, if there has not been a break of more than one academic year in their attendance and if they fall within the six-year catalog limitation policy. Undergraduate students transferring from any accredited United States college or university may follow the MSU catalog which was in effect when they first entered the institution from which they transferred, or any subsequent catalog in effect prior to graduation, provided there has been no break in attendance of more than one academic year. The six-year catalog limitation policy applies to transfer students.

MSU undergraduates who change majors may follow the catalog in effect when they began their freshman year at MSU or any subsequent catalog in effect prior to their graduation, provided there has been no break in attendance of more than one academic year. In these instances, too, the six-year catalog limitation policy will apply. In either case (transferring or changing majors) it may be necessary to make course substitutions within the department curricular requirements, due to changes in tabulations from year to year. Students should consult with their academic advisors about this. The curriculum advisor and department certifying officer make the official check on degree-specific requirements for graduation. The Registrar provides the final check on university requirements: CORE requirements, total credits earned, grade points, cumulative grade point average earned at MSU, as well as University-wide requirements during the last semester prior to graduation. Students must be officially registered in their chosen curriculum for at least two semesters prior to graduation to be eligible for a degree in that curriculum.

Online Catalog
Students are encouraged to consult the online version of the MSU Bozeman catalog for the most current information regarding academic policies and curricular requirements. The online catalog, found at www.montana.edu/wwwcat/, is updated on an ongoing basis as changes are made to programs and courses. It is the responsibility of the student to check with his or her department to confirm any changes in curricula.

Six-Year Catalog Limitation Policy
Each MSU-Bozeman catalog covers a specific time period, usually two years, beginning fall semester of the first year and ending summer session two years later. From the time a student enters Montana State University, he or she has six years to fulfill the curricular requirements stated in the catalog in effect when he or she entered. If a student does not complete the requirements in six years, he or she must select a subsequent catalog. This policy applies to all students, including undergraduate who change major/curriculum and transfer students.

Change of Major/Curriculum
A change of curriculum card may be obtained from the Registrar’s Office or the college dean’s office. The approval of the new academic adviser is required. A change of curriculum becomes official when the change of curriculum card is filed with the Registrar’s Office.

CORE 2.0

Purpose
As a land grant university, MSU Bozeman is charged, through the Morrill Act of 1862, with providing “liberal and practical education...in the several pursuits and professions of life.” In addition, as a member of the Montana University System, MSU is charged with providing programs that “stimulate critical analysis, clear and effective communication, and the creative process.” Students should also “broaden their cultural horizons by contact with the creative arts, sciences and the humanities, and achieve an understanding of the political, social, economic and ethical problems of the contemporary world and the relation of their studies to these problems.”

To this end, the faculty of MSU have developed a common core curriculum, called CORE 2.0, for all undergraduate students in an effort to enable students to reach their intellectual potential, to become contributing members of society, and to compete more successfully in our rapidly changing and increasingly complex world.

The purpose of the CORE 2.0 curriculum is to ensure a wide-ranging general education of consistent and high quality to all Montana State University students regardless of their major or area of study. Core courses allow students to reaffirm their common experiences, redefine their common goals, and confront their common problems. Core courses emphasize communication and techniques of creative inquiry in a variety of disciplines.

One of the goals of the Core is to provide students with the opportunity to develop their creative and intellectual potential. Therefore, Core courses will require students to do the following:

1. Think, speak, and write effectively, and evaluate the oral and written expression of others.
2. Develop learning objectives and the means to reach them, thus developing lifelong patterns of behavior which increase the potential to adapt to and create change.
3. Exercise and expand intellectual curiosity.
4. Think across areas of specialization and integrate ideas from a variety of academic disciplines and applied fields.
5. Use complex knowledge in making decisions and judgments.
6. Make discriminating moral and ethical choices with an awareness of the immediate and long-term effects on our world.
7. Develop a critical appreciation of the ways in which we gain and apply knowledge and understanding of the universe, of society, and of ourselves.
8. Understand the experimental methods of the sciences as well as the creative approaches of the arts.
9. Develop an appreciation of other cultures as well as an understanding of global issues.

**CORE 2.0 Foundation Courses**

**University Seminar (US):**
The University Seminar provides an introduction to college studies aimed at expanding students' intellectual interests, improving critical thinking and communication skills, and creating a community of learners. It emphasizes discussion, critical interpretation of important texts, multi-disciplinary perspectives, exploration of diverse perspectives and interpretations, and examination of arguments and evidence.

Students choose one course from the following:
- AGED 140US Leadership Dev For Agriculture
- BUS 101US First Year Seminar
- CLS 101US Knowledge and Community
- CLS 201US Knowledge and Community
- COEX 101US First Year Seminar
- COM 110US Public Communication
- EDU 101US Teaching and Learning
- LS 101US Ways of Knowing
- UIH 201US Texts & Criticism: Knowledge
- US 101US First Year Seminar
- Any other course with the "US" suffix

**Quantitative Reasoning (Q):**
Every person is inundated daily with numerical information, often in the form of graphical representations, statistical summaries, or projections from mathematical models. Comprehension of the elementary quantitative concepts, development of quantitative reasoning skills, and the ability to reasonably assert the implications of quantitative information are goals of Quantitative Reasoning courses.

All courses in this category focus on identified classical mathematical concepts and modern techniques of mathematical thought and critical reasoning. These courses require prerequisite competencies at the level of M 096/097 or higher. One way to demonstrate prerequisite competency is by passing the Mathematics Placement Exam (MPLEX) at the appropriate level.

Students choose one course from the following:
- M 121Q College Algebra
- M 126Q Math for K-8 Teachers II
- M 145Q Math for the Liberal Arts
- M 149Q Secrets of the Infinite
- M 151Q Precalculus
- M 161Q Survey of Calculus
- M 165Q Calculus for Technology I
- M 166Q Calculus for Technology II
- M 171Q Calculus I
- M 172Q Calculus II
- M 181Q Honors Calculus I
- M 279Q Multivariable Calculus
- M 283Q Honors Multivariable Calculus
- Any other course with the "Q" suffix

**College Writing (W):**
College Writing focuses on expository (vs. creative or personal) writing with sections organized around topics/themes of the instructor’s choosing. With some variation, typical sections incorporate a wide range of learning components in support of major paper assignments: reading of essays, study of writing instruction texts, short compositions in response to reading, in-class writing, small group workshops, peer review of writing, draft conferences, and class discussion.

Students choose one course from the following:
- WRIT 101W - College Writing I
- Any other course with the "W" suffix

**Diversity (D):**
Graduates of Montana State University face an ever changing and increasingly complex world. An understanding of and sensitivity to other cultural perspectives prepares them to function in the global community and creates a campus climate that is conducive to academic growth for all students. Diversity courses address the study of identities (e.g., race, class, gender, sexual orientation, ability, etc.), societies, nations, or national languages and cultures.

Students choose one course from the following:
- AMST 101D Introduction to American Studies
- ANTY 101D Anthropology and Human Experience
- ANTY 242D Contemporary Japan
- CHIN 201D Intermediate Chinese I
- DANC 206D Dance as Cultural Expression
- EDU 211D Multicultural Education
- FRCH 102D Elementary French II
- FRCH 201D Intermediate French I
- FRCH 220D French Language & Culture
- GPHY 121D Human Geography
- GPHY 141D Geography of World Regions
- GRMN 201D Intermediate German I
- HSTR 130D Latin American History
- HSTR 135D The Modern Middle East
- HSTR 145D Reinventing Japan
- JPNS 201D Intermediate Japanese I
- LIT 214D Regional Literature
- LIT 292D Mythologies
- MGMT 245D Cultural Dimensions of International Business
- MKTG 242D Introduction to International Business
- NASX 201D Introduction to Native American Studies
- NASX 205D Native Americans in Contemporary Society
- NASX 232D Montanan Indian Culture, History, and Current Issues
- PSCL 230D Introduction to International Relations
- RLST 110D Religion, Conflict & Politics
- RLST 202D Asian Religions - Hinduism
- SOCI 150D Social Differences
- SPNS 102D Elementary Spanish II
- SPNS 201D Intermediate Spanish I
- SPNS 220D Spanish: Language and Culture
- Any other course with the "D" suffix

**Contemporary Issues in Science (CS):**
Contemporary Issues in Science courses focus on natural science or technology. These courses examine the
ways in which science contributes to the study of significant problems in the contemporary world to help individuals and society make informed decisions about these issues.

Students choose one course from the following:

- ARCH 231CS Issues in Sustainability
- BIOE 103CS Environmental Science and Society
- CSCI 215CS Social & Ethical Issues in Computer Science
- ECHM 205CS Energy and Sustainability
- EGEN 125CS Technology, Innovation, and Society
- GEO 103CS Introduction to Environmental Geology
- GPHY 111CS Introduction to Physical Geography
- HSTR 282CS Darwinian Revolution
- NUTR 221CS Basic Human Nutrition
- PHL 262CS Science, Pseudo-Science & Subjectivity
- PHL 278CS Origins of Life
- TE 250CS Technology and Society
- UNIV 125CS Microbes in the Environment
- Any other course with the “CS” suffix

Note: Course availability can change over time. A current list of CORE courses is maintained on the MSU website (www.montana.edu) under the MyInfo tab.

Students may substitute courses for this requirement. See the Permitted Substitutions near the end of this section.

CORE 2.0 Ways of Knowing Courses

All Ways of Knowing Courses emphasize the methods used to discover and create the factual and theoretical knowledge of the discipline. Inquiry courses (indicated with an I) do this primarily through classroom instruction and require at least one major learning activity based on methods of inquiry appropriate to the discipline. Research courses (indicated with an R) require students to have autonomous experience in the research and creative process and to generate a scholarly product. Lower-division R courses are intended to introduce students to the discipline and thus also satisfy a Ways of Knowing area (RA, RI, RN, or RS). Upper-division R course are often intended for majors and do not have a Ways of Knowing designation. These courses are listed separately with an R following the number.

All students must take at least one (1) Inquiry or one (1) Research & Creative Experience course in each of the following areas:

**Arts (IA or RA):**

- ARCH 121IA Introduction to Design
- ARCH 322IA World Architecture I
- ART 260IA Art of World Civilization I
- DAN 230IA Dance Appreciation
- MFA 101IA Film in America
- MFA 112IA Exploring Digital Photography
- MUS 203IA American Popular Music
- MUSI 211IA Masterworks in Music
- MUSI 307IA World Music
- THTR 122IA Acting for Non-Theater Majors
- ARCH 151RA Design Fundamentals I
- ART 145RA Web Design
- ARTZ 105RA Visual Language - Drawing
- ARTZ 106RA Visual Language - 2D Foundations
- ARTZ 211RA Drawing I
- ARTZ 231RA Ceramics I
- CS 145RA Web Design
- MTA 103RA Fundamentals of Musical Creation
- Any other course with the “IA or RA” suffix

Note: Course availability can change over time. A current list of CORE courses is maintained on the MSU website (www.montana.edu) under the MyInfo tab.

**Humanities (IH or RH):**

Courses in the Humanities explore ethical and moral, aesthetic and creative, historical and descriptive dimensions of human cultural traditions, emphasizing methods of reaching a conclusion, formulating an interpretation, or making a judgment in the discipline.

Students choose from the following:

- CHIN 320IH History of Chinese Cinema
- ENGL 290IH Theory & Methods in Linguistics
- FRCH 306IH French: From Reflection to Revolution
- HSTA 101IH American History I
- HSTR 102IH Western Civilization II
- LIT 119IH Introduction to Lit
- PHL 101IH Introduction to Philosophy: Reason and Reality
- PHL 110IH Introduction to Ethics: Good and Evil
- RIST 207IH Myth and Metaphor
- UH 292 - Texts and Critics: Imagination (see the Permitted Substitutions at the end of this section.)
- UH 400IH Honors Seminar
- WS 201IH Introduction Feminist Theory and Method
- LIT 451RH Studies in Major Authors
- LIT 494RH Seminar: Research Issues
- PHL 350RH State, Community & Individual
- PHL 361RH History of Philosophy: Ancient/Medieval
- UH 402RH Honors Seminar
- Any other course with the “IH or RH” suffix

Note: Course availability can change over time. A current list of CORE courses is maintained on the MSU website (www.montana.edu) under the MyInfo tab.

**Natural Sciences (IN or RN):**

Courses in Natural Sciences emphasize a coherent body of scientific principles and the methods scientists use to create knowledge of the natural world.

Students choose from the following:

- ASTR 110IN Introduction to Astronomy: Mysteries of the Sky
- BIOE 100IN Organism Function
- BIOL 170IN Principles of Biological Diversity
- BIOM 103IN Unseen Universe: Microbes
- BICO 262IN Introduction to Entomology
- CHMY 121IN Introduction to General Chemistry
- ENSC 245IN Soils
- ERTH 201IN Honors Earth System Science
- GEO 101IN Introduction to Physical Geology
- GEO 105IN Oceanography
- GEO 111IN Dinosaurs
- MATH 103IN Our Physical World
- MATH 201IN Physics by Inquiry
- ERTH 212RN Yellowstone: Scientific Lab
- Any other course with the “IN or RN” suffix

Note: Course availability can change over time. A current list of CORE courses is maintained on the MSU website (www.montana.edu) under the MyInfo tab.

Students may be able to substitute courses for this requirement. See the Permitted Substitutions at the end of this section.

**Social Sciences (IS or RS):**

Courses in the Social Sciences emphasize methods and principles used by social scientists to systematically study human behavior.

Students choose from the following:

- ANTY 215IS Human Prehistory
- ANTY 225IS Culture, Language, and Society
- ANTY 252IS Mysteries of the Past
- ECNS 101IS Economic Way of Thinking
- ECNS 294HS Microeconomics
- EDUC 222HS Educational Psychology & Child Development
- EDUC 223HS Educational Psychology and Adolescents Dev
- HDCF 150HS Individual Family Development
- LIFESPAN 341H Business Research Methods
- PSCH 210HS Introduction to American Government
- PSCH 214HS Principles of Political Science
- PSYX 100HS Introduction to Psychology
- SOCI 101IS Introduction to Sociology
- SOCI 211IS Criminal Justice System
- UH 400HS Honors Seminar
- AGEQ 451HS Economics of Agricultural Policy
- UH 405HS Honors Seminar
- Any other course with the “IS or RS” suffix
Note: Course availability can change over time. A current list of CORE courses is maintained on the MSU website (www.montana.edu) under the MyInfo tab.

Additional Research & Creative Experience Courses:

Important: All students must take at least one (1) approved Research & Creative Experience course or a total of three credits of independent undergraduate research (290R or 490R). Students may take an approved Research & Creative Experience course in one of the four Ways of Knowing areas or they may take a separate Research & Creative Experience course in any discipline, including the Undergraduate Scholars Program (USP 490R). Any course with the "R" suffix satisfies this requirement.

- ACTG 490R Undergraduate Research
- AGEC 290R Undergraduate Research
- AGEC 490R Undergraduate Research
- AGED 190R Undergraduate Research
- AGED 490R Undergraduate Research
- AGSC 465R Health, Agriculture, Poverty
- ANSC 410R Meat Processing
- ANSC 455R Beef Cattle Management
- ANSC 490R Undergraduate Research
- ANTY 490R Undergraduate Research & Instruction
- ARCH 490R Undergraduate Research
- ARTH 499R Senior Thesis: Art History
- ARTZ 499R Senior Thesis: Studio
- BCH 144R Biochemistry & Molecular Biology Methods
- BCH 490R Undergraduate Research
- BFIN 457R Financial Markets and Institutions
- BFIN 490R Undergraduate Research
- BIO 299R Undergraduate Research
- BIOE 490R Undergraduate Research
- BIOE 299R Undergraduate Research
- BIOG 490R Undergraduate Research
- BIOI 490R Undergraduate Research
- BIOM 490R Undergraduate Research
- BIOM 299R Undergraduate Research
- BION 490R Undergraduate Research
- BMEH 490R Undergraduate Research
- BMGT 475R Management Practicum
- ECON 299R Undergraduate Research
- ECON 399R Undergraduate Research
- ECON 490R Undergraduate Research
- ECON 290R Undergraduate Research
- ECNG 299R Undergraduate Research
- ECNG 490R Undergraduate Research
- EEDU 490R Undergraduate Research
- EEE 490R Undergraduate Research
- EEE 290R Undergraduate Research
- EEE 488R Electric Engineering Design I
- EEE 490R Undergraduate Research
- ELE 499R Capstone: Electrical Engineering Design
- EENN 490R Undergraduate Research
- EGEN 319R Multidisciplinary Engineering Design
- EGEN 490R Undergraduate Research
- EIND 490R Undergraduate Research
- EMEC 499R Capstone I
- EMEC 499R Capstone II
- EMEC 499R Undergraduate Research
- EMEC 499R Mechanical Engineering Design
- ENGL 461R Issues in English Education
- ENGL 490R Undergraduate Research
- ENSC 290R Undergraduate Research
- ENSC 410R Biodiversity Methods
- ENSC 490R Undergraduate Research
- ENSC 499R LRES Capstone
- ERTH 490R Undergraduate Research
- ETCC 490R Undergraduate Research
- ETCC 499R Senior Capstone: Construction Engineering Tech
- ETME 490R Undergraduate Research
- ETME 499R Undergraduate Research & Technology Design Capstone II
- GEO 490R Undergraduate Research
- GPHY 490R Undergraduate Research
- HDCF 425R Family Law & Public Policy
- HDCF 453R Administration of Human Service Program
- HDCF 490R Undergraduate Research
- HDHL 490R Undergraduate Research
- HORT 490R Undergraduate Research
- HSTA 490R Undergraduate Research
- HSTR 499R Senior Capstone: History Methodology
- ICS 490R Undergraduate Research
- IMID 490R Undergraduate Research
- IMID 498R Biotechnology Internship
- LIT 490R Undergraduate Research
- M 290R Graduate Research
- M 490R Undergraduate Research
- MBEH 490R Undergraduate Research
- MGMT 475R Management Practicum
- MGMT 490R Undergraduate Research
- MKTG 592R Marketing Research
- MKTG 490R Undergraduate Research
- ML 490R Undergraduate Research
- MTA 490R Undergraduate Research
- MUSI 499R Senior Recital/Capstone Project
- NASX 290R Undergraduate Research
- NASX 490R Undergraduate Research
- NRSK 387R Research in Health Care
- NRSK 490R Undergraduate Research
- NRSM 490R Undergraduate Research
- NUTR 490R Undergraduate Research
- PHL 490R Undergraduate Research
- PHSX 290R Undergraduate Research
- PHSX 490R Undergraduate Research
- PSCI 490R Undergraduate Research
- PSCI 499R Senior Project/Thesis
- PSYX 490R Undergraduate Research
- PSYX 499R Senior Thesis/Capstone
- TE 490R Undergraduate Research
- UH 490R Undergraduate Research
- USP 490R Undergraduate Research
- WILD 490R Undergraduate Research
- WRIT 490R Undergraduate Research
- Any other course with the "R" suffix

Note: Course availability can change over time. A current list of CORE courses is maintained on the MSU website (www.montana.edu) under the MyInfo tab.

Permitted Substitutions

1. Completion of at least two of the following courses with a grade of C- or better satisfies the Contemporary Issues in Science (CS) and the Inquiry Natural Science (IN) requirements. Individual substitutions for one requirement or the other are not permissible.

- NRSM 240
- BIOH 101, 110, 160, 170, 256, 260, 258
- BIOL 201, 211
- BIOM 210, 230
- BIO 23
- CHMY 121, 123, 141, 143, 151, 153, 211
- GEO 101, 103, 205, 211
- GPHY 101
- ENSC 245
- PHXS 205, 207, 220, 222, 224, 240, 242

2. The University Honors course UH 202, with a grade of C- or better, may substitute for the Inquiry Humanities (IH) requirement.

Credit Policies

1. University Core requirements cannot be satisfied by the CLEP procedure.
2. Advanced Placement credits (AP), if equivalent to MSU Core courses, can be used to fulfill Core requirements.
3. Credit earned in repeatable Core courses may be applied only once to University Core requirements.
4. Some study abroad programs, upon approval, may satisfy the Diversity requirement.
5. Students in good standing in the University Honors Program may fulfill part of their University Core curriculum requirements with designated honors courses. Specific information is available in the Honors Program Office, Quad D.

Grading Standards

1. College-level competence in all areas of the Core curriculum is necessary for adequate performance in the Core and beyond. A grade of C or better is required in all University Core courses.
2. No University Core course may be taken on a pass/fail basis.
Appeals
Unusual circumstances that warrant an appeal of the established policies and procedures must be initiated by the student and sent through his/her adviser to the Core Equivalency Review Board via the Registrar’s Office.

Accommodation for Students with Math Learning Disabilities
Accommodation to the Quantitative Reasoning (Q) Core Curriculum Requirement may be made for students with Math learning problems caused by disabilities. Accommodations, when permitted, apply only to the Core Curriculum Requirement; they do not change requirements in majors, minors, or certificates.

MSU recognizes that some students with specific learning disabilities may experience difficulty completing the Core Quantitative Reasoning requirement. Students with learning disabilities who believe that they need an accommodation to meet the Quantitative Reasoning requirement should contact the office of Disabled Student Services (DSS) to begin the process to certify the disability. Learning Disability documentation must meet established MSU requirements as developed by DSS. This documentation is available from:

Disabled Student Service
P.O. Box 173960
Strand Union, Room 155
Montana State University
Bozeman, MT 59717-3960

CREDITS FOR DEGREE COMPLETION

Correspondence Credits and Extension Courses
No more than thirty semester credits earned by correspondence, extension, or continuing education from accredited colleges or universities may be counted toward graduation. However, special circumstances may warrant consideration, and approval of such courses is on a case-by-case basis.

Special Topics and Individual Problems Courses
No more than twelve credits of Special Topics 291 or 491 combined in each rubric will count toward graduation. No more than six credits of 492 Independent Study in each rubric will count toward graduation. Some departments have established lower limits than these, and students are responsible for checking course listings to ensure that they do not exceed the allowable number of credits in each category.

Credits
A candidate for the bachelor’s degree must complete the minimum number of credits required for the degree selected. The minimum number of credits must be composed of credits earned for graduation. The required number of credits varies among the four-year curricula leading to the bachelor’s degree.

Credits Earned for Graduation
Credits earned for graduation shall mean the total number of credits for which passing grades (A through C, and P) have been received in courses numbered 100 or above. If students repeat courses in which they have passing grades, the most recent grade will be the effective grade for graduation. A course taken by an undergraduate or a non-degree student may not later be repeated and applied toward requirements for a graduate degree. For further credit-use restrictions, see Special Topics and Individual Problems, or refer to the Course Descriptions for maximum allowable credit limits placed on certain courses.

Upper-Division Credit Requirement
A minimum of forty-two credits for the first degree and at least nine additional credits for the second degree must be earned in courses numbered 300 and above (upper-division courses). As required by the Minimum Competency Requirements, a grade of C- or better is required in all courses to be counted toward the upper division credits required in all degrees.

Note: The curricula for specific majors may have more stringent requirements.

Transfer Student Credit Requirements at MSU-Bozeman
To graduate from Montana State University, transfer students must earn not less than thirty MSU credits and a minimum 2.0 cumulative GPA, as well as meet the curriculum requirements for a degree. Furthermore, twenty-three of the last thirty credits earned to meet graduation requirements must be MSU credits.

Deficiencies, I, and F Grades
All deficiencies, make-up grades, transfer work, advanced standing, and challenge examinations must be completed and transcripts filed in the Registrar’s Office at least one month before the end of the semester of expected graduation.

GRADUATION REQUIREMENTS FOR BACCALAUREATE DEGREES

Registration Required
A student must be registered at Montana State University the semester of his or her graduation. If the student is not required to take any courses at Montana State University during the final semester, he or she must process an “in absentia” registration and pay a registration fee of $30 before the end of the third week of the semester he or she expects to earn a degree. Arrangements for this registration must be made by the student with the Registrar. Graduate students must have the written permission of the Graduate Dean to register in absentia.

Except for certain pre-professional curricula (e.g., pre-medicine), twenty-three of the last thirty credits earned to meet the graduation requirement must be MSU credits. Specific majors may have program-specific requirements for courses that must be taken from MSU to meet graduation requirements. Such requirements are clearly identified in the curriculum description for that department.

SECOND MAJORS AND DEGREES

Second Major
A student who completes all the degree requirements for a first major may earn a second major by fulfilling the degree requirements for the second major. The student is not required to complete additional core requirements for the second major since these requirements will have been fulfilled in the major area for which the student’s undergraduate degree is being awarded.
A student who wishes to earn a second bachelor’s degree must so inform, in writing, both the department and college in which he or she is earning the degree and the department of the second major. The department of the second major will assign an adviser for the student and will furnish the appropriate form, titled Second Major/Second Degree Declaration form. The catalog in effect at the time a student files the Declaration for a Second Major or Second Degree is the one that governs the requirements for a second major.

The second major will be posted on the student’s transcript at the time of graduation upon verification by the Registrar of completion of the courses listed on the Application for a Second Major, which must be submitted with the student’s Application for Baccalaureate Degree. Both forms must be submitted to the Registrar’s Office by the end of the semester one year prior to the semester the student plans to graduate. Former returning students may do this during the first week of classes.

Second Bachelor’s Degree

There are two distinct methods for obtaining more than one bachelor’s degree:

A student who has already completed requirements for one bachelor’s degree must complete a minimum of thirty additional credits, all course requirements of the second degree curriculum, and two semesters in residence at Montana State University after completing the requirements for the first degree. Nine of the total minimum number of credits required for the second degree must be upper division. All courses listed on the student’s transcript at the time of graduation are considered as required for both degrees (none of those extra credits will be system, only on those courses taken after the first degree. Students working on two bachelor’s degrees concurrently must have a total cumulative average of 2.0.

Minors

All applications for a non-teaching minor must be submitted to the Registrar with the Application for Baccalaureate Degree by the end of the semester one year prior to the semester of completion. Former returning students may do this during the first week of classes. The minimum number of credits required for a non-teaching minor is twenty-one, with nine of those being upper-division credits.

Teaching Minors

Teaching Minor Application forms may be obtained from the Registrar’s Office or the Education Department. Teaching minors must be approved by the certifying officer in the Education Department.

Non-Teaching Minors

Non-teaching Minor Application forms may be obtained from department offices or the Registrar’s Office.

GRADUATION PROCEDURES

Notification of Degree Eligibility

Students are expected to submit an Application for Baccalaureate Degree form by the end of the semester one year prior to the semester the student plans to graduate. A $30 degree application fee is assessed at the time the Application for Degree form is filed. Returning former students must file the application during the first week of university instruction of the semester of completion. Application for Degree forms can be moved from one semester to the next for up to one academic year. If, however, it is necessary to delay graduation beyond one academic year, the student must file a new Application for Degree form.

Satisfaction of Financial Obligation

All candidates for degrees must fully satisfy their financial obligations to the University (or make arrangements with Montana State University for doing so) as a condition for completing their degree programs. Candidates failing to comply with this requirement shall not be eligible for graduation, diplomas, degrees, or any transcripts of their records.

Graduation Grade Point Average

In order to graduate, students must earn a cumulative grade point average of 2.00. Further restrictions and graduation requirements may be imposed by the various curricula. To receive a graduate degree from MSU-Bozeman, students must earn a 3.00 grade point average required in the major and minor for the degree. Students must also earn 3.00 grade point average taken at MSU-Bozeman which are required in the major and minor.
Graduation with Honors

Graduation with honors or highest honors applies only to baccalaureate degrees.

To receive honors, a student must earn a cumulative grade-point average between 3.25 and 3.69. To receive highest honors, a student must earn a minimum cumulative grade point average of 3.70. Cumulative grade point averages are computed at the end of the semester of graduation.

All MSU credits attempted and grades received will be used in computing graduation with honors or highest honors.

Transfer students receiving their first baccalaureate degree must meet the cumulative grade-point average requirements stated above and complete a minimum of sixty semester credits at MSU. The credits earned at MSU must compute to minimum grade point averages of 3.25 or 3.70 for graduating with honors or highest honors respectively.

For second degree or subsequent baccalaureate candidates, the grade point average of the first or subsequent degrees and any transfer work will be included in the determination of honors or highest honors. Transfer credit and grade point average requirements apply.

Diplomas

Diplomas are dated the last day of the semester in which the requirements for the degree are completed. Diplomas are mailed to graduates the semester following degree completion after final degree verification is complete.

Appeals of Graduation Requirements

The Admission and Graduation Requirements Board (GARC) is composed of the Assistant Vice Provost for Undergraduate Education (chairperson), the assistant dean of the college concerned, and the Registrar. This board considers appeals and/or petitions from undergraduate and non-degree students seeking waivers of established requirements in special situations.

Instructions for submitting appeals and petitions are available through the Registrar’s Office.

These submissions should be forwarded by letter to the Registrar and should originate with the student in conjunction with the student’s adviser.
Mountain biking near the MSU campus. Photo by Kelly Gorham.
ACADEMIC AND REGISTRATION POLICIES

For the most up-to-date catalog information:
www.montana.edu/wwwcat

ACADEMIC POLICIES

Family Educational Rights and Privacy Act (FERPA)

The Family Educational Rights and Privacy Act of 1974 grants certain rights, privileges, and protections related to students’ educational records maintained by the University. Students’ educational records (with the exception of directory information) will not be released to third parties outside of the University, except with the written consent of the student. Students have the right to inspect their own educational records, except for those to which students have expressly waived this right (e.g., Career Services placement files or graduate school recommendations). Students have the right to request amendment of their records, if they are found to be inaccurate, misleading, or otherwise in violation of the students’ privacy or other rights. Such requests should be made as soon as the student becomes aware of the inaccuracy or any other problem.

Any student may file a complaint with the U.S. Department of Education concerning any alleged failure on the part of the University to comply with the requirements of the Family Educational Rights and Privacy Act.

Directory Information

Student records considered to be “directory information” and therefore subject to release to a third party include:
1. name, campus address, home address, telephone listing and campus email address.
2. state of residence
3. age, date, and place of birth
4. sex and marital status
5. name of advisor
6. name and address of parent(s)
7. major field of study, including the college, division, department, or program in which the student is enrolled
8. classification as a freshman, sophomore, junior, senior, or graduate student, or by number referring to such cases
9. participation in officially recognized activities and sports
10. weight and height of members of athletic teams
11. dates of attendance and graduation, and degrees received
12. the most recent educational institutional attended
13. honors and awards received, including selection to a Dean’s list or honorary organization, and the grade point average of students selected
14. photographic, video or electronic images of students taken and maintained by the University

Any student wishing to withhold this information from third-party access must inform the Registrar in writing no later than the 10th class day of the semester.

For complete and up-to-date information on FERPA policy and procedures, please reference www2.montana.edu/policy/family_ed_privacy_act/.

Residency Requirements for Fee Purposes

In-state admission and fee status is granted to those persons who have demonstrated over a period of time that their permanent residence is Montana, a state which they have supported through the payment of appropriate taxes. In general, a person must meet all seven requirements listed below to qualify for in-state status:
1. A person must be physically present in Montana for twelve or more consecutive months without an absence in excess of a total of thirty days. One must demonstrate by appropriate actions during the twelve month period the intent to make Montana one’s permanent home. The required twelve month period does not begin until specific actions are taken to change legal ties to Montana.
2. The twelve month period does not begin until one or more acts, that clearly indicate the intent to become a resident, are taken. Mere presence in Montana alone will not serve to start this period. The legal action date must occur in the preceding year, on or before the fifteenth day of class of the term for which reclassification is requested. Sufficient actions to begin the period are:
   a. Montana voter registration
   b. Montana driver’s license
   c. Montana vehicle registration
   d. Purchase of a principal residence where a Montana title is obtained
   e. Filing of a resident Montana income tax return
   f. If none of the above is applicable, an affidavit of intent may be filed with the Registrar’s Office.

3. An individual must be at least fifty-one percent financially self-sufficient during the entire twelve month period, and that person must not be claimed as an exemption under federal income tax regulations by someone filing an out-of-state federal tax return, commencing with the tax year in which the twelve month period begins.
4. A person must file a Montana income tax return
5. If a person drives a motor vehicle in Montana or has a driver’s license from another state, he or she must obtain a Montana operator’s license within the required legal time limit.
6. If a person owns a motor vehicle in Montana, he or she must license the vehicle in Montana within the required legal time limit.
7. An individual must register to vote in Montana if she or he expects to exercise the right to vote.
An individual who is enrolled for more than half-time status during any semester that falls within the twelve month period is presumed to be present in the state primarily for educational purposes, and such periods may not generally be applied toward the physical presence requirement of the policy. At Montana State University, six credits is considered half-time enrollment.

There are additional regulations concerning married persons and others with special circumstances. Persons interested in gaining residency should request the pamphlet “Montana University System Student Guide to Montana’s Residency Policy.” For more information, new students should contact the Office of Admissions. Currently enrolled students and former students can obtain petition forms and more information from the Registrar’s Office.

**Academic Advisers**

Academic advisers are available to help students plan their programs of study and make informed choices about courses. Although students are fully responsible for their academic decisions, they should recognize the advantages of close cooperation and understanding between themselves and their advisers.

Because academic advisers are usually associated with a students’ major department or field, students should contact their major departmental offices or the offices of their college deans to determine the names and locations of their advisers. In some programs such as University Studies, Native American Studies, University Honors, pre-health professions, or WAMI, special assistance is available from advisers in those areas.

**Student Records**

Access to student records is restricted according to the Family Educational Rights & Privacy Act (FERPA). For more information see www2.montana.edu/policy/family_ed_privacy_act/. Questions regarding privacy of student records should be directed to the Registrar.

**Name Change**

Notice of legal change of name, resulting from marriage, divorce, or other reason, must be promptly filed with the Registrar. Name change forms are available from the Registrar’s Office and must be submitted with copies of a legal court document, driver’s license and Social Security card with new name before academic records can reflect any name change.

**Transcript of Record**

For every transcript request, a fee is charged. Transcript requests must be made to the Registrar’s Office. Transcripts are sent only at the signed or authenticated request of the student. All requests for transcripts will be checked through the Student Accounts Office for University bill clearance. If the student requesting a transcript has an outstanding debt with the University, the request will not be processed until the bill has been paid and the Student Accounts Office has notified the Registrar of payment.

Under normal conditions requests for transcripts will be processed within five working days after they are received in the Registrar’s Office. Requests received during the first or last weeks of a semester may be delayed an additional few days. Transcripts may be requested online at www.montana.edu/registrar or may be requested in person at: Registrar’s Office Montana State University 101 Montana Hall PO Box 172660 Bozeman, MT 59717-2660

**Advanced Standing**

Under certain circumstances, if students can demonstrate mastery of course work not taken at the University, they may receive advanced standing and University credit for the course. Two mechanisms are available for obtaining advanced standing:

1. **College Level Examination Program (CLEP)**

   Montana State University awards credit toward graduation for successful performance in certain Subject Examinations of the College Level Examination Program conducted by the College Entrance Examination Board. Students may arrange to take these examinations on campus or at designated centers throughout the country. Passing grades are determined by Montana State University. These students receive credit and a P grade on the transcript for scores above the passing level; scores below the passing level are not entered on the transcript. CLEP examinations do not apply as a grade waiver for a course previously taken. University Core requirements cannot be satisfied by the CLEP procedures.

   In general, a department will not give a challenge examination if a CLEP examination is available for the same course.

2. **Advanced Standing by Challenge**

   Challenge provides the opportunity to earn college credits and grade points without formal course enrollment. A student who has completed the work of a college course on his or her own initiatives and time, may, with the approval of the student’s academic advisor, the instructor, the department head, the college deans, take a comprehensive examination in the subject matter of the course. Performance in the examination will become the basis for a grade in the course, and the results will be recorded on the student’s permanent academic record at the end of the term which the challenge exam is taken. Official permission forms should be secured in advance from the Registrar’s Office. Students must be registered at MSU when they take the challenge examination, and they must have passed ten credits of regular course work at Montana State University before the challenge grade will be recorded on their permanent records.

   The challenge examination for credit in a course which is a prerequisite to a second course must be taken before completion of the second course. Students who have enrolled in a regular or an extension course and received a grade other than W or have taken a regular or an extension course for zero credit may not challenge that course. Challenges are not permitted in any 290, 291, 292, 490, 491, 492 and 498 courses.
The following list gives the names of the CLEP examinations and the course for which credit is given:

<table>
<thead>
<tr>
<th>MSU Course</th>
<th>Title</th>
<th>CLEP Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARNR 101</td>
<td>Nat Resource Conservation</td>
<td>Natural Resource Conservation</td>
</tr>
<tr>
<td>BIOL 101</td>
<td>Biology of Organisms</td>
<td>Gen Biology</td>
</tr>
<tr>
<td>BIOL 102</td>
<td>Molec &amp; Cellular Biology</td>
<td>Gen Biology</td>
</tr>
<tr>
<td>ECNS 101</td>
<td>Econ Way of Thinking</td>
<td>Intro Microecon</td>
</tr>
<tr>
<td>ECNS 202</td>
<td>Prin of Macroeconomics</td>
<td>Intro Macroecon</td>
</tr>
<tr>
<td>EDCI 208</td>
<td>Ed Psych Hum Dev</td>
<td>Sch Age Educ Psych</td>
</tr>
<tr>
<td>LIT 110</td>
<td>Intro to Lit</td>
<td>Analysis &amp; Interp of Lit</td>
</tr>
<tr>
<td>HSTR 101</td>
<td>Western Civilization I</td>
<td>Western Civilization I with essay</td>
</tr>
<tr>
<td>HSTR 102</td>
<td>Western Civilization II</td>
<td>Western Civilization II with essay</td>
</tr>
<tr>
<td>HSTA 101</td>
<td>American History I</td>
<td>Am Hist I with essay</td>
</tr>
<tr>
<td>HSTA 102</td>
<td>American History II</td>
<td>American History II with essay</td>
</tr>
<tr>
<td>M 151 Pr</td>
<td>Precalculus</td>
<td>Precalculus</td>
</tr>
<tr>
<td>M 171 Ca</td>
<td>Calculus I</td>
<td>Calc with Elem Fncts</td>
</tr>
<tr>
<td>FRCH 101</td>
<td>Elementary French I</td>
<td>Col French I</td>
</tr>
<tr>
<td>FRCH 102</td>
<td>Elementary French II</td>
<td>Col French I &amp; II</td>
</tr>
<tr>
<td>FRCH 201</td>
<td>Intermediate French I</td>
<td>Col French I &amp; II</td>
</tr>
<tr>
<td>GRMN 101</td>
<td>Elementary German I</td>
<td>Col German I</td>
</tr>
<tr>
<td>GRMN 102</td>
<td>Elementary German II</td>
<td>Col German I &amp; II</td>
</tr>
<tr>
<td>GRMN 201</td>
<td>Intermediate German I</td>
<td>Col German I &amp; II</td>
</tr>
<tr>
<td>SPNS 101</td>
<td>Elementary Spanish I</td>
<td>Col Spanish I</td>
</tr>
<tr>
<td>SPNS 102</td>
<td>Elementary Spanish II</td>
<td>Col Spanish I &amp; II</td>
</tr>
<tr>
<td>SPNS 219</td>
<td>Intermediate Spanish I</td>
<td>Col Spanish I &amp; II</td>
</tr>
<tr>
<td>PSCI 210</td>
<td>Intro to American Government</td>
<td>Am Govt</td>
</tr>
<tr>
<td>PSPP 102</td>
<td>Plant Science, Resource &amp; Environment</td>
<td>Plant Science, Resource &amp; Environment</td>
</tr>
<tr>
<td>PSYX 100</td>
<td>Intro to Psychology</td>
<td>Intro Psy</td>
</tr>
<tr>
<td>SOCI 101 IS</td>
<td>Introduction to Sociology</td>
<td>Intro Soc</td>
</tr>
</tbody>
</table>

In general, a department will not give a challenge examination if a CLEP examination is available for the same course.

A fee of $30 per credit is assessed and must be paid prior to taking the challenged exam.

COURSES, CREDITS, AND GRADES

Definitions
• Course
A course is a unit of instruction in a subject-matter area offered in a single university semester. Resident courses (courses for which resident credit is granted) are those listed in the Schedule of Classes. Continuing education courses are arranged through Extended University.

• Credit
A credit is the unit used in computing the amount of work required for graduation. One credit is equivalent to three hours of work each week for one semester. One lecture hour assumes two hours of work outside of class. In the case of laboratories, library work, or studio classes, the entire time may be spent under the supervision of the instructor.

• Credit Load
Undergraduate students who are enrolled for twelve or more credits and graduate students for nine or more credits, will be certified and reported as full-time students. Completion of a 120-credit undergraduate curriculum in four years requires students to complete an average of fifteen credits each semester.

• Curriculum
A curriculum is a combination of courses that constitutes a program of study leading to the completion of an academic program.

• Semester
Montana State University operates on a semester system consisting of two semesters and a summer session. The Term Calendar gives the dates of each semester.

• Grades
The quality of the student’s work in each course is denoted by a letter grade according to the following tabulation. In computing scholastic averages, each letter grade is assigned a specific number of grade points for each credit. The general quality of a student’s work is expressed in terms of a grade point average (GPA). Semester grades indicate when students are on University probation, suspend warning, or suspended.

Minimum Competency Requirements
The Montana Board of Regents has established a common policy on minimum course grades across all campuses in the system. According to the policy, a grade of C-or better is required to satisfy requirements for pre-requisite and required courses in majors, minors, and certificate programs and for all core requirements. Further, a grade of C- or better is required in all courses that will be counted toward the 42 upper-division credits required in all degrees. Courses with a passing grade of D-, D, or D+ may only be counted toward the overall 120 credit requirement. This policy creates a minimum requirement, which may be superseded by more stringent requirements within specific majors. Any such requirements are explained within the descriptions of those curricula.

Semester Grade-Point Average
The student’s semester grade-point average is computed by dividing the number of grade points earned by the number of credits carried. Semester grade-point averages are used in computing fraternity, sorority, and all-university averages.
**ACADEMIC AND REGISTRATION POLICIES**

**Cumulative Grade-Point Average**

The cumulative grade-point average is computed by dividing the sum of grade points earned by the sum of credits carried, except that neither the credits nor the grade points shall be counted for the following:

1. Below college level courses.
2. For repeated courses, only the credits and grades received the last time the course was taken will be used in the calculation of the cumulative grade-point average, and only the credits received the last time the course was taken will be included in the credits counted for graduation. However, all grades received will be listed on the transcript. Repeat waivers are figured manually and will be reflected in the cumulative totals the next semester after the courses have been repeated.
3. Courses passed on a pass/fail basis.
4. Only credits taken at MSU are used to compute the cumulative grade-point average.

**W Grade Eligibility**

After the 15th day of the semester, students may drop courses and receive a grade of W (withdrawal) only if approved by the academic advisor and course instructor. Approval is not guaranteed, and no refund is given. Until the last day of the official registration period for the following semester, students use a Drop/Add form (see advisor, department office, or Registrar’s Office) to drop courses with a W. The W grade is non-punitive; it counts in credits attempted but not in earned credits or in quality points toward the GPA. If a student repeats the course in a subsequent semester, the new grade will count in the GPA but the original W grade will remain on the transcript.

**I Grade (Incomplete)**

Instructors may assign a grade of I (Incomplete) when students have been unable to complete their academic obligations because of circumstances beyond their control.

The University takes the position that when students register, they commit themselves to completing their academic obligations as their primary responsibility. Therefore, the instructor may assign an I grade only in cases when students have suffered extreme personal hardship or in unusual academic situations.

An instructor may assign an I grade in cases of personal hardship when students have been unable to fulfill their commitments because of illness, death or illness in the immediate family, family emergencies, or military orders. The Dean of Students will verify personal hardship cases at the instructor’s request. The instructor may assign an I grade to a student for personal hardship, provided the student has completed three-fourths of the work of the course with a passing grade. If the instructor has not satisfactorily completed three-fourths of the course work the instructor must provide written justification for assigning an I grade.

The instructor may also assign an I grade, subject to the department head’s approval, in cases when a student has been unable to complete course requirements for reasons such as apparatus or equipment failure, death or disease in experimental animals, delays in material shipments from suppliers, or in other unusual academic circumstances which are clearly beyond the student’s control. In these situations, the student must have completed three-fourths of the work of the course with a passing grade. If the student has not satisfactorily completed three-fourths of the course work the instructor must provide written justification for assigning an I grade.

In each instance qualifying for an I grade, the instructor must prepare an I Grade Authorization form. On this form, the instructor will list the makeup requirements and the date beyond which the I will revert to a F grade.

To change the I grade after the make-up work has been completed, the instructor will obtain the proper form from the Registrar’s Office, place the grade on the form, and return it to the Registrar’s Office. Unless an alternate time is specified by the instructor, an I grade shall be made up no later than the end of the following semester (excluding summer session). An instructor

### Grade System

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Grade Points for Each Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td></td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td></td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>Good</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td></td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td></td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td>Fair</td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
<td></td>
<td>1.7</td>
</tr>
<tr>
<td>D+</td>
<td></td>
<td>1.3</td>
</tr>
<tr>
<td>D</td>
<td>Passing</td>
<td>1.0</td>
</tr>
<tr>
<td>D-</td>
<td></td>
<td>0.7</td>
</tr>
<tr>
<td>N</td>
<td>Continuing (Math only)</td>
<td>0</td>
</tr>
<tr>
<td>P</td>
<td>Pass</td>
<td>0</td>
</tr>
<tr>
<td>S</td>
<td>Satisfactory (CEU only)</td>
<td>0</td>
</tr>
<tr>
<td>W</td>
<td>Withdraw</td>
<td>0</td>
</tr>
<tr>
<td>Au</td>
<td>Audit</td>
<td>0</td>
</tr>
<tr>
<td>NR</td>
<td>Missing Grade</td>
<td>0</td>
</tr>
</tbody>
</table>

### Nonpassing Grades

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Grade Points for Each Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Failure</td>
<td>0</td>
</tr>
<tr>
<td>I</td>
<td>Incomplete</td>
<td>0</td>
</tr>
</tbody>
</table>
may extend the specified completion time by submitting the required documentation to the Registrar’s Office before the reversion grade takes effect. An I grade may not be extended beyond one calendar year. An I grade not made up in the prescribed length of time or within one calendar year lapses to a failure (F).

Make-Up of I Grades
An I Grade make-up is reported to the Registrar on a Grade Change Form. No fee is charged. These grades are not included on the next semester grades.

During the time allowed for the completion of the unfinished work leading to the I grade, the student may have access to university resources (e.g., library) necessary to complete the work.

Pass/Fail Grading
As a general policy, courses at Montana State University are graded by the letter grades, A, A-, B+, B, etc. However, in certain courses, pass/fail grading may be more appropriate. Courses may be offered on a pass/fail basis for all students registered in the course, with the approval of the department head and college dean. Courses offered on a pass/fail basis will be identified in the Schedule of Classes. Permission to offer a course on a pass/fail basis for all students registered in the course, with the approval of the department head and college dean. Courses offered on a pass/fail basis will be identified in the Schedule of Classes. Permission to offer a course on a pass/fail basis is limited to one academic year; if the permission is not renewed, the course reverts to a letter-grade basis.

In pass/fail grading, passing work will receive a P grade on the student’s transcript, but it will not count in the grade-point average. However, the course credit will count toward the number of credits required for graduation. Failing work will receive an F grade and will count in the grade-point average.

N Grade
An N grade may be assigned to students enrolled in sequential learning courses only. This grade indicates that, though students have not completed the course, they have made satisfactory progress. These students must re-enroll in the course immediately in order to continue with the course work and complete the course.

Grade Changes
Once a grade has been reported by the instructor to the Registrar, it cannot be changed except in case of clerical error or unless it was fraudulently obtained. All grades and credits will stand as recorded in the Registrar’s official record if changes are not reported in writing to the Registrar within five years of the last day of the semester in which the course was taken.

A change of grade does not mean allowing additional time to complete the work of a course or allowing the student to submit work or to take or to retake examinations after the conclusion of the semester. A change of grade is not a substitute for an I grade when an I grade cannot be justified.

A change of grade may be made only with the concurrence of the department head. If the grade being changed was given more than one academic year previously, the college dean must also approve the change.

All courses taken prior to degree completion are used toward fulfillment of the specific degree requirements, and the permanent record is closed as of the completion date.

Dean’s List and President’s List
Any undergraduate student who passes twelve or more credits and attains a 3.50 grade-point average or better for any one semester is placed on the Dean’s List. A student who receives a 4.00 grade-point average and is taking twelve credits or more is placed on the President’s List. The names of the students making the Dean’s List and President’s List are announced by the Registrar at the end of each semester. These lists apply only to undergraduate students.

Pass/Fail Elective Courses
Undergraduate students may take some of their University elective courses on a pass/fail basis subject to the following restrictions:
1. Students can elect the pass/fail option only for courses that are outside their departments and are not required for graduation. Pass/fail courses may not be applied toward completion of Core requirements. This restriction does not apply to HHD activity courses.

2. A student may not register for more than one pass/fail elective course per semester, excluding one-credit HHD activity courses.

3. Undergraduate students may take a maximum of twelve credits of pass/fail elective courses. This maximum does not include courses that are offered only on a pass/fail basis.

4. Students register for pass/fail courses in the same manner as for other courses, but they must have written permission from their advisors, college deans, and the instructors of the course. The Registrar has forms for this purpose.

5. Students may only change a pass/fail registration to a regular registration, or a regular registration to a pass/fail registration, prior to the end of the tenth day of instruction. Students will follow the regular drop-add procedures, except that students changing to a pass/fail registration must also secure the written permission of the instructor and adviser (see 4 above).

6. Prerequisites will apply for all courses taken on a pass/fail basis.

7. The instructor’s requirement to obtain a grade of P in the course must be submitted with the Request for Pass/Fail form.

8. The Admission and Graduation Requirements Board will review petitions for exceptions to the pass/fail policy.

Absence from Classes
When students enroll in a course, they enter a contractual agreement with the instructor for the duration of the course, and both the student and the instructor are expected to honor the specified terms of that agreement. It is important, therefore, for the student to understand the attendance requirements in each course. The instructor should communicate these requirements during the first or second class meeting in writing via the course syllabus.

Absences from classes are handled exclusively within the purview of the individual instructor. If a student has an accident, falls ill, or suffers some other emergency over which he or she has no control, the student should gather avail-
able documentation (e.g., copies of repair or tow bills, prescriptions, accident reports, or statements from physicians) to show to instructor. In some instances, the student may wish to petition the instructor for I grades.

The provisions for making up missed class work may vary from one instructor to another. Most but not necessarily all instructors provide for some opportunity to make up missed work: for example, if a student is absent from campus to participate in a university-sponsored event. Students involved in such activities should advise their instructors of these events in advance and determine what arrangements are available to make up missed class work.

REGISTRATION

Dates for Registration

The dates for registration each semester are published in the Registration Handbook, which is printed prior to registration and is available from the Registrar’s Office. The Registration Handbook is also available online through the MyInfo link on the MSU Homepage. Before the beginning of each semester, the Admissions Office mails acceptance letters to new students who have been accepted for admission, and the Registrar’s Office mails letters to former students who have submitted Intent to Register forms. A continuing student in good standing will receive registration times and access information from academic departments. Information on registration and course offerings is also provided in the Registration Handbook.

Class Rolls

During the third day of University instruction and thereafter, those students who have registered but have not attended class may be required by the instructor to drop the course when space and/or equipment is limited and other students have requested to add that class. Students are not automatically dropped; this action requires a student-initiated drop/add form.

Final grades are due within forty-eight hours after the final examination in each course. No grade or credit will be given to students in courses for which they are not properly registered.

Students must pay all fees at the scheduled time of fee payment. (See semester Registration Handbook for fee payment times.)

Undergraduate Student Petitions for Registration and Reservation of Certain Courses

Undergraduate students may petition to register for certain graduate-level courses either to fulfill undergraduate requirements or to reserve for future application to a graduate program. Undergraduate students also may petition to reserve 400-level courses outside their undergraduate major for possible application to a graduate program. Reserved 400-level courses may be applicable to either the major or minor areas of a graduate program. A successful petition must meet all of the following criteria:

1. The student is of senior standing.
2. The student has a cumulative grade-point average of at least 3.25.
3. All prerequisites for the course(s) have been completed.
4. The course does not have “graduate standing” or an equivalent prerequisite.
5. The student has not reserved more than nine (9) credits total of all 400-and graduate-level courses taken prior to completion of a baccalaureate degree.
6. The petition may not include any internship or independent study courses for either registration or reservation.
7. The petition is filed prior to registering for the course.
8. The student, through a petition, has received approval from the head of the department offering the course, the head of the department from which the student will receive the bachelor’s degree, the instructor(s), and The Graduate School.

A graduate-level course approved by petition may be used either for fulfilling undergraduate or graduate program requirements, but not for both. The student must indicate on the petition form the intended use of the registered/reserved course credits.

Undergraduate senior students with financial aid should be aware that credits reserved for future application to a graduate program may affect their current financial aid eligibility.

Petition forms may be obtained from the student’s departmental office or from the Graduate School.

Drop/Add Regulations and Procedures

Add Procedure

Students may add classes online using MyINFO through the 5th day of class. After the 5th day of the semester, all adds require the signatures from the instructor and advisor. After the 10th day of the semester, all adds require the additional signature of the Assistant Dean of the student’s major curriculum on the Drop/Add form.

Drop Procedure

Note that if the student has paid fees and wishes to drop all courses, a University Withdrawal must be obtained through the Dean of Students Office. Each student is responsible for fees upon registration. Contact the Student Accounts Office for partial-refund dates.

Students may drop classes online through the 10th day of the semester. After the 10th day of the semester, all drops require the signatures of the instructor and advisor. Although no refund will be given after the 15th day of the semester, students may continue to drop one or more courses with a grade of “W” up through the last day of the official registration period for the following semester, with the approval of the academic advisor and their course instructor.

1. Students can obtain the Drop/Add form from their advisor, department, Registrar’s Office or download the form from the Registrar’s homepage www.montana.edu/registrar under Student Forms.
2. The student should discuss the reason for the drop with an academic advisor. If the advisor approves and signs the form, then the instructor’s approval and signature is required on the form.
3. The student must return the completed Drop/Add form to the Registrar’s Office with a picture ID.
Taking Courses for Zero Credit

Auditor
Registered students may, with the permission of the instructor, enroll in a course as auditors and earn zero credit. A student must decide to audit a course by the tenth class day of the semester. Auditors pay the same fees as students enrolled for credit.

Non-matriculated Student (Listener)
Any adult not regularly enrolled may, with the permission of the instructor, register for a non-laboratory class. Application forms for non-matriculated enrollment are obtained from the Registrar’s Office, and the Registrar reviews the completed application for compliance. Payment is required upon approval at the rate charged a regularly enrolled in-state student. A listener may not participate in class discussions or take examinations.

Fresh Start Policy
A former Montana State University undergraduate who returns to the University after a minimum absence of five years will have the opportunity to petition to begin a new cumulative (or Fresh Start) GPA as follows:

1. After returning to Montana State University, a student must complete thirty credits of academic study with a minimum cumulative GPA of 2.5 for the new course work before petitioning for a Fresh Start GPA.
2. A student who is eligible for a Fresh Start GPA must petition for a new cumulative GPA during the semester following that in which he or she meets the requirements stated in #1.
3. A student may begin a Fresh Start GPA only once.
4. Student petitions will be considered on a case-by-case basis by the Admission and Graduation Requirements Board. The decisions of the Board will be final.
5. When the new GPA is started, all previous grades and credits earned at Montana State University are excluded; it is not possible to select some grades and credits to exclude while retaining others. Only Montana State University grades and credits will be excluded.
6. The new GPA begins the first semester the student is re-enrolled. The transcript will state that a new GPA has been started. The old grades will remain on the transcript. Although old credits will appear on the transcript, they may not be used to fulfill any University requirements.

Students wishing to petition for a Fresh Start GPA should contact the Registrar’s Office to initiate the process.

Classification of Students

- At the end of each semester, students are classified as follows:
  - Freshman: A student who is entitled to regular or conditional admission with less than thirty credits.
  - Sophomore: A student who has earned thirty to fifty-nine credits.
  - Junior: A student who has earned sixty to eighty-nine credits.
  - Senior: A student must have earned ninety or more credits.
  - Second bachelor’s degree candidate: A student who has already earned one or more baccalaureate degrees and is seeking another.
  - Non-degree undergraduate student: A student taking courses for special interest, but not planning on using the credit toward a degree.
  - Non-degree graduate student: A student with at least a baccalaureate degree but not seeking another degree.
  - Graduate degree student: A student who has at least a baccalaureate degree and has been accepted into the College of Graduate Studies.

Examinations

Common Hour Exams
Common hour exams are given during the semester for multi-section courses. Dates and times are published in the Registration Handbook. These exams take the place of one class meeting and are included in the student’s commitment to the course upon enrolling in it.

Final Exams
Final examinations in one-credit courses are given during regular class periods. Final examinations for all other courses are scheduled by the Registrar, and may not be rescheduled or given prior to the start of the final examination period. According to University policy, the examination period is instructional time, and it is expected that some instructional use is made of this period if a final examination is not given.

A student who has three or more final examinations in any one day should first contact the instructors of the courses to see if one exam can be rescheduled. If this rescheduling can’t be resolved, then the student should contact the assistant dean of his or her college at least one week before the beginning of final examination week to assist in resolving the conflict.

University Withdrawal
If a student must withdraw from all classes during the semester for personal reasons, he or she should apply at the Dean of Students Office for a university withdrawal.

Students who withdraw before the end of the fifteenth day of instruction will not receive grades for any course taken. After the fifteenth day through the last day of instruction, students who withdraw for “extraordinary reasons” will receive W grades in all courses.

The Dean of Students Office will assign the official date of the university withdrawal.

Students who leave the campus without withdrawing through regular channels or who withdraw late without extraordinary reasons will receive F grades in all course work for that semester.

Retroactive University Withdrawal Policy
A retroactive university withdrawal may be an option for students who were unable to complete a standard university withdrawal during the semester of their departure from the university. A retroactive university withdrawal is an extraordinary remedy that is available only for the reasons set forth below. Students who are granted a retroactive university withdrawal receive W grades in all courses for the semester in which they apply for the retroactive withdrawal. Requests for retroactive withdrawals must be submitted no later than three years from the last day of the semester for which the withdrawal is sought.
Students who leave the campus without applying at the Dean of Students Office for a university withdrawal during the semester of departure or who fail to withdraw through regular channels or who fail to withdraw for extraordinary reasons may apply for a retroactive university withdrawal only if they can provide evidence of the following:

1. The student had a debilitating illness or injury that significantly limited his/her capacity to withdraw in a timely manner; or
2. The student was forced to leave the University abruptly due to health or safety emergency within his/her immediate family; or
3. The student has been recommended to apply for a retroactive university withdrawal by the University Scholastic Appeals Board and meets the other criteria for a retroactive university withdrawal.

To apply for a retroactive university withdrawal, students must submit a formal letter of request to the Dean of Students, no later than three years after the last day of the semester for which the withdrawal is sought. The student must include his/her name, social security number and/or student identification number, dates for the requested retroactive withdrawal, and supporting documentation to verify claims of illness, injury or emergency which precluded the student from applying for a university withdrawal during the semester of departure. The Dean of Students Office will assign the official date of the retroactive university withdrawal.

An Appellate Board will convene to review the request for a retroactive withdrawal upon receipt of appropriate verification of potential eligibility. Requests for a retroactive withdrawal will be considered by the Appellate Board only if sufficient documentation is provided to support claims of extraordinary illness, injury, or emergency. The review process will be limited to a review of documents and student records. The Dean of Students, in his/her capacity as Chair of the Appellate Board, shall inform the student of the Board’s decision within ten working days of the Hearing. The decision of the Appellate Board is final.

Scholastic Probation and Suspension

Probation and Suspension Decisions

When a student’s semester or cumulative grade-point average falls below 2.00, the record of the student’s performance is reviewed by the University Scholastic Appeals Board, which is composed of the Senior Vice Provost for Academic Affairs, the Dean of Students, and the dean or assistant dean of the college concerned. The board meets between semesters and at other times as needed to act upon individual cases recommended for either suspension or transfer out of a curriculum. This board has the authority 1) to suspend a student from the University for scholastic reasons, 2) to reinstate a student who has been suspended for scholastic reasons, and 3) to require a student to transfer out of a curriculum with the consent of both colleges involved. The chairperson of this board will notify students in writing of the action. (The designation probation, suspension warning, or suspension will be entered on the student’s permanent record.) Semester grade reports indicate the status of students, and it is the individual student’s responsibility to review his or her grade report each semester.

Appeal of Suspension

A student who has been suspended may appeal the suspension if he or she believes there were extraordinary circumstances beyond the student’s control of which the University Scholastic Appeals Board was unaware when it reached its decision. Appeal forms are available from the offices of academic deans.

Reinstatement

A student who was suspended for the first time is automatically reinstated after one semester has elapsed (exclusive of Summer Session). In order to enroll again at MSU, however, a suspended student must submit an Intent to Register form to the Registrar’s Office. After a second suspension, one academic year must elapse before the student will be reinstated, again with submission of an Intent to Register form. Intent to Register forms may be obtained from the Registrar’s Office. Completed Intent to Register forms must be received by the following approximate deadline dates (check with the Registrar’s Office for current deadline dates).

<table>
<thead>
<tr>
<th>For Reinstatement</th>
<th>Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>August 1</td>
</tr>
<tr>
<td>Spring Semester</td>
<td>January 1</td>
</tr>
<tr>
<td>Summer Session</td>
<td>May 1</td>
</tr>
</tbody>
</table>

Students who have received more than two suspensions must petition for reinstatement through their academic dean to the University Scholastic Appeals Board. Petitions are available from the academic deans and must be submitted in accordance with the deadlines listed above.

Reinstated students will be on “probation” when they re-enroll. When students achieve a term and cumulative GPA of 2.00 and above, the “probation” designation is removed. Students must have a 2.00 term and cumulative GPA to graduate.
### Guidelines Used by the University Scholastic Appeals Board

<table>
<thead>
<tr>
<th>Previous Status</th>
<th>TGPA = Term GPA, CGPA = Cumulative GPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Standing</td>
<td>0 ≤ TGPA &lt; 1</td>
</tr>
<tr>
<td>College Probation</td>
<td>1 ≤ TGPA &lt; 2</td>
</tr>
<tr>
<td>Continuing College Probation</td>
<td>2 ≤ TGPA ≤ 4 and 0 ≤ CGPA &lt; 2</td>
</tr>
<tr>
<td>University Probation</td>
<td>2 ≤ TGPA ≤ 4 and 2 ≤ CGPA ≤ 4</td>
</tr>
</tbody>
</table>

- **Good Standing**: University Probation*
- **College Probation**: Suspension*
- **Continuing College Probation**: Suspension*
- **University Probation**: Suspension*
- **Suspension Warning**: Suspension*
- **Suspension (Re-instated)**: Suspension*

*These academic actions appear on the student's transcript.

<table>
<thead>
<tr>
<th>Good Standing</th>
<th>A student has both a term GPA and cumulative GPA of at least 2.00 or better or is a new student (transfer students may be admitted on university probation).</th>
</tr>
</thead>
<tbody>
<tr>
<td>College Probation</td>
<td>A student in “good” standing has received the first term GPA between 1.00 and 1.99.</td>
</tr>
<tr>
<td>Continuing College Probation</td>
<td>A student previously on College Probation has raised the term GPA above 2.00 but the cumulative GPA is not above 2.00.</td>
</tr>
<tr>
<td>University Probation</td>
<td>A student previously on University Probation has raised the term GPA above 2.00 but the cumulative GPA is not above 2.00, or has received a term GPA between 0.00 and 0.99 after being in “good” standing.</td>
</tr>
<tr>
<td>Suspension Warning</td>
<td>A student has received a term GPA less than 2.00 for the past two terms. One more term with a GPA less than 2.00 will result in suspension.</td>
</tr>
<tr>
<td>Suspension</td>
<td>Students will be required to sit out one term on their first suspension and one year on their second suspension. Third suspensions will be handled on an appeal basis only.</td>
</tr>
</tbody>
</table>

All students in either College Probation, University Probation, or Suspension Warning status remain in some form of probationary status until both their most recent term GPA and their cumulative GPA are above 2.0.
Looking south from the MSU campus toward the Gallatin Range. Photo by Kelly Gorham.
PROGRAMS OF INSTRUCTION
For the most up-to-date catalog information: www.montana.edu/wwwcat

Alphabetic List of Programs

A
Accountancy (Professional) - M
Accounting - BS option in Business; minor
Adult & Higher Education - option in MEd; option in EdD
Aerospace - minor
Agribusiness Management - concentration
Agricultural Business - BS; minor
Agricultural Education - BS; MS
Agricultural Education Broadfield - teaching option
Agricultural Relations - BS option in Agricultural Education
Agroecology - BS option in Sustainable Food and Bioenergy Systems
American Studies - BA; MA; PhD
Animal & Range Sciences - MS; PhD
Animal Science - BS; minor
Animal Systems - BS option in Biotechnology
Anthropology - BS; minor
Applied Economics - MS
Applied Mathematics - BS option in Mathematics
Applied Psychology - BS option in Psychology; MS
Architecture - BA option in Environmental Design; M.Arch
Art - BA; BFA; MFA; teaching option; teaching minor; Art History minor
Art History - BA option in Art; minor

B
Bio-resources Engineering - BS option in Civil Engineering
Biochemistry - BS option in Chemistry; MS; PhD; minor
Bioengineering - BS
Biological Sciences - BS; MS; PhD
Biology - teaching option; teaching minor
Biomedical Sciences - BS option in Cell Biology and Neuroscience
Biotechnology - BS
Botany - refer to Organismal Biology
Business - BS
Business Administration - minor

C
Cell Biology and Neuroscience - BS; option in Cell Biology and Neuroscience
Chemical Engineering - BS; MS; PhD option in Engineering
Chemistry - BS; professional option; teaching option; teaching minor; MS; PhD
Child Services - minor
China Studies - minor
Civil Engineering - BS; MS; PhD option in Engineering
Clinical Nurse Specialist - Adults with Complex Acute and Chronic Health Problems
Coaching - minor
Community Health - BS
Computer Engineering - BS; MS; minor
Computer Science - BS; BS; MS; PhD; minor
Construction Engineering Management - MS
Construction Engineering Technology - BS
Counseling - MS option in Health & Human Development

Cr
Crop Science - BS option in Plant Sciences
Curriculum & Instruction - option in MEd; option in EdD

D
Dietetics - BS option in Food and Nutrition

E
Early Childhood Education - BS option in Elementary Education
Early Childhood Education and Child Services - BS
Earth Sciences - BS; MS; PhD; teaching minor
Ecology & Environmental Sciences - PhD
Ecology & Evolution - option for BS in Biological Sciences
Economics - BS; teaching minor; minor
Economics (Applied) - MS
Education - MEd with options in Adult and Higher Education, Curriculum and Instruction, Education Leadership, and School Counseling; EdD with options in Adult and Higher Education, Curriculum and Instruction, and Education Administration
Educational Leadership - option in MEd; option in EdD; option in EdD
Education Specialist - EdS with option in Education Administration
Electrical & Computer Engineering - PhD option in Engineering
Electrical Engineering - BS; MS; M.Eng.; minor
Elementary Education - BS
Engineering - PhD with options in Applied Mechanics, Chemical Engineering, Civil Engineering, Electrical & Computer Engineering, Environmental Engineering, Industrial Engineering, and Mechanical Engineering
English - BA; MA; writing option; literature option; teaching option
English Literature - minor
English Writing - minor
Entrepreneurship & Small Business Management - minor
Entomology - MS; minor
Environmental Biology - BS option in Environmental Sciences
Environmental Design - BA
Environmental Engineering - BS; MS; PhD option in Engineering
Environmental Health - BS option in Microbiology
Environmental Horticulture - BS
Environmental Horticulture Science - BS option in Environmental Horticulture
Environmental Sciences - BS
Environmental Studies - BA option in Liberal Studies
Equine Science - BS option in Animal Science
Exercise Science - BS option in Health & Human Performance

F
Family & Consumer Sciences - BS teaching or nonteaching option; MS option in Health & Human Development
Family & Consumer Science Education - teaching minor
Family Financial Planning - MS option in Health & Human Development
Family Nurse Practitioner - M option in Nursing
Family Nurse Practitioner Certificate, Post-Master's - Post Master's FNP
Farm & Ranch Management - concentration
Film and Photography - BA options in Film or Photography; minor in Photography
Finance - BS option in Business
Fish & Wildlife Biology - PhD
Fish & Wildlife Management - BS option in Biological Sciences; MS
Food & Nutrition - BS
French - BA option in Modern Languages & Literature; teaching option; teaching minor; minor

G
General Science - BS option in Secondary Education
Genetics - non-teaching minor
Geography - BS option in Earth Sciences
Geographic Information Science (GIS)/Planning option
Geographic Information Science (GIS) - minor
Geohydrology - BS option in Earth Sciences
Geology - BS option in Earth Sciences
Geospatial and Environmental Analysis - BS
German - BA option in Modern Languages & Literature; teaching option; teaching minor; minor
Global/Multicultural Studies - BA option in Liberal Studies
Government - teaching minor
Graphic Design - option in BFA Art

H
Health & Human Development - MS with options in Counseling, Family and Consumer Sciences, Family Financial Planning, Exercise and Nutrition Sciences, and Health Promotion and Education
Health and Human Performance - BS option in Exercise Science; Kinesiology
Health Enhancement K-12 (Health and Physical Education) - BS
Health Promotion and Education - MS option in Health & Human Development
Health Sciences - MS in Health Sciences
Hispanic Studies - BA option in Modern Languages and Literature; minor
History - BA; MA; PhD; Japan Studies; SETS; teaching option; teaching minor; minor
Honors - courses

I
Immunology and Infectious Diseases - MS; PhD
Industrial Engineering - BS; PhD option in Engineering
Industrial & Management Engineering - MS
Industrial Technology - BS option in Technology Education
Interdisciplinary Studies - BA; BS
International Business - minor
International Relations - BS option in Political Science
J
Japan Studies - BA option in History; minor

K
Kinesiology - BS option in Health and Human Performance

L
Land Rehabilitation - BS; MS
Land Resources and Environmental Sciences - MS
Landscape Design - BS option in Environmental Horticulture
Latin American and Latino Studies - minor
Liberal Studies - BA
Library Media - BS option in Elementary Education; teaching minor
Literature - BA option in English
Livestock Management and Industries - BS option in Animal Science

M
Management - BS option in Business
Management of Information Technology - minor
Marketing - BS option in Business
Mathematics - BS; MS with options in Mathematics and Mathematics Education; PhD; teaching option; BS option in Elementary Education; teaching minor; minor
Mathematics (Applied) - BS option in Mathematics
Mathematics Education - MS option in Mathematics
Mechanical Engineering - BS; MS; PhD option in Engineering
Mechanical Engineering Technology - BS
Mechanics (Applied) - PhD option in Engineering
Medical Laboratory Science - BS option in Microbiology
Microbial Systems - BS option in Biotechnology
Microbiology - BS; MS; PhD
Military Aerospace Studies-Air Force ROTC - courses
Military Science-Army ROTC - courses; minor
Modern Languages & Literatures - BA
Museum Studies - minor
Music Education - BMED
Music - BA; minor
Music Technology - BA

N
Native American Studies - MA; minor
Online Graduate Certificate
Natural Resources and Rangeland Ecology - BS; minor
Nursing - BS; Master of Nursing (MN): Family Nurse Practitioner (FNP) option; Clinical Nurse Leader (CNL) option; Family Psychiatric Mental Health Nurse Practitioner (FPMHNP) option; Post Master’s Family Nurse Practitioner (FNP) Certificate; Certificate in Nursing Education
Nutrition Science - BS option in Food and Nutrition

O
Organismal Biology - option for BS in Biological Sciences

P
Paleontology - BS option in Earth Sciences
Philosophy - BA; minor
Photography - See film and Photography
Physics - BS; MS; PhD; Professional, Interdisciplinary, and teaching options; teaching and non-teaching minors
Plant Biology - BS option in Plant Sciences
Plant Genetics - PhD option in Plant Sciences
Plant Pathology - MS; PhD option in Plant Sciences
Plant Sciences - BS; MS; PhD with options in Plant Genetics and Plant Pathology
Plant Systems - BS option in Biotechnology
Political Science - BA; options in Analysis and Policy, International Relations, Political Theory, Political Institutions; minor
Pre-Medical/Pre-Health Professions - MS in Health Sciences
Post Baccalaureate Pre-Medical Certificate
Pre-Med Intake Major
Courses
Preventive Medicine - courses
Project Engineering & Management - M
Psychology - BS; teaching minor; minor
Psychology (Applied) - BS option in Psychology; MS
Public Administration - M; minor

R
Rangeland Ecology and Management - option
Reading - BS option in Elementary Education; teaching minor
Relations - BS option in Agricultural Relations
Religious Studies - BA; minor

S
School Counseling - MEd
Science Education - BS option in Elementary Education; MS
Science & Natural History Filmmaking - MFA
Science, the Environment, Technology and Society (SETS) - BA option in History
Secondary Education - BS
Snow Science - BS option in Earth Sciences
Social Studies - BS option in Secondary Education
Sociology - BS; minor
Soil Science - minor
Soil and Water Sciences - BS option in Environmental Sciences
Spanish - BA option in Modern Languages & Literatures; teaching option; teaching minor; minor
Spatial Analysis/GIS - minor
Special Education - BS option in Elementary Education
Statistics - BS option in Mathematics; MS; PhD; minor
Studio Arts - option in BFA Art
Sustainable Crop Production - BS option in Sustainable Food & Bioenergy Systems
Sustainable Food & Bioenergy Systems - BS
Sustainable Food Systems - BS option in Sustainable Food & Bioenergy Systems
Sustainable Livestock Production - BS option in Sustainable Food & Bioenergy Systems

T
Technology Education - BS option in Secondary Education; teaching minor
Theatre Arts - BA

U
University Studies - University Seminar, other courses

W
Water Resource - minor
Wildlife Biology - refer to Fish and Wildlife Management
Wildlife Biology - refer to Fish and Wildlife Management
Wildlife Habitat Ecology & Management - option
Women’s Studies - minor

Z
Zoology - refer to Organismal Biology

Undergraduate Degrees, Majors, and Options
MSU-Bozeman offers a wide range of programs through its seven academic colleges. Specific degrees, majors, and options are listed under each college. By your junior year, earlier if possible, you will need to select a major in your main area of academic interest. The choice should be based on your current interests and your plans for the future. Careful consideration should also be given to the courses offered in the major and the requirements for completing the program of study.

College of Agriculture

• Bachelor of Science in Agricultural Business
  • Agribusiness Management Concentration
  • Farm and Ranch Management Concentration
• Bachelor of Science in Agricultural Education
  • Agricultural Education Broadfield Teaching Option
  • Agricultural Relations Option
• Bachelor of Science in Animal Science
  • Equine Science Option
  • Livestock Management and Industry Option
  • Science Option
• Bachelor of Science in Biotechnology
  • Animal Systems Option
  • Plant Systems Option
  • Microbial Systems Option
• Bachelor of Science in Environmental Horticulture
  • Environmental Horticulture Science Option

Landscape Design Option
• Bachelor of Science in Environmental Sciences
  • Environmental Biology Option
  • Soil and Water Sciences Option
• Bachelor of Science in Geospatial and Environmental Analysis
• Bachelor of Science in Geospatial Analysis
• Bachelor of Science in Natural Resources and Rangeland Ecology
  • Rangeland Ecology and Management Option
  • Wildlife Habitat Ecology and Management Option
• Bachelor of Science in Plant Science
  • Crop Science Option
  • Plant Biology Option
• Bachelor of Science in Sustainable Food & Bioenergy Systems
  · Agroecology Option
  · Sustainable Crop Production Option
  · Sustainable Livestock Production Option
• Non-degree program
  · Preveterinary Medicine Program

College of Arts and Architecture
• Bachelor of Arts in Art
  · Art Education K-12 Broadfield Option
  · Art History Option
  · Liberal Arts Studio Option
• Bachelor of Arts in Environmental Design
• Bachelor of Arts in Film and Photography
  · Film Option
  · Photography Option
• Bachelor of Fine Arts in Art
  · Graphic Design Option
  · Studio Arts Option
• Bachelor of Arts in Music
• Bachelor of Music Education
• Bachelor of Arts in Music Technology

College of Business
• Bachelor of Science in Business
  · Accounting Option
  · Finance Option
  · Management Option
  · Marketing Option

College of Education, Health and Human Development
• Bachelor of Science in Community Health
• Bachelor of Science in Early Childhood Education and Child Services
• Bachelor of Science in Elementary Education K-8
  · Early Childhood Education Option
  · Mathematics Option
  · Science Education Option
  · Special Education Option
• Bachelor of Science in Family and Consumer Sciences
  · Nonteaching Option
  · Teaching Option
• Bachelor of Science in Food and Nutrition
  · Dietetics Option
  · Nutrition Science Option
• Bachelor of Science in Secondary Education
  · General Science Broadfield Option
  · Social Studies Broadfield Option
  · (Departmental Teaching Options)
• Bachelor of Science in Health Enhancement K-12 (Health and Physical Education)
• Bachelor of Science in Health and Human Performance
  · Exercise Science Option
  · Kinesiology Option
• Bachelor of Science in Sustainable Food & Bioenergy Systems
  · Sustainable Food Systems Option
• Bachelor of Science in Technology Education
  · Industrial Technology Option
  · Technology Education Broadfield Teaching Option

College of Engineering
• Bachelor of Science in Bioengineering
• Bachelor of Science in Chemical Engineering
• Bachelor of Science in Civil Engineering
  · Bio-Resources Engineering Option
• Bachelor of Science in Computer Engineering
• Bachelor of Science in Computer Science
  · Interdisciplinary Option
  · Professional Option
• Bachelor of Science in Construction Engineering Technology
• Bachelor of Science in Electrical Engineering
• Bachelor of Science in Industrial Engineering
• Bachelor of Science in Mechanical Engineering
• Bachelor of Science in Mechanical Engineering Technology
• Non-degree programs
  · Military Aerospace Studies - Air Force ROTC
  · Military Science - Army ROTC

College of Letters and Science
• Bachelor of Arts in American Studies
• Bachelor of Science in Anthropology
• Bachelor of Science in Biological Sciences - (Ecology)
  · Biology Teaching Option
  · Ecology and Evolution Option
  · Fish and Wildlife Management Option
  · Organismal Biology Option
• Bachelor of Science in Cell Biology and Neuroscience
  · Biomedical Sciences Option
  · Cell Biology & Neuroscience Option
• Bachelor of Science in Chemistry
  · Biochemistry Option
  · Chemistry Professional Option
  · Chemistry Teaching Option
• Bachelor of Science in Earth Sciences
  · Geography Option
  · Geohydrology Option
  · Geology Option
  · GIS/Planning Option
  · Paleontology Option
  · Snow Science Option
• Bachelor of Science in Economics
• Bachelor of Arts in English
  · Writing Option
  · English Teaching Option
  · Literature Option
• Bachelor of Arts in History
  · History Option
  · History Teaching Option
  · Japan Studies Option
  · Religious Studies Option
  · Science, the Environment, Technology, and Society (SETS) Option
• Bachelor of Arts in Liberal Studies
  · Environmental Studies Option
  · Global/Multicultural Studies Option
  · Quaternion Option
• Bachelor of Science in Mathematics
  · Applied Mathematics Option
  · Mathematics Option
  · Mathematics Teaching Option
  · Statistics Option
• Bachelor of Science in Microbiology
  · Environmental Health Option
  · Medical Laboratory Science Option
  · Microbiology Option
• Bachelor of Arts in Modern Languages and Literatures
  · French Teaching Option
  · French & Francophone Studies Option
PROGRAMS OF INSTRUCTION

· German Teaching Option
· German Studies Option
· Hispanic Studies Option
· Spanish Teaching Option
• Bachelor of Arts in Philosophy
  · Philosophy Option
  · Philosophy and Religion Option
• Bachelor of Science in Physics
  · Professional Option
  · Physics Teaching Option
  · Interdisciplinary Option
• Bachelor of Arts in Political Science
  · International Relations Option
  · Analysis and Policy Option
  · Political Institution Option
  · Political Theory Option
• Bachelor of Science in Psychology
  · Applied Psychology Option
  · Psychological Science Option
• Bachelor of Science in Sociology
• Non-degree program
  · Pre-Medical Intake Major
  · Pre-Medical/Pre-Health Professions

College of Nursing
• Bachelor of Science in Nursing

University Honors
A program which provides academically motivated students with unique opportunities to undertake interdisciplinary coursework and undergraduate research leading to a university honors degree.

Undergraduate Minors

Teaching Minors
A number of teaching minors are available for students majoring in Secondary Education or Elementary Education.
· Art K-12
· Biology
· Chemistry
· Earth Science
· Economics
· Family and Consumer Sciences
· Government
· History
· Mathematics
· French K-12
· German K-12
· Spanish K-12
· Physics
· Psychology
· Sociology
· Technology Education

Non-teaching Minors
In addition to a major field of study, many students are now declaring a non-teaching minor. This is a secondary area of academic specialization. Some students use minors to expand their career opportunities, while others pursue minors in education. Students must submit an Application for a Minor to the Registrar’s Office two semesters prior to graduation. Below is a list of non-teaching minors currently available.
· Accounting
· Aerospace
· Agricultural Business
· Animal Science
· Anthropology
· Art History
· Astrobiology
· Women’s Studies
· Biochemistry
· Business Administration
· Chemistry
· China Studies
· Coaching
· Computer Engineering
· Computer Science
· Economics
· Electrical Engineering
· English Literature
· English Writing
· Entrepreneurship and Small Business Management
· Entomology
· Environmental Horticulture
· French
· Genetics
· Geographic Information Science (GIS)
· German
· Global Studies
· History
· International Business
· Japan Studies
· Latin American and Latino Studies
· Management of Information Technology
· Mathematics
· Mechatronics
· Microbiology
· Military Studies
· Museum Studies
· Music
· Native American Studies
· Natural Resources and Rangeland Ecology
· Philosophy
· Photography
· Physics
· Political Science
· Psychology
· Religious Studies
· Sociology
· Soil Science
· Spanish
· Spatial Analysis/GIS
· Statistics
· Water Resources
· Women’s Studies

MSU-Bozeman reserves the right to add or withdraw programs at any time subject to the concurrence of the Board of Regents of Higher Education.

Graduate Degrees and Options
MSU-Bozeman offers forty master’s degrees and fourteen doctoral degrees through its seven academic colleges. Specific majors and options are listed under each college. Further information on these programs is also available through the Graduate School.

College of Agriculture
• Master of Science in Applied Economics
• Master of Science in Agricultural Education
• Master of Science in Animal and Range Sciences
• Master of Science in Entomology
• Master of Science in Immunology and Infectious Diseases
• Master of Science in Land Resources and Environmental Sciences
• Master of Science in Land Rehabilitation
• Master of Science in Plant Pathology
• Master of Science in Plant Science
• Doctor of Philosophy in Animal and Range Sciences
• Doctor of Philosophy in Ecology and Environmental Sciences
• Doctor of Philosophy in Plant Science
  · Plant Genetics Option
  · Plant Pathology Option
College of Arts and Architecture

• Master of Architecture (M.Arch.)
• Master of Fine Arts in Art (M.F.A.)
• Master of Fine Arts in Science and Natural History Filmmaking (M.F.A.)
• Master of Arts in Art History

College of Business

• Master of Professional Accountancy (M.P.A.C.)

College of Education, Health and Human Development

• Certificate
  · College Teaching Certificate
• Master of Education (M.Ed.) in Curriculum and Instruction
  · Professional Educator Option
  · Educational Research Option
  · Technology Education Option
• Master of Education in Education (M.Ed.)
  · Adult and Higher Education Option
  · Educational Leadership Option
• Master of Education in School Counseling
• Master of Science in Health and Human Development
  · Counseling Option
  · Exercise & Nutrition Sciences Option
  · Family and Consumer Sciences Option
  · Family Financial Planning Option
  · Food, Family and Community Health
• Education Specialist (Ed.S.)
  · Educational Leadership Option
• Doctor of Education in Education (Ed.D.)
  · Adult and Higher Education Option
  · Curriculum and Instruction Option
  · Educational Leadership Option

College of Engineering

• Master of Construction Engineering Management (M.C.E.M.)
• Master of Science in Chemical Engineering
• Master of Science in Civil Engineering
• Master of Science in Computer Science
• Master of Science in Electrical Engineering
• Master of Science in Environmental Engineering
• Master of Science in Industrial and Management Engineering
• Master of Science in Mechanical Engineering
• Master of Science in Bioengineering
• Master of Science in Chemical Engineering
• Master of Science in Electrical Engineering
• Master of Science in Mechanical Engineering
• Master of Science in Computer Science
• Doctor of Philosophy in Engineering
  · Applied Mechanics Option
  · Chemical Engineering Option
  · Civil Engineering Option
  · Electrical & Computer Engineering Option
  · Environmental Engineering Option
  · Industrial Engineering Option
  · Mechanical Engineering Option

College of Letters and Science

• Master of Arts in American Studies
• Master of Arts in English
• Master of Arts in History
• Master of Arts in Native American Studies
• Master of Public Administration (M.P.A.)
• Master of Science in Biochemistry
• Master of Science in Biological Sciences
• Master of Science in Chemistry
• Master of Science in Earth Sciences
• Master of Science in Fish and Wildlife Management
• Master of Science in Mathematics
  · Mathematics Option
  · Mathematics Education Option
• Master of Science in Microbiology
• Master of Science in Neuroscience
• Master of Science in Physics
• Master of Science in Psychology
• Master of Science in Statistics
• Doctor of Philosophy in American Studies
• Doctor of Philosophy in Biochemistry

College of Nursing

• Master of Nursing (M.N)
  · Clinical Nurse Leader (CNL) Option
  · Family Nurse Practitioner (FNP) Option
  · Family Psychiatric Mental Health Nurse Practitioner (FPMHNP) Option
• Post Masters FNP Certificate Option
• Certificate in Nursing Education Option

Intercollege

• Master of Science in Science Education
• Doctor of Philosophy in Ecology and Environmental Sciences
• Master of Science in Health Science
• Post Baccalaureate Pre-Medical Certificate

MSU-Bozeman reserves the right to add or withdraw programs at any time subject to the concurrence of the Board of Regents of Higher Education.
COLLEGE OF AGRICULTURE

Jeff Jacobsen, Dean and Director

Undergraduate Programs Available:

- B.S. in Agricultural Business
- B.S. in Agricultural Education
- B.S. in Animal Science
- Biological Sciences at MSU
- B.S. in Biotechnology
- B.S. in Environmental Horticulture
- B.S. in Environmental Sciences
- B.S. in Land Rehabilitation
- B.S. in Geospatial and Environmental Analysis
- B.S. in Natural Resources and Rangeland Ecology
- B.S. in Plant Science
- Pre-veterinary Medicine Program
- B.S. in Sustainable Food & Bioenergy Systems

The College of Agriculture offers the Bachelor of Science degree in agricultural business, agricultural education, animal science, biotechnology, environmental horticulture, environmental sciences, land rehabilitation, land resource sciences, natural resources and rangeland ecology, plant science, and sustainable food & bioenergy systems. In addition a pre-veterinary program is available for students wishing to prepare for professional training in veterinary medicine.

Minors

Undergraduate minors are offered in agricultural business, agricultural education extension, animal science, entomology, natural resources and rangeland ecology, and soil science.

The Agricultural Business Minor is specifically designed for management training with emphasis on finance, accounting, and managerial economics in agriculture-related businesses and industries. The minor in animal science is designed to give students outside of agriculture a broad overview of the livestock industry. The agricultural education-extension minor is designed to give students a general agriculture and agricultural education background in preparation for extension work. The entomology minor provides focused training in entomology for students majoring in agricultural and natural resource disciplines. A natural resources and rangeland ecology minor provides students with the basics of managing rangeland ecosystems for wildlife habitat, livestock production, and soil and water conservation. The soil science minor is designed to provide non-majors with fundamental soils courses in preparation for natural resource careers.

Agricultural Business

Department of Agricultural Economics & Economics
http://www.montana.edu/econ/

Agribusiness is a dynamic industry with a high degree of global and technological sophistication. The agribusiness sector includes companies that are on the cutting edge in the use of biotechnology, strategy, information systems, risk management, logistics, and international trade. The study of agricultural business involves the application of business and economic principles to farming and ranching and related sectors of the general economy. Training in agricultural business includes courses in agricultural firm management, marketing farm products, farm credit and finance, agricultural prices and outlook, agricultural policy, management science, agricultural law, technical agriculture, and the business aspects of industries serving agriculture. Surveys indicate that employers seek out graduates with expertise in communication, critical thinking, business management and quantitative analyses. Our program specifically develops each of these skills.

Many employment possibilities are open to students with training in agricultural business. Positions are available with businesses which process and market agricultural products, and with the large number of businesses that sell products and services to farmers and ranchers, such as fertilizer companies, farm machinery companies, banks, and farm credit institutions. Also, opportunities exist to operate and manage farms and ranches. In addition, federal and state governments employ persons with training in agricultural business.

Many of our graduates work for regional, national, and even international agribusiness firms that market, process, and transport agricultural products. Other graduates work for companies that service agriculture by supplying inputs to producers. Agricultural credit institutions employ many of our graduates. Some of our graduates continue their education by pursuing graduate degrees or attending law school.

Agribusiness Management Concentration

The agribusiness sector of the economy, which produces and sells goods and services to farmers and ranchers on one hand, and processes and markets agricultural commodities on the other, is growing rapidly. In the United States, for every job in agricultural production, there are approximately three jobs in agriculture-related businesses. The MSU agribusiness management curriculum has established an excellent reputation with employers and is specifically designed for management training with emphasis on finance, accounting, and managerial economics in agriculture-related businesses and industries.

Farm and Ranch Management Concentration

For a student who expects to work in agricultural production and eventually own and operate a farm or ranch, the farm and ranch management option provides a vital set of management skills for success in undertaking the investment and complicated business aspects of farming and ranching. The future farm or ranch manager needs to be familiar with marketing, finance, business management, and the global agribusiness system in which production agriculture operates. Farm and ranch management is a strong academic program designed to provide marketing, management, and finance skills. This curriculum is supplemented with courses that emphasize technical agricultural issues.
## Curricula in Agricultural Business

### AGRIBUSINESS MANAGEMENT CONCENTRATION

#### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 100-Intro Animal Science</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 101B-Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 202-Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 110CS-Introduction to Plant Biology</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 121IN-Intro Gen Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>BIOB 170N-Principles of Biological Diversity</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

- M 151Q-Survey of Calculus                                           | 4       |
- M 171Q-Calculus I                                                  | 4       |

Take one of the following:

- AGED 140US-Leadership Development for Agr                         | 3       |
- COM 110US-Public Communication                                      | 3       |

University Core and Electives                                         | 3       |

### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 204IS-Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 309-Managerial Economics</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 337-Agricultural Law</td>
<td>3</td>
</tr>
<tr>
<td>AGED 105-Microcomputers in Agriculture</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 201-Principles of Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 202-Principles of Manageral Accounting</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 245IN-Soils</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

- BMGT 205-Management Communication Fundamentals                      | 3       |
- WRIT 201-College Writing II                                         | 3       |
- WRIT 221-Intermediate Tech Writing                                  | 3       |

University Core and Electives                                         | 3       |

### Junior and Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGBE 321-Econ of Ag Mkgt.</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 345-Ag Fin &amp; Credit Analysis</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 415-Advanced Agricultural Marketing</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 335-Management &amp; Organization</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 311-Management Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 325-Marketing</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 421-Advanced Agricultural Mkgt</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 445-Agricultural Management</td>
<td>3</td>
</tr>
</tbody>
</table>

University Core and Electives                                         | 3       |

### Graduation Requirements

Agricultural Business students must receive a grade of C- or better in ECNS 101IS, ECNS 202, ECNS 204IS, ECNS 301, ECNS 303, and M 161Q or M 171Q (or their equivalents) to meet departmental graduation requirements. All other AGBE/ECNS and selective courses counting toward departmental graduation requirements must be graded C- or better.

Agricultural Business students seeking a second major in Economics must complete an additional 15 credits at the 300 level or above in AGBE/ECNS electives over and above all requirements for graduation with a major in Agricultural Business.

A minimum of 120 credits is required for graduation; 42 of these credits must be numbered 300 or above.

### FARM AND RANCH MANAGEMENT CONCENTRATION

#### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 100-Intro to Animal Science</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 101B-Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 202-Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 110CS-Introduction to Plant Biology</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 121IN-Intro to General Chemistry</td>
<td>4</td>
</tr>
</tbody>
</table>

Take one of the following:

- M 151Q-Survey of Calculus                                           | 4       |
- M 171Q-Calculus I                                                  | 4       |

Take one of the following:

- AGED 140US-Leadership Development for Agr                         | 3       |
- COM 110US-Public Communication                                      | 3       |

University Core and Electives                                         | 3       |

### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 204IS-Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 309-Managerial Economics</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 337-Agricultural Law</td>
<td>3</td>
</tr>
<tr>
<td>AGED 105-Microcomputers in Agriculture</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 201-Principles of Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 202-Principles of Manageral Accounting</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 245IN-Soils</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

- BMGT 205-Management Communication Fundamentals                      | 3       |
- WRIT 201-College Writing II                                         | 3       |
- WRIT 221-Intermediate Tech Writing                                  | 3       |

University Core and Electives                                         | 3       |

### Junior and Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGBE 321-Econ of Ag Mkgt.</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 345-Ag Finance &amp; Credit Analysis</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 415-Advanced Agricultural Mkgt</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 445-Agricultural Management</td>
<td>3</td>
</tr>
</tbody>
</table>

University Core and Electives                                         | 3       |

### MINOR IN AGRICULTURAL BUSINESS (NON-TEACHING)

A student must receive a grade of C- or better in all courses required for the minor.

### Departmental Course Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 101B-Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 202-Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 301-Managerial Micro with Calculus</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 321-Econ of Ag Mkgt.</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 341-Farm &amp; Ranch Management</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 345-Ag Fin &amp; Cred Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

### Supporting Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 301-Principles of Financial Accounting</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

- M 151Q-Survey of Calculus                                           | 4       |
- M 171Q-Calculus I                                                  | 4       |

### Total

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
</tr>
</tbody>
</table>

### Electives

ECNS 251IN (Honors Economics, 4 credits) may be substituted for the 3 course sequence ECNS 101IS, ECNS 202, and ECNS 204IS.

### Other

Students cannot use either AGBE 337 or BGEN 361 to meet the requirements of the minor.

"P" grades may be accepted at the discretion of the department only for courses transferred from outside the Montana University System.

---

*Neither AGBE 445 nor AGBE 421 can be used to simultaneously satisfy the Major and Supporting Area Course requirements.

Electives Must Include:

- Social Sciences (excluding AGBE/ECNS)                                 | 6       |
- One additional course from Fine Arts, Humanities, or Social Sciences (excluding AGBE/ECNS) | 3       |

---
Agricultural Education
Division of Agricultural Education
http://ageducation.montana.edu/

Agricultural Education majors may choose from two options: Teaching or Relations. Agricultural education graduates are employed by high schools, area vocational schools, community colleges, public agriculture sector, Extension Service, Natural Resource Conservation Service, and other federal and state and government agencies.

The agricultural education curriculum is designed to provide professional preparation for extension agents, middle school and secondary agricultural education teachers, and persons in agricultural service areas where content knowledge, pedagogical, and andragogical skills, and presentation experience are desirable attributes. Our graduates are prepared for a wide variety of jobs because they have a broad base of knowledge combined with excellent people skills.

Students in agricultural education gain leadership experience through the Collegiate 4-H, Collegiate FFA, and other College of Agriculture student organizations.

Teaching Option
The teaching option permits a student to choose a balanced program among agricultural economics, agricultural mechanics, animal & range sciences, and plant & soil sciences, while also gaining teaching and presentation skills. Students preparing to teach spend 10-12 weeks in an approved high school agriculture department as student teachers. Graduates are eligible to receive a Montana Class Two (standard) teaching license which permits them to teach in middle and high schools. This licensure is recognized in most other states throughout the U.S.

Students may pursue a teaching minor in a variety of disciplines that provides them with additional employment opportunities.

Relations Option
The relations option is designed specifically to prepare students for entry-level employment in the Extension Service, other federal or state agencies or the public agriculture sector. This option provides broad-based education that emphasizes six subject areas: animal science, plant science, agricultural economics, education, communications, and agricultural technology. An approved internship in a local Extension office or an approved internship program with an agricultural agency is required.

Curricula in Agricultural Education

AGRICULTURAL EDUCATION

TEACHING OPTION

Freshman Year
F S
WRIT 101W-College Writing I.........3
CHMY 121IN-Intro to General Chem......4
AGED 140US-Leadership
Development for Agr......................3
M 145Q-Math for Liberal Arts..........3
NRSM 101-Natural Resource Conservation 3
NRSM 102-Montana Range Plants Lab .... 1
BIOB 110CS-Introduction to Plant Biology .... 3
BIOB 190-Principles of Living Systems ...... 4
HDCP 150-Lifespan Human Development .... 3
EDU 202-Early Field Experience ........1
ANSC 100-I Intro Animal Science ......3
AGED 105-Microcomputers in Agriculture ....3
Total 17 17

Sophomore Year
F S
ECNS 101B-Econ Way of Think ............3
EDU 223-Ed Psy & Adolescent Dev .........3
ANSC 265-Functional Anatomy Dom Animal ..3
ANSC 266-Funct Anatomy
Dom Animal Lab..........................1
TE 207-Materials and Processes ............4
ENSC 245IN-Soils............................5
WRIT 221-Intermediate Tech Writing ... 3
EDU 211D-Multicultural Education ......3
EDU 382-Assessment, Curric, Instruction ....3
ETME 311-Welding Processes .............3
ANSC 282-Range Livestock Production ......3
AGED 255-Ag Ed in Pub Schools ..........3
Total 17 17

Junior Year
F S
Take one of the following:
BIOB 318-Biometry ......................3
STAT 216Q-Introduction to Statistics ... 3
AGED 312R-Communicating Ag ..........3
ANSC 320-Natural Nutrition ..............4
AGTE 355-Power Syst Oper Control ... 3
HDCP 356-Exceptional Needs ..........3
AGED 310S-Economics of Ag Business ....3
AGED 301-Rural Electrification ..........3
AGED 494-Seminar ..........................1
HORT 245-Plant Propagation ............3
University Core ................................3
Total 16 16

Senior Year
F S
EDU 497-Methods: Ag and Tech Ed .......3
TE 406-Curr & Facilities Plan ......3
AGED 333-Construction Technology ......3
AGED 397-Ed Methods in Agr Seminar ......3
EDU 408-Professional Issues: 5-12 ... 2
EDU 495-Student Teaching: 5-12 .... 10-12
Upper Division Ag Elective ............4
Total 16 12-14

* Required 300 and above.
**A minimum of 24 Ag Relations Curriculum Electives must be taken with advisor approval, 12 of which must come from the College of Agriculture. A minimum of 128 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

AGRICULTURAL EDUCATION

REATIONS OPTION

Freshman Year
F S
WRIT 101W-College Writing I.........3
ECNS 101B-Econ Way of Think ............3
AGED 140US-Leadership
Development for Agr......................3
M 145Q-Math for Liberal Arts ..........3
NRSM 101-Natural Resource Conservation ....3
NRSM 102-Montana Range Plants Lab .... 1
CHMY 121IN-Intro to General Chemistry
AGSC 101-Intr to Ag & Enviro Sci ......1
ASCE 100-Intra to Animal Science ......3
AGED 105-Microcomputers in Agri .........3
HORH 160-Principles of Living Systems ......4
Total 15 16

Sophomore Year
F S
HDCP 150S-Lifespan Human Development .... 3
WRIT 221-College Writing II ......3
EDU 223-Ed Psy & Adolescent Dev ........3
ENSC 245IN-Soils............................3
ECNS 204IN-Micro Theory ..................3
AGED 210S-Economics of Ag Business ....3
HORH 220-General Botany .................4
Ag Relations Curriculum Electives ......3
University Core ...................................3
Total 15 17

Junior Year
F S
ANSC 265-Functional Anatomy Dom Animal ..3
ANSC 266-Funct Anatomy Lab ..........3
AGED 312R-Communicating Ag ..........3
BIOB 202-SYS Intro to Endo Ento .......3
Take one of the following:
BIOB 318-Biometry ......................3
STAT 216Q-Introduction to Statistics ....3
AGED 310S-Economics of Ag Business ....3
HDCP 356-Exceptional Needs ..........3
*Ag Relations Curriculum Electives ......4
University Core ...................................3
Total 14 16

Senior Year
F S
AGED 482-Non Form Tchng Mtbl Ag ......3
AGED 321E-Cong of Ag Mkglg ..........3
AGED 482-International Extension Systems ....3
AGED 312-Econom of Ag Business .......3
AGED 498-Internship ......................4
AGED 509-Phil & Prog in Extension .......3
AGED 494-Seminar ..........................2
*Ag Relations Curriculum Electives ......4
Total 19 15

* A minimum of 24 Ag Relations Curriculum Electives must be taken with advisor approval, 12 of which must come from the College of Agriculture. A minimum of 128 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

Animal Science
Department of Animal and Range Sciences
http://animalrange.montana.edu/

Note: MSU’s programs in the biological sciences are distributed across multiple departments. MSU does not have a single Department of Biology. For additional options see pages 78 and 155.
The animal science curricula are administered by the Department of Animal and Range Sciences. The curricula in animal science provide students with a firm foundation in the biological and natural sciences, animal breeding, reproductive physiology, nutrition and livestock production, and management. Applications to production environments of the Western United States are emphasized, including the close relationships among livestock, rangeland, and natural resources. Three options are offered leading to a B.S. in Animal Science. Proper use of restricted electives allows students to tailor curricula to meet their individual needs.

Equine Science Option

The Equine Science Option emphasizes science and technology combined with practical aspects of management, horsemanship, and training. Graduates of this program will have a firm foundation to meet the growing needs of the equine industry. This program is designed to prepare students for employment in breeding, nutrition, and management of facilities, and land, as well as in the allied industries such as sales, feed, tack, and equipment. Students can tailor their program for more emphasis in biotechnology, business, or range management.

Livestock Management & Industry Option

The Livestock Management & Industry Option stresses the application of science to livestock production, incorporating courses in agricultural economics and business. Emphasis is placed on the application of the principles of economics, range science, genetics, physiology and nutrition in sustainable production systems and business and management skills as they relate to livestock enterprises and service industries closely allied to livestock production. It is designed to allow flexible course work choices to prepare graduates to manage livestock enterprises or for employment with companies producing and marketing livestock, animal feeds and health products, as well as employment with a variety of communication and service organizations such as breed associations, commodity groups, livestock publications and government agencies.

### Science Option

The Science Option emphasizes greater depth in the basic sciences and is designed for highly motivated students who have a strong interest in graduate training or professional school. Individual curricula can be tailored to provide excellent preparation for veterinary school, medical school, or graduate studies in animal biotechnology, physiology, nutrition or genetics.

### Curricula in Animal Science

#### EQUINE SCIENCE OPTION

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 109--Intro to Animal Science..............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 101--Natural Resource Conserv .............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 102--Montana Range Plants Lab ...........</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CHMY 121IN--Intro to General Chem .......... 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECNS 101B--Economic Way of Thinking ............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Applied Courses ................................</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives..................</td>
<td>7 .... 3</td>
<td></td>
</tr>
<tr>
<td>Total......................................</td>
<td>15 .... 15</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRSM 256--Small Pasture Management ............</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CHMY 123--Intro to Organic &amp; Biochem ..........</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ANSC 265--Funct Anatomy Dom Animal ...........</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ANSC 266--Funct Anatomy Dom Animal Lab .........</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Take one of the following: BMGT 205--Mgmt Comm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundamentals ..................................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing ............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ECNS 292--Principles of Macroeconomics ........</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ECNS 294B--Microeconomics ......................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Take one of the following: BMGT 318--Biometry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAT 216Q--Introduction to Statistics ..........</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Econ &amp; Business Elective ......................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Applied Courses ................................</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives ..................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total......................................</td>
<td>14 .... 16</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 329--Animal Nutrition ......................</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ANSC 521--Physiology of Animal Reproduction ....</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ANSC 322--Princ of Animal Breed/Geneic .........</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EQUH 327--Equine Lameness ................. 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANSC 357--Diseases of Domestic Livestock ......</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EQUH 347--Equine Form to Function .......... 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANSC 498--Internship (min. 3 cr.) .............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Econ &amp; Business Elective ......................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Applied Courses ................................</td>
<td>2 .... 2</td>
<td></td>
</tr>
<tr>
<td>Total......................................</td>
<td>16 .... 14</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQUH 346--Equine Reproductive Management ....</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following: ANSC 418--Topics in Beef Nutrition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQUH 425--Equine Nutrition ....................</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>EQUH 450--Equine Management ..................</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives .................</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Econ and Business Elective ....................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mgmt &amp; Industry Electives ....................</td>
<td>6 .... 6</td>
<td></td>
</tr>
<tr>
<td>Total......................................</td>
<td>13 .... 16</td>
<td></td>
</tr>
</tbody>
</table>

### Applied Courses

| Select 8 Credits |
|------------------|----------------|
| EQUH 110--Western Equitation ..................| 2 |
| EQUH 114--Beginning English Equitation ..........| 2 |
| EQUH 207--Intermediate English Equitation ......| 2 |
| EQUH 210--Western Equitation ..................| 2 |
| EQUH 253--Starting Colts .......................| 2 |
| EQUH 256--Developing the Young Horse ..........| 2 |
| EQUH 255--Horse Science and Management Lab ....| 1 |
| NRSM 235--Range and Pasture Monitoring ...... 1 |
| EQUH 314--Equestrian Instruction Methods .......| 2 |

### Econ & Business Electives

| Select 9 Credits |
|------------------|----------------|
| ACTG 220--Survey of Accounting ................| 3 |
| AGRE 210IS--Econ of Agribusiness Mgmt ........| 3 |
| AGRE 321--Econ Ag Marketing ...................| 3 |
| AGRE 357--Ag Law ................................| 3 |
| AGRE 341--Farm & Ranch Mgmt ...................| 3 |
| AGRE 345--Ag Finance Cred Analys ................| 3 |
| AGRE 421--Adv Ag Marketing ....................| 3 |
| AGED 353--Co-op Bus Prin & Pract ..............| 3 |
| ACTG 201--Prin Accounting .....................| 3 |
| ACTG 202--Managerial Accounting ...............| 3 |
| BMGT 355--Mgmt & Organization .................| 3 |
| BMKT 325--Marketing ............................| 3 |
| BGEN 361--Intro to Law ..........................| 3 |
| ECNS 314--International Economics .............| 3 |
| BMKT 242D--Intro Global Markets ...............| 3 |
| BMKT 337--Consumer Behavior ....................| 3 |
| BMKT 436--Sales and Sales Management ..........| 3 |

### Management & Industry Electives

| Select 12 Credits |
|------------------|----------------|
| ANSC 252--Livestock Mgmt/Sheep .................| 1 |
| ANSC 254--Livestock Mgmt/Beef ..................| 1 |
| NRSM 240--Natural Resource Ecology ..............| 3 |
| NRSM 455--Repairian Ecology & Management ........| 3 |
| NRSM 553--Grazing Ecology & Management ..........| 3 |
| ANSC 410--Veterinary Entomology .................| 2 |
| ANSC 432--Sheep Management .....................| 3 |
| ANSC 454R--Beef Cattle Management ...............| 4 |
| NRSM 453--Habitat Inventory & Analysis ..........| 3 |
| ENSC 245N--Soils ..................................| 3 |
| AGSC 341--Field Crop Production .................| 3 |
| AGSC 342--Forages ................................| 3 |

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. University core requirements must be completed.

### LIVESTOCK MANAGEMENT & INDUSTRY OPTION

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 109--Intro to Animal Science ..............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 101--Natural Resource Conserv .............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 102--Montana Range Plants Lab ............</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CHMY 123--Intro to Organic &amp; Biochem ..........</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BMGT 160--Principles of Living Systems ..........</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 121IN--Intro to General Chem .............</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ECNS 101B--Economic Way of Thinking ............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Applied Courses ................................</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives ..................</td>
<td>7 .... 3</td>
<td></td>
</tr>
<tr>
<td>Total......................................</td>
<td>15 .... 15</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMGT 205--Mgmt Comm Fundamentals ...............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing ............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMGT 318--Biometry ................................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT 216Q--Introduction to Statistics ..........</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Econ &amp; Business Elective ......................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Applied Courses ................................</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives ..................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total......................................</td>
<td>14 .... 16</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 329--Animal Nutrition ......................</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ANSC 357--Diseases of Domestic Livestock ......</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EQUH 347--Equine Form to Function .............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ANSC 498--Internship (min. 3 cr.) .............</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Econ &amp; Business Elective ......................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Applied Courses ................................</td>
<td>2 .... 2</td>
<td></td>
</tr>
<tr>
<td>Total......................................</td>
<td>16 .... 14</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQUH 346--Equine Reproductive Management ....</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following: ANSC 418--Topics in Beef Nutrition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EQUH 425--Equine Nutrition ....................</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>EQUH 450--Equine Management ..................</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives .................</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Econ and Business Elective ....................</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mgmt &amp; Industry Electives ....................</td>
<td>6 .... 6</td>
<td></td>
</tr>
<tr>
<td>Total......................................</td>
<td>13 .... 16</td>
<td></td>
</tr>
</tbody>
</table>
### PROGRAMS OF INSTRUCTION – AGRICULTURE

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 230--Intro to Meat Eul (or)</td>
<td>2</td>
</tr>
<tr>
<td>ANSC 208-Livestock Evaluation</td>
<td>2</td>
</tr>
<tr>
<td>ANSC 232-Livestock Mgmt-Sheep</td>
<td>2</td>
</tr>
<tr>
<td>EQU 233-Horse Science and Mgmt Lab</td>
<td>1</td>
</tr>
<tr>
<td>ANSC 254-Livestock Mgmt-Beef</td>
<td>1</td>
</tr>
<tr>
<td>NRSM 235-Range and Pasteure</td>
<td>1</td>
</tr>
<tr>
<td>ANSC 322-Princ of Animal Breed/Genetic</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 337-Diseases of Domestic Livestock</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 498-Internship (minimum 3 credits)</td>
<td>3</td>
</tr>
<tr>
<td>Econ &amp; Business Elective</td>
<td>4</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 316-Meat Science</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 320-Animal Nutrition</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 321-Physiology of Animal Reproduction</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 322-Princ of Animal Breed/Genetic</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 337-Diseases of Domestic Livestock</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 498-Internship (minimum 3 credits)</td>
<td>3</td>
</tr>
<tr>
<td>Econ &amp; Business Elective</td>
<td>4</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 320-Animal Nutrition</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 321-Physiology of Animal Reproduction</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 322-Princ of Animal Breed/Genetic</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 337-Diseases of Domestic Livestock</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 498-Internship (minimum 3 credits)</td>
<td>3</td>
</tr>
<tr>
<td>Econ &amp; Business Elective</td>
<td>4</td>
</tr>
</tbody>
</table>

**ARNR Livestock Management Electives** (Select 6 credits)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 116R-Meat Processing</td>
<td>3</td>
</tr>
<tr>
<td>EQU 310-Horse Management</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 322-Sheep Management</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 414R-Beef Cattle Mgmt</td>
<td>4</td>
</tr>
</tbody>
</table>

**Econ & Business Electives** (Select 9 credits)

- ACTG 220-Survey of Accounting 3
- ACTG 321-Econ Ag Marketing 3
- AGRE 337--Ag Law 3
- AGRE 341-Farm & Ranch Mgmt 3
- AGRE 345--Ag Finance Cred Analysis 3
- AGRE 421--Adv Ag Marketing 3
- AGED 355--Coop Bus Prim & Pract 3
- ACTG 201--Prin Accounting 3
- ACTG 202--Managerial Accounting 3
- BMKT 337--Consumer Behavior 3
- BMKT 346-Sales and Sales Management 3

**Management & Industry Electives** (Select 12 credits)

- EQU 327--Equine Lameness 3
- NRSM 435--Riparian Ecology & Management 3
- NRSM 355--Grazing Ecology & Management 3
- ANSC 410--Veterinary Entomology 2
- ANSC 421--Assist Reproductive Technologies 4
- ANSC 416--Topics in Beef Nutrition 2
- EQU 329--Equine Nutrition 2
- NRSM 455--Habitat Inventory & Analysis 3
- ENSC 254F--Soils 3
- AGSC 341--Field Crop Production 3
- AGSC 342--Forages 3

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. University core requirements must be completed.

### SCIENCE OPTION

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 109--Intro to Animal Science</td>
<td>3</td>
</tr>
<tr>
<td>NRSM 101--Natural Resource Conservation</td>
<td>3</td>
</tr>
<tr>
<td>NRSM 102--Montana Range Plants Lab</td>
<td>1</td>
</tr>
<tr>
<td>BIBO 170N--Principles of Biological Diversity</td>
<td>1</td>
</tr>
<tr>
<td>BIBO 160--Principles of Living Systems</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I 4</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>15</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRSM 240--Natural Resource Ecology</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 211--Elements of Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Take one of the following</td>
<td></td>
</tr>
<tr>
<td>BMGT 205--Mgmt Comm Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>M 161Q--Survey of Calculus</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>BIBO 318--Biometry</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q--Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>BIBO 105C--Intro to Biotech</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 265--Prin Anatomy Dom Animal</td>
<td>5</td>
</tr>
<tr>
<td>ANSC 266--Prin Anatomy Dom Animal</td>
<td>5</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>15</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 320--Animal Nutrition</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 321--Physiology of Animal Reproduction</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 322--Princ of Animal Breed/Genetic</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 337--Diseases of Domestic Livestock</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 498-Internship (minimum 3 credits)</td>
<td>3</td>
</tr>
<tr>
<td>Econ &amp; Business Elective</td>
<td>4</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 116-R-Meat Processing</td>
<td>3</td>
</tr>
<tr>
<td>EQU 310-Horse Management</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 322--Princ of Animal Breed/Genetic</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 337--Diseases of Domestic Livestock</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 498-Internship (minimum 3 credits)</td>
<td>3</td>
</tr>
<tr>
<td>Econ &amp; Business Elective</td>
<td>4</td>
</tr>
</tbody>
</table>

### ANIMAL SCIENCE MINOR (NON-TEACHING)

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. University core requirements must be completed.

### MSU GENETICS MINOR

The department participates in MSU’s Genetics Minor and recommends this minor to students particularly interested in genetics.

### Biological Sciences at MSU

**ANIMAL SCIENCE**

- Animal and Range Sciences Department; College of Agriculture
- **Equine Science**: emphasizes science and technology combined with practical aspects of management, horsemanship, and training.

**Livestock Management and Industry**: stresses the application of science to livestock production, incorporating courses in agriculture economics and business. This program focuses on
sustainable livestock systems, business, and management skills as they relate to livestock enterprises and production service industries.

**Science Option:** emphasizes greater depth in the basic sciences and is designed for highly motivated students who have a strong interest in graduate training or professional school.

**BIOTICAL SCIENCES**  
*Ecology Department;  
College of Letters and Science*

Conservation Biology and Ecology: gives students a clear understanding of the ways that natural and human-related processes affect species, communities and ecosystems, and relate this knowledge to its broad societal context.

Fish and Wildlife Ecology and Management: provides a professional degree program for those students who have an interest in employment in these fields. Study leading toward a bachelor’s degree emphasizes basic principles of animal ecology, with considerable work in related fields.

Organismal Biology: provides a rigorous program of study in plant or animal biology at the whole-organism, species, population, and community levels, while allowing students flexibility in selecting those biology courses that best meet their interests and objectives.

Biology Teaching: certifies graduates to be qualified to teach secondary school biology and provides a solid education in biology and basic sciences with professional preparation courses required for state teacher certification.

**BIOTECHNOLOGY**  
*Immunology and Infectious Diseases Dept;  
Microbiology Dept; Plant Sciences and Plant Pathology Department*

Modern research in cellular and molecular biology and its resultant technology offers unparalleled opportunities to provide solutions to our society’s most urgent problems in human and animal health, agriculture, and environmental quality.

- Animal Systems
- Plant Systems
- Microbial System

**CELL BIOLOGY AND NEUROSCIENCE**  
*Cell Biology and Neuroscience Department;  
College of Letters and Science*

**Biomedical Sciences:** The biomedical science options curriculum provides a strong background for students who are (1) interested in biomedical sciences career in research or teaching, or (2) plan on a career in medicine or other health professions.

**Cell Biology and Neuroscience:** The curriculum in the cell biology and neuroscience option provides a strong background for students who are interested in a career in research or teaching in cell biology, molecular biology, developmental biology, or neuroscience.

**CHEMISTRY; BIOCHEMISTRY OPTION**  
*Chemistry and Biochemistry Department;  
College of Letters and Science*

This course of study includes a core of Chemistry, Biochemistry, and biology courses for the student interested in the molecular nature of biological materials and life processes.

**ENVIROMENTAL HORTICULTURE**  
*Plant Sciences and Plant Pathology Department;  
College of Agriculture*

Environmental Horticulture Science: the science and art of growing and maintaining plants for food and the enjoyment and improvement of the human environment. Its application through research has led to improved varieties of plants to benefit our daily lives.

Landscape design: prepares students to solve aesthetic and functional landscape problems.

**ENVIRONMENTAL SCIENCES**  
*Land Resources and Environmental Sciences Department; College of Agriculture*

**Environmental Biology:** intended to train students who are interested in understanding the ecology of organisms in natural environments, and/or in understanding how organisms may be used to clean up environments that have been disturbed by human activities.

**Soil and Water Sciences** provides students with fundamental training in biological, chemical, and physical sciences and advanced training in soil and water sciences.

**LAND REHABILITATION**  
*Land Resources and Environmental Sciences Department; College of Agriculture*

This course of study provides training in site re-vegetation, soil remediation, riparian zone restoration, stream channel restoration, investigation of impacted geologic resources, restoration ecology, and remediation of sites contaminated by industrial activities.

**GEOGRAPHICAL AND ENVIRONMENTAL ANALYSIS**  
*Land Resources and Environmental Sciences; College of Agriculture*

This program is for students interested in land resources and their management at landscape scales.

**MICROBIOLOGY**  
*Microbiology Department; College of Letters and Science*

Environmental Health: provides a program for attaining a broad understanding of the physical, chemical, and biological factors in our environment, and their interactions that relate to health.

**Medical Laboratory Science:** designed to prepare students for careers in Clinical Laboratory Science.

Microbiology: In this option, students obtain a thorough education in the fields of medical, ecological, physiological and environmental microbiology, immunology, virology, and molecular biology.

**NATURAL RESOURCES AND RANGELAND ECOLOGY**  
*Animal and Range Sciences Department; College of Agriculture*

Rangeland Ecology and Management: provides training in soils, vegetation, water, riparian areas, and livestock production on rangelands.

Wildlife Habitat Ecology and Management: the science and art of managing wildland habitats for wildlife.
PLANT SCIENCES
Plant Sciences and Plant Pathology
Department; College of Agriculture

Crop Science: The challenge for crop scientists is to implement crop and soil management schemes that maintain and/or increase production, but at the same time conserve our soil and water resources and preserve the delicate balance in the agroecosystem.

Plant Biology: Plant biology provides a broad education in the plant sciences.

Biotechnology
Department of Biotechnology
http://iid.montana.edu/

Note: MSU’s programs in the biological sciences are distributed across multiple departments. MSU does not have a single Department of Biology. For additional options see pages 78 and 155.

Modern research in cellular and molecular biology and its resultant technology offers unparalleled opportunities to provide solutions to our society’s most urgent problems in human and animal health, agriculture, and environmental quality. The emerging biotechnology industries are involved in developing products to maintain biodiversity, restore soil and water quality, develop new pharmaceuticals to combat disease, decrease our dependence on nonrenewable resources, and improve food and fiber production. Students interested in microbiology, animal or plant science, biochemistry, and animal or human medicine will find challenging careers in the diverse areas of biotechnology in either an academic or industrial setting. Students successfully completing a biotechnology curriculum will also be prepared to enter graduate or medical professional schools for further study.

The Bachelor of Science in Botany degree is offered by the College of Agriculture. Students will pursue a basic science curriculum the first two years and then choose an area of emphasis in plant, animal or microbial systems for the junior/senior years. Depending on the option chosen, students will be advised by participating faculty in the Colleges of Agriculture and Letters and Science.

Curricula in Biotechnology

ALL BIOTECHNOLOGY OPTIONS

Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 170N</td>
<td>Principles of Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>or BIOL 256</td>
<td>Intro to BioScience</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 150</td>
<td>Forensic Science</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 151</td>
<td>College Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 152</td>
<td>College Zoology</td>
<td>3</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 255</td>
<td>Principles of Life Science</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 256</td>
<td>Principles of Living Systems</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 257</td>
<td>Principles of Cell Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 258</td>
<td>Principles of Microbiology</td>
<td>3</td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 300</td>
<td>Principles of Molecular Biology I</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 301</td>
<td>Principles of Molecular Biology II</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 302</td>
<td>Principles of Molecular Biology III</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 303</td>
<td>Principles of Molecular Biology IV</td>
<td>3</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 400</td>
<td>Principles of Molecular Biology V</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 401</td>
<td>Principles of Molecular Biology VI</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 402</td>
<td>Principles of Molecular Biology VII</td>
<td>3</td>
</tr>
</tbody>
</table>

ANIMAL SYSTEMS OPTION

Junior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOI 110</td>
<td>Principles of Animal Science</td>
<td>3</td>
</tr>
<tr>
<td>BIOI 120</td>
<td>Principles of Animal Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOI 130</td>
<td>Principles of Animal Physiology</td>
<td>3</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOI 210</td>
<td>Principles of Animal Reproduction</td>
<td>3</td>
</tr>
<tr>
<td>BIOI 220</td>
<td>Principles of Animal Behavior</td>
<td>3</td>
</tr>
<tr>
<td>BIOI 230</td>
<td>Principles of Animal Development</td>
<td>3</td>
</tr>
</tbody>
</table>

PLANT SYSTEM OPTIONS

Junior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 100</td>
<td>Principles of Plant Science</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 110</td>
<td>Principles of Plant Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 120</td>
<td>Principles of Plant Physiology</td>
<td>3</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 210</td>
<td>Principles of Plant Reproduction</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 220</td>
<td>Principles of Plant Development</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 230</td>
<td>Principles of Plant Ecology</td>
<td>3</td>
</tr>
</tbody>
</table>

Restricted Electives

Choose Four Of The Following Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 300</td>
<td>Principles of Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 301</td>
<td>Principles of Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 302</td>
<td>Principles of Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 303</td>
<td>Principles of Molecular Biology</td>
<td>3</td>
</tr>
</tbody>
</table>

Recommended Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 200</td>
<td>Animal Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 300</td>
<td>Principles of Animal Breeding</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 400</td>
<td>Principles of Animal Genetics</td>
<td>3</td>
</tr>
</tbody>
</table>

BCH 441 | Biochemistry of Macromolecules | 3 |
| BCH 442 | Biochemistry of Metabolism | 3 |
| BCH 443 | Biochemistry of Cell Biology | 3 |
| BCH 444 | Biochemistry of Molecular Biology | 3 |

BCH 445 | Biochemistry of Genetics | 3 |
| BCH 446 | Biochemistry of Development | 3 |
| BCH 447 | Biochemistry of Disease | 3 |

AGS 401 | Food and Animal Nutrition | 3 |
| AGS 402 | Food and Animal Physiology | 3 |
| AGS 403 | Food and Animal Genetics | 3 |

BCH 448 | Biochemistry of Metabolism | 3 |
| BCH 449 | Biochemistry of Cell Biology | 3 |
| BCH 450 | Biochemistry of Molecular Biology | 3 |

BCH 451 | Biochemistry of Genetics | 3 |
| BCH 452 | Biochemistry of Development | 3 |
| BCH 453 | Biochemistry of Disease | 3 |

AGS 404 | Food and Animal Nutrition | 3 |
| AGS 405 | Food and Animal Physiology | 3 |
| AGS 406 | Food and Animal Genetics | 3 |

BCH 448 | Biochemistry of Metabolism | 3 |
| BCH 449 | Biochemistry of Cell Biology | 3 |
| BCH 450 | Biochemistry of Molecular Biology | 3 |
Senior Year  

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 441--Biochem of Macromolec</td>
<td>3</td>
</tr>
<tr>
<td>BCH 444--Biochem Mthds Molec Biol</td>
<td>3</td>
</tr>
<tr>
<td>BIOH 211--Human Anatomy &amp; Physiology</td>
<td>4</td>
</tr>
<tr>
<td>EENY 447-Hazardous Waste Management</td>
<td>3</td>
</tr>
<tr>
<td>BIO 435--Virology</td>
<td>4</td>
</tr>
<tr>
<td>BIOH 405-Hematology</td>
<td>3</td>
</tr>
<tr>
<td>and BIOH 406-Hematology Lab</td>
<td>1</td>
</tr>
<tr>
<td>BIOM 431--Med Bacteriology</td>
<td>3</td>
</tr>
<tr>
<td>and BIOM 432-Med Bac Lab</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 345--Environ Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 435--Soil &amp; Env Physics</td>
<td>3</td>
</tr>
<tr>
<td>EMA 251--Materials Structures and Properties</td>
<td>3</td>
</tr>
<tr>
<td>EBOH 438-Bioprocess Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

A minimum of 129 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

Environmental Horticulture

Department of Plant Sciences and Plant Pathology

http://plantsciences.montana.edu/

Note: MSU’s programs in the biological sciences are distributed across multiple departments. MSU does not have a single Department of Biology. For additional options see pages 78 and 155.

The department participates in MSU’s Genetics Minor and recommends this minor to students particularly interested in genetics.

The curriculum in Environmental Horticulture is administered by the Department of Plant Sciences and Plant Pathology. Options are available in Environmental Horticulture Science and Landscape Design.

Faculty members who advise students and teach courses are also active researchers in their disciplines. Students learn current knowledge and technology through formal coursework and gain valuable first-hand experience in departmental laboratories, greenhouses, and at field research farms. Students are encouraged to seek additional learning experiences outside the classroom by working in summer jobs and internship with private industry and government agencies.

Each student works closely with a faculty advisor to formulate a program of study which is appropriate with the student’s career goals and also fits into one of the following options.

Environmental Horticulture Science Option

Horticulture is the science and art of growing and maintaining plants for food and for the enjoyment and improvement of the human environment. Its application through research has led to improved varieties of plants to benefit our daily lives. Students studying horticulture take fundamental courses in biology and chemistry prior to taking specialized courses such as plant materials, plant physiology, commercial plant production, plant propagation, turfgrass management and horticulture capstone, and landscape management.

Graduates of this program are prepared for careers in such area as nursery crop production; landscape nurseries; greenhouse businesses; botanic gardens; golf courses; grounds maintenance; cooperative extension service; and research with private companies, public agencies or institutions of higher learning.

Landscape Design Option

The Landscape Design option will prepare students to solve aesthetic and functional landscape problems. Students learn written, oral and graphic communication skills which are necessary to convey creative solutions for landscape planning. This blend of art and science which utilizes both technical and creative studies leads to problem-solving skills for beautiful, functional and efficient landscape design solutions. Emphasis is placed on utilization of plant materials to solve specific site problems. Graduates are employed by landscape nurseries, landscape contractors, and planning agencies; others become self-employed as landscape designers and contractors. Many students have chosen to continue advanced studies in programs of landscape architecture.

Curricula in Environmental Horticulture

ENVIRONMENTAL HORTICULTURE

SCIENCE OPTION

Freshman Year  

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORT 105--Miracle Growing</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 121IN--Intro to General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>M 145Q-Math for Liberal Arts</td>
<td>5</td>
</tr>
</tbody>
</table>

Sophomore Year  

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORT 231--Woody Ornamentals</td>
<td>3</td>
</tr>
<tr>
<td>HORT 232--Herbaceous Ornamentals</td>
<td>3</td>
</tr>
<tr>
<td>HORT 245--Plant Propagation</td>
<td>3</td>
</tr>
<tr>
<td>BICO 220-General Botany</td>
<td>4</td>
</tr>
</tbody>
</table>

Junior Year  

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSC 351-Nutrient Cycling</td>
<td>3</td>
</tr>
<tr>
<td>BIOH 577--Practical Genetics</td>
<td>3</td>
</tr>
<tr>
<td>HORT 319--Turfgrass Management</td>
<td>3</td>
</tr>
<tr>
<td>HORT 345--Commercial Plant Production</td>
<td>3</td>
</tr>
</tbody>
</table>

Senior Year  

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BICO 435--Commercial Plant Propagation</td>
<td>3</td>
</tr>
<tr>
<td>BICO 486--Horticulture Capstone I</td>
<td>1</td>
</tr>
<tr>
<td>BICO 486R--Horticulture Capstone II</td>
<td>2</td>
</tr>
<tr>
<td>BICO 435--Plant Physiology</td>
<td>3</td>
</tr>
<tr>
<td>HORT 498--Internship</td>
<td>3</td>
</tr>
</tbody>
</table>

Take two of the following:

- AGSC 441--Crop Breeding
- BIOO 435--Plant Systematics
- AGSC 141--Crop Breeding
- BIOM 425--Myology
- BIOM 424--Ecology of Fungi
- HORT 499R--Undergraduate Research

University Core & Electives                                             | 11-12   |

Take two of the following:

- ENSC 355--Management & Organizational Planning
- BMIT 352--Marketing

University Core & Electives                                             | 12      |

Take two of the following:

- AGED 482--Non Formal Teaching Methods in Agriculture
- AGED 312R--Communicating

Agriculture to the Public                                               | 3       |

Take two of the following:

- BMGT 205--Management Communication Fundamentals
- BMIS 211--Introduction to Business
- WRIT 201-College Writing II
- WRIT 221--Intermediate Tech Writing
- SPNS 101--Elementary Spanish I
- AGED 312R--Communicating

University Core & Electives                                             | 45      |

Take two of the following:

- BMGT 355--Management & Organizational Planning
- BMIT 352--Marketing

University Core & Electives                                             | 30      |
A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

**LANDSCAPE DESIGN OPTION**

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 151RA-Design Fundamentals I</td>
<td>4</td>
</tr>
<tr>
<td>BIOC 170N-Principles of Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 121IN-Introduction to General Chem</td>
<td>4</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>M 15Q-Math for Liberal Arts</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 110CS-Introduction to Plant Biology</td>
<td>3</td>
</tr>
<tr>
<td>HORT 151-Landscape Design, Hist/Theory</td>
<td>3</td>
</tr>
<tr>
<td>HORT 105-Miracle Greeting</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>7</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSC 245IN-Soils</td>
<td>3</td>
</tr>
<tr>
<td>HORT 231-Woody Ornamentals</td>
<td>3</td>
</tr>
<tr>
<td>HORT 252-Herbaceous Ornamentals</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 116-Engineering Graphics</td>
<td>1</td>
</tr>
<tr>
<td>HORT 225-Landscape Graphics I</td>
<td>3</td>
</tr>
<tr>
<td>HORT 226-Landscape Graphics II</td>
<td>3</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td></td>
</tr>
<tr>
<td>ART 143RA-Web Design</td>
<td>3</td>
</tr>
<tr>
<td>AGED 312R-Communicating Agriculture to the Public</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 205-Management Communication Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 211-Introduction to Business Decision Support</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 201-College Writing II</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221-Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>SFNS 101-Spanish I</td>
<td>4</td>
</tr>
<tr>
<td>University Core &amp; Electives</td>
<td>6.7</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORT 310-Turfgrass Management</td>
<td>3</td>
</tr>
<tr>
<td>HORT 331-Planting Design</td>
<td>3</td>
</tr>
<tr>
<td>HORT 335-Site Development</td>
<td>4</td>
</tr>
<tr>
<td>HORT 336-Landscape Construction</td>
<td>4</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td></td>
</tr>
<tr>
<td>ACTG 201-Principles of Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 202-Principles of Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 335-Management &amp; Organizational Accounting</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 325-Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>ECIV 308-Construction Practice</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 448-Entrepreneurship</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>10</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORT 498-Internship</td>
<td>3</td>
</tr>
<tr>
<td>HORT 452-Advanced Landscape Design</td>
<td>4</td>
</tr>
<tr>
<td>Take three of the following:</td>
<td></td>
</tr>
<tr>
<td>Applied Art/Design/Architecture</td>
<td></td>
</tr>
<tr>
<td>ARTH 150RA-Visual Language-Drawing</td>
<td>4</td>
</tr>
<tr>
<td>ARTH 160RA-Visual Language - 2D Foundations</td>
<td>4</td>
</tr>
<tr>
<td>ARTZ 109RA-Visual Language - 2D Foundations</td>
<td>4</td>
</tr>
<tr>
<td>ARTZ 211R-Drilling I</td>
<td>4</td>
</tr>
<tr>
<td>GDSS 225-Design Principles</td>
<td>4</td>
</tr>
<tr>
<td>GDSS 244-Form and Content</td>
<td>4</td>
</tr>
<tr>
<td>ARCH 152-Design Fundamentals II</td>
<td>4</td>
</tr>
<tr>
<td>ARCH 450-Community Design Center</td>
<td>5</td>
</tr>
<tr>
<td>History-Art/Design/Architecture</td>
<td></td>
</tr>
<tr>
<td>ARTH 200IA-Art of World Civilization I</td>
<td>4</td>
</tr>
<tr>
<td>ARTH 201IA-Art of World Civilization II</td>
<td>4</td>
</tr>
<tr>
<td>ARTH 360-History of Asian Art and Architecture</td>
<td>3</td>
</tr>
<tr>
<td>ARTH 410-ARTH 440-Upper Division</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 322IA-World Architecture I</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 325IA-World Architecture II</td>
<td>3</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>AGED 353-Construction Technology</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 241-Building Construction</td>
<td>3</td>
</tr>
<tr>
<td>CE 210-Surveying</td>
<td>3</td>
</tr>
<tr>
<td>EC 507-Construction Estimating &amp; Bidding</td>
<td>3</td>
</tr>
<tr>
<td>Plant, Water, &amp; Land Ecology</td>
<td></td>
</tr>
<tr>
<td>NRSM 101-Natural Resource Conservation</td>
<td>3</td>
</tr>
<tr>
<td>NRSM 249-Natural Resource Ecology</td>
<td>3</td>
</tr>
<tr>
<td>NRSM 370-Fire Ecology &amp; Management</td>
<td>3</td>
</tr>
<tr>
<td>NRSM 453-Habitat Inventory &amp; Analysis</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 370-General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 406-Rocky Mountain Vegetation</td>
<td>2</td>
</tr>
<tr>
<td>BIOE 416-Alpine Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 421-Yellowstone Wildlife Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 272SE-Water Resources</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 370-Water Quality</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 441-Watershed Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>WILD 438-Wildlife Habitat Ecology</td>
<td>3</td>
</tr>
<tr>
<td>Take three of the following:</td>
<td></td>
</tr>
<tr>
<td>University Core &amp; Elective</td>
<td>22</td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

**ENTOMOLOGY MINOR (NON-TEACHING)**

**Required Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 301-Introduction to Entomology</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 401-Integrated Pest Management</td>
<td>4</td>
</tr>
<tr>
<td>BIOC 465-Insect Identification</td>
<td>4</td>
</tr>
<tr>
<td>ANSC/ENSCT/INSECT 1490-Invertebrate Research</td>
<td>1-3</td>
</tr>
<tr>
<td>Restricted Elective Courses</td>
<td></td>
</tr>
<tr>
<td>Take three of the following:</td>
<td></td>
</tr>
<tr>
<td>NRSM 249-Natural Resource Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 370-General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 375-General Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 380-Biochemistry</td>
<td>4</td>
</tr>
<tr>
<td>ENSC 407-Environmental Risk Assessment</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 420-Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 412-Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 430-Neuroethology</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 428-Freshwater Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 428-Freshwater Ecology</td>
<td>3</td>
</tr>
<tr>
<td>WILD 501-Principles of Fish and Wildlife Management</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 250-Microbiology for Health Sciences</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 318-Biometry (or)</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 341-Field Crop Production</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 421-Concepts of Plant Pathology</td>
<td>3</td>
</tr>
</tbody>
</table>

**ENVIRONMENTAL HORTICULTURE MINOR (NON-TEACHING)**

**Required Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 170N-Principles of Biological Diversity</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 121IN-Intro to General Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>HORT 105-Miracle Greeting</td>
<td>4</td>
</tr>
<tr>
<td>HORT 231-Woody Ornamentals</td>
<td>3</td>
</tr>
<tr>
<td>HORT 232-Herbsceous Ornamentals</td>
<td>3</td>
</tr>
<tr>
<td>HORT 245-Plant Propagation</td>
<td>3</td>
</tr>
<tr>
<td>Elective courses (take 4 of the following):</td>
<td></td>
</tr>
<tr>
<td>HORT 310-Turfgrass Management</td>
<td>3</td>
</tr>
<tr>
<td>HORT 337-Vegetable Production</td>
<td>3</td>
</tr>
<tr>
<td>HORT 343-Commercial Plant Production</td>
<td>3</td>
</tr>
<tr>
<td>HORT 345-Organic Market Gardening</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 421-Concepts of Plant Pathology</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 450-Plant Physiology</td>
<td>3</td>
</tr>
<tr>
<td>HORT 447-Advanced Plant Propagation</td>
<td>3</td>
</tr>
</tbody>
</table>

**Environmental Sciences**

**Department of Land Resources & Environmental Sciences**

http://landresources.montana.edu/

Note: MSU’s programs in the biological sciences are distributed across multiple departments. MSU does not have a single Department of Biology. For additional options see pages 78 and 155.

Effective management of land and water resources requires a solid fundamental understanding of the processes and relationships in land and natural resources systems, combined with applications of environmental science and applied ecology. The Environmental Sciences curricula are designed to provide this classroom, laboratory, and field training. Graduates of these degree programs will: (i) possess a broad knowledge of biological, physical, and chemical processes important across landscapes; (ii) receive training in applied ecology, soil and water science, and land resources analysis; (iii) be capable of critical analysis of land resource problems; and (iv) be experienced with teamwork required to develop and implement effective land management strategies. They will be the scientists most capable of making significant advances and contributions in the 21st century!

The Environmental Sciences degree programs are administered by the Department of Land Resources and Environmental Sciences.
Environmental Biology Option

This option is intended to train students who are interested in understanding the ecology of organisms in natural environments, and/or in understanding how organisms may be used to clean up environments that have been disturbed by human activities. The curriculum launches from a base in environmental science which includes a broad knowledge of organisms (including plants, animals, and microorganisms) and the physical and chemical characteristics of natural environments. A special feature of this option is that it emphasizes cross-training between the traditional disciplines of Biology and Microbiology. Students trained in Biology or Microbiology normally focus on either large or small organisms or on human biology and disease. But, even biologists trained as ecologists have a poorly understood microorganisms, despite the fact that they appreciate the great importance of microorganisms in most natural environments. Similarly, most microbiologists do not understand the diversity of large organisms and are never exposed to natural principles of ecology and evolution. In the LRES Environmental Biology curriculum, students will develop a knowledge of the diversity of organisms and their interrelated functions in complex environments. In later stages of the curriculum, students may select from a wide array of upper division courses in environmental microbiology, natural ecosystems, applied ecology, and policy and planning that enable them to specialize in areas best-suited to their own career vision.

Career opportunities: Environmental industries and consulting firms that address problems associated with disturbed environments. Biotechnology companies that attempt to exploit biological diversity for the benefit of humans. Government jobs in environmental management and policy making. Graduate training that leads to independent research in basic and applied ecology, environmental biology, and environmental microbiology.

Soil and Water Science Option

The Soil and Water Science Option provides students with fundamental training in basic biological, chemical, and physical sciences and advanced training in soil and water sciences. Students are encouraged through choice elective blocks to emphasize specific course sequences to help them understand the underlying processes central to managed and natural landscapes, as well as to develop practical skills and abilities relevant to applying this knowledge in land resource management and the environmental sciences.

Water is perhaps the most unique substance on earth, having a multitude of seemingly anomalous properties, and literally forms the basis for life as we know it. Soils form the precious ‘skin’ of the Earth, the critical interface between atmospheric and geologic/groundwater systems. The multitude of physical, chemical, and biological processes that occur in the three-phase soil system (solids, water and air) are critical to sustainability of natural and managed ecosystems. Soils and water will be among the most critical limiting resources in coming decades. The LRES Soil and Water Science Option provides students with advanced training in the chemical, physical, and biological sciences, and integration of these fundamentals in applications related to soil science, hydrology, watershed management, pollution treatment and prevention, land rehabilitation, agricultural and natural resources management, and bioremediation. Students develop relevant skills in written and oral communication, and gain experience in modern measurement, monitoring and analysis techniques used in land and water sciences and management.

Career opportunities: Environmental industries and consulting firms that work on problems associated with soils, water, contaminant transport, fate of chemicals in the environment, and water resource management. Local, state, or federal government positions in natural resources and environmental sciences management and policy. Advanced graduate training to prepare for research and management positions in soil sciences, hydrology, water resources, land reclamation, and related areas.

Curricula in Environmental Sciences

ENVIRONMENTAL BIOLOGY OPTION

Freshman Year  Credits
ENSC 110--Land Resources & Environ Sciences 3
BIOB 170N-Prin Biological Diversity .................4
BIOB 160-Prin Living Systems ................................4
CHMY 141-College Chemistry I  ............................4
CHMY 143-College Chemistry II ............................4
ECNS 101S-Economic Way of Thinking ................4
WRIT 110W-College Writing I ...............................3

Take one of the following:
M 161Q-Q Survey of Calculus .............................4
M 165Q--Calculus for Technology I ........................3
M 171Q--Calculus I .................................................4
University Core and Electives ..............................1-2

Sophomore Year  Credits
CHMY 211-Elements of Organic Chemistry ..........5
Take one of the following:
STAT 216Q-Introduction to Statistics ...............3
BIOB 318-Biometry .................................................3
PHSX 265-College Physics I .................................5
WRIT 201-College Writing II ...............................3
ENSC 245N-Soils .................................................3
Take one of the following:
NRSM 249-Non-Renewable Resource Ecology ........3
BIOE 370-General Ecology ....................................3
University Core and Electives ..............................9

Junior Year  Credits
BCHM 380-Biochemistry ....................................5
BIOB 375-General Genetics ....................................3
ENSC 353-Environ Biogeochemistry ....................3
ENSC 468-Ecosystem Biogeochemistry .................3
BIOM 420--Evolution .............................................3
University Core and Electives ..............................8

Senior Year  Credits
BIOM 415-Microbiol Diversity, Ecol & Evol ...........3
BIOM 420-Evolution .............................................3
ENSC 465-Environ Biophysics ..............................3
ENSC 499R-Seminar / Capstone .........................3
University Core and Electives ..............................18
Take a minimum of 24 credits from the following:
Environmental Microbiology:
BIOM 450-Microbial Physiology ........................3
BIOM 453--Applied & Environ Microbiology.....4
BIOM 410-Microbial Genetics ..............................3
BIOM 455-Rich Mthds in Microbiology ..........4
BIOM 423-Mycology .............................................3

Environmental Macrobiology:
BIOE 405--Behavioral & Evol Ecology ................3
BIOO 412-Animal Physiology .............................3
BIOO 415-Ichthyology ............................................3
BIOO 475-Mammalogy ...........................................3
BIOO 470-Ornithology ..........................................3
BIOO 433-Plant Physiology ..................................3

Natural Ecosystems:
ENSC 444-Watershed Hydrology ........................3
ENSC 445-Watershed Analysis ............................3
BIOE 408-Rocky Mountain Vegetation ..........2
BIOE 428-Freshwater Ecology ............................3

Applied Ecology:
AGSC 401-Integrated Pest Management ..............3
GPHY 428N-Remote Sensing .............................3
ENSC 477-Environmental Risk Assess .................3
ENSC 443-Weed Ecology & Management ............3
ENSC 448-Stream Restoration Ecology ..............3
ENSC 461-Restoration Ecology ............................3
WILD 458-Wildlife Habitat Ecology .................3
NRSM 453-Habitat Inventory & Analysis ............3
WILD 301-Principles Fish/Wildlife Mgmt ..........3

University Core and Electives ..............................8

Total Credits: 83

PROGRAMS OF INSTRUCTION – AGRICULTURE
Take one of the following:

**University Core and Electives** ..................................12

- **ENSC 499**—Seminar/Capstone ..................................3
- **BIOE 428**—Freshwater Ecology ................................3
- **ENSC 465**—Environ Biophysics ................................3
- **ENSC 448**—Stream Restoration Ecology .................3
- **ENSC 444**—Watershed Hydrology ..............................3

**Senior Year** Credits

- **ENSC 454**—Landscape Pedology..............................3
- **BIOM 452** —Soil & Environmental Microbiology ....3
- **ENSC 353**—Environ Biogeochemistry .....................3
- **STAT 216Q**—Introduction to Statistics ............. 3
- **BIOB 318**—Biometry ............................................3

Take one of the following:

**Junior Year** Credits

- **30**
- **University Core and Electives** ....................................5
- **PHSX 205**—College Physics.........................................4
- **GPHY 111CS**—Intro to Physical Geography ..............4
- **CHMY 211**—Elements of Organic Chemistry ...........5
- **M 172Q**—Calculus II .............................................4
- **OR**
  - Math Sequences:
    - **M 165Q**—Calculus Technology I ........................3
    - **M 166**—Calculus Technology II ............................3
    - **OR**
    - **M 171Q**—Calculus I .............................................4
    - **M 172Q**—Calculus II .............................................4
- **CHMY 211**—Elements of Organic Chemistry ...........5
- **GPHY 111CS**—Intro to Physical Geography ..............4
- **WRIT 201**—College Writing II ..................................3
- **ENSC 245IN**—Soils .......................................................3
- **PHSX 205**—College Physics ......................................4
- **University Core and Electives** .....................................5

**Sophomore Year** Credits

- **30**
- **Take one of the following two-semesters**
  - **Math Sequences:**
    - **M 165Q**—Calculus Technology I ........................3
    - **M 166**—Calculus Technology II ............................3
    - **OR**
    - **M 171Q**—Calculus I .............................................4
    - **M 172Q**—Calculus II .............................................4
  - **CHMY 211**—Elements of Organic Chemistry ...........5
  - **GPHY 111CS**—Intro to Physical Geography ..............4
  - **WRIT 201**—College Writing II ..................................3
  - **ENSC 245IN**—Soils .......................................................3
  - **PHSX 205**—College Physics ......................................4
  - **University Core and Electives** .....................................5

Take one of the following:

**Freshman Year** Credits

- **ENSC 110**—Land Resources & Environmental Sciences..........3
- **BIOB 160**—Principles of Living Systems.................4
- **BIOB 170IN**—Principles of Biological Diversity ........4
- **CHMY 114**—College Chemistry I ..............................4
- **CHMY 211**—Elements of Organic Chemistry ...........5
- **GPHY 111CS**—Intro to Physical Geography ..............4
- **WRIT 101W**—College Writing I ..................................3
- **GEO 101IN**—Intro to Physical Geology ..................4
- **University Core and Electives** .....................................4

A minimum of 120 credits is required for graduation; at least 42 of these credits must be in courses numbered 300 and above.

---

**SOIL AND WATER SCIENCE OPTION**

**Freshman Year** Credits

- **ENSC 110**—Land Resources & Environmental Sciences..........3
- **BIOB 160**—Principles of Living Systems.................4
- **BIOB 170IN**—Principles of Biological Diversity ........4
- **CHMY 114**—College Chemistry I ..............................4
- **CHMY 211**—Elements of Organic Chemistry ...........5
- **GPHY 111CS**—Intro to Physical Geography ..............4
- **WRIT 101W**—College Writing I ..................................3
- **GEO 101IN**—Intro to Physical Geology ..................4
- **University Core and Electives** .....................................4

**Sophomore Year** Credits

- **30**
- **Take one of the following two-semesters**
  - **Math Sequences:**
    - **M 165Q**—Calculus Technology I ........................3
    - **M 166**—Calculus Technology II ............................3
    - **OR**
    - **M 171Q**—Calculus I .............................................4
    - **M 172Q**—Calculus II .............................................4
  - **CHMY 211**—Elements of Organic Chemistry ...........5
  - **GPHY 111CS**—Intro to Physical Geography ..............4
  - **WRIT 201**—College Writing II ..................................3
  - **ENSC 245IN**—Soils .......................................................3
  - **PHSX 205**—College Physics ......................................4
  - **University Core and Electives** .....................................5

**Junior Year** Credits

- **30**
- **Take one of the following:**
  - **BIOB 318**—Biometry ............................................3
  - **STAT 216Q**—Introduction to Statistics ............. 3
  - **BIOB 318**—Biometry ............................................3

Take one of the following:

**Senior Year** Credits

- **ENSC 454**—Landscape Pedology..............................3
- **BIOM 452** —Soil & Environmental Microbiology ....3
- **ENSC 353**—Environ Biogeochemistry .....................3
- **STAT 216Q**—Introduction to Statistics ............. 3
- **BIOB 318**—Biometry ............................................3

Because some of our courses are offered during alternate years, the proposed scheduling of courses in junior and senior years may need to be modified. Work with your advisor for your individual schedule.

A minimum of 120 credits is required for graduation; at least 42 of these credits must be in courses numbered 300 and above.

---

**SOIL SCIENCE MINOR**

**Non-Teaching**

- **ENSC 245IN**—Soils .......................................................3
- **ENSC 353**—Environ Biogeochemistry .....................3
- **BIOM 452**—Soil & Environmental Microbiology ....3
- **ENSC 454**—Landscape Pedology ..................................3
- **ENSC 465**—Environmental Biophysics ..................3

Take 2 courses from the following:

- **ENSC 444**—Watershed Hydrology ............................3
- **ENSC 460**—Soil Remediation ....................................3
- **ENSC 461**—Restoration Ecology ......................... 3
- **ENSC 468**—Ecosystem Biogeochemistry ..................3

---

**Land Rehabilitation**

**Department of Land Resources & Environmental Sciences**

[http://landresources.montana.edu/](http://landresources.montana.edu/)

Note: MSU’s programs in the biological sciences are distributed across multiple departments. MSU does not have a single Department of Biology. For additional options see pages 78 and 153.

The Land Rehabilitation curriculum provides training in site remediation and restoration ecology; including soil remediation, revegetation, fluvial and riparian restoration, investigation of impacted geologic resources,amelioration of contaminated soils and water, integrated management of invasive species, and remediation of sites impacted by industrial, recreational, and land management activities. Emphasis is placed on developing a broad understanding of hydrologic, soil, and plant processes, from both a basic and an applied science approach. Coursework in the chemical, biological, and environmental sciences provides a foundation of knowledge. During the junior and senior years, students take courses in soil, water and plant sciences that range from molecular to landscapes in scale. Students will acquire skills in plant identification and landscape inventory including geographic information systems. Additionally, students select coursework from one of three focal areas: microbial/bioremediation science, soil and water science, and plant/vegetation science. Land rehabilitation is critically important to Montana, the surrounding region, and the United States. Graduates possess a broad knowledge of land rehabilitation processes, are able to critically analyze and solve problems, and can work in teams to develop and implement effective land management strategies. Studies in Land Rehabilitation will infuse students with critical knowledge and skills needed to analyze and manage lands requiring rehabilitation. Students will also receive foundation skills in writing, communication, arts, humanities and social sciences. Graduates in Land Rehabilitation will be very capable of making significant advances during the 21st century.

The Land Rehabilitation degree program is administered by the Department of Land Resources and Environmental Sciences.

**Career Opportunities:** Worker and manager for local, state, and federal agencies responsible for land rehabilitation and remediation, ecological restoration, invasive species management, and land resource management. Land reclamation managers for environmental consulting, mining, and highway construction companies. Stepping stone to Graduate School for independent research and advanced coursework in restoration ecology, soil sciences, geology, hydrology, ecology, and the plant sciences. Environmental consulting and non-profit organization related to restoration and conservation.
Curriculum in Land Rehabilitation

LAND REHABILITATION

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSC 110-Land Resources &amp; Environmental Sciences</td>
<td>3</td>
</tr>
<tr>
<td>BIB 170N-Principles of Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>BIOB 160-Principles of Life Sciences</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 145-College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 111C-Intro to Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
</tr>
</tbody>
</table>

Sophomore Year

Take one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 161Q-Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>M 162Q-Calculus for Technology I</td>
<td>4</td>
</tr>
<tr>
<td>M 171Q-Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>BISO 230-Ident of Seed Plants</td>
<td>4</td>
</tr>
<tr>
<td>ENSC 245IN-Soils</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 284-Intr to GIS Science &amp; Cartog</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 205-College Physics I</td>
<td>4</td>
</tr>
<tr>
<td>WRIT 201-College Writing II</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>NRSM 240-Natural Resource Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOE 370-General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6-7</td>
</tr>
</tbody>
</table>

Junior Year

Take one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BISO 218-Biometry</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216-Q-Intro to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 353-Environmental Biogeochem</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 384-Adv GIS &amp; Spatial Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 445-Weed Ecology &amp; Management</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 492-Soil &amp; Environ Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 454-Landscape Pedology</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>AGSC 454-Agroecology</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 460-Restoration Ecology</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSC 419B-Biodiversity: Surv &amp; Monitor</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 439-Natural Resource Law</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 444-Watershed Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 448-Stream Restoration Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 460-Soil Remediation</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 461-Restoration Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 465-Environ Biophysics</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 499R-Seminar/Capstone</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
</tr>
</tbody>
</table>

Take 10 credits from the following electives:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSC 407-Environ Risk Assessment</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 421-Holistic Thought &amp; Mgmt</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 445-Watershed Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 468-Ecosystem Biogeochem</td>
<td>3</td>
</tr>
<tr>
<td>ERTH 432R-Surface Water</td>
<td>3</td>
</tr>
<tr>
<td>BIEO 428-Freshwater Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIEO 455-Plant Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIEO 455-Plant Physiology</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 457-GPS Fund Apps in Mapping</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 484R-Adv Appel GIS &amp; Spatial Analysis</td>
<td>3</td>
</tr>
<tr>
<td>NRSM 455-Habitat Inventory Analysis</td>
<td>3</td>
</tr>
<tr>
<td>WILD 501-Prin of WIL Mgmt</td>
<td>3</td>
</tr>
</tbody>
</table>

Take a minimum of 120 credits for graduation; at least 42 of these credits must be in courses numbered 300 and above.

SOIL SCIENCE MINOR

Take 2 courses from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENSC 245N-Soils</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 353-Environ Biogeochem</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 452-Soil &amp; Environmental Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 454-Landscape Pedology</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 455-Environmental Biophysics</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 460-Soil Remediation</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 461-Restoration Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 468-Ecosystem Biogeochem</td>
<td>3</td>
</tr>
</tbody>
</table>

Geospatial & Environmental Analysis

Department of Land Resources & Environmental Sciences (LRES)

http://landresources.montana.edu/

Note: MSU’s programs in the biological sciences are distributed across multiple departments. MSU does not have a single Department of Biology. For additional options see pages 78 and 155.

Effective management of agricultural and other managed land resources requires individuals to have sound fundamental understanding of the processes and relationships in land systems, combined with excellent skills in modern land inventory and analysis techniques including geographic information systems (GIS), global positioning systems (GPS), remote sensing, and an appreciation for the intricacies of land resources and land use practices. The Land Resource Sciences curricula are designed to provide classroom, laboratory, and field training. Graduates of this program will: (i) possess a broad knowledge of land processes, (ii) be able to critically analyze and solve land resource problems, and (iii) work in teams to develop and implement effective land management strategies. They will be the premier land resource users and managers in the 21st century.

The Geospatial & Environmental Analysis degree program is administered by the Department of Land Resources and Environmental Sciences.

Geospatial & Environmental Analysis

This degree is for students interested in land resources and their management at landscape scales. All human activities depend on the world’s land and water resource base. The air we breathe, the water we drink, and the food we eat all depend upon activities occurring and interacting across broad extents of the Earth’s land surface. This curriculum is based on the philosophy that our well being requires knowledge-based decision making involving land and natural resources across these large areas. Students build on knowledge of the basic natural sciences with course work in geology, biology, geography, soils, and ecology. Then, courses in remote sensing, geographic information systems, global positioning and statistics provide tools for gathering, processing, analyzing, and displaying information about land resources across large areas. Finally, students learn how to integrate land resource information with social and financial realities to support balanced management decisions. Throughout the program, students are encouraged to gain hands-on experience with land, people, and information through field trips, internships, and the capstone field course. The knowledge and skills of land resource analysis and management are needed wherever there are land resources. Graduates in the Geospatial & Environmental Analysis major can be the environmental scientists and managers most capable of providing information for sound management of the land resource base.

Career Opportunities: Careers in natural resource management, environmental consulting, precision agriculture, watershed management, and land mapping, requiring professionals who can work outdoors on the land and indoors with data and computer applications dealing with geographic information systems and remote sensing. Employment with federal government land management agencies, such as the Forest Service, Bureau of Land Management, Natural Resources Conservation Service, and Bureau of Reclamation; state agencies, such as departments of natural resources; local and regional planning organizations; private organizations which own and manage land (timber companies, ranches, farms, recreation areas); consulting firms; conservation organizations such as land trusts; and Congressional staffs. Graduate training leading to independent research in remote sensing, ecological processes, and soil and water science.
Curricula in Geospatial & Environmental Analysis

**GEOSPATIAL & ENVIRONMENTAL ANALYSIS**

**Freshman Year**
- **Credits**
- ENSC 110--Land Resources & Environmental Sciences.......................3
- BIOB 170N--Principles of Biological Diversity........4
- BIOB 160--Principles of Living Systems....................4
- CHMY 141-College Chemistry I.........................4
- CHMY 145-College Chemistry II.........................4
- WRIT 101W-College Writing I.................................5

Choose one Math/Stats Sequence: A or B
- Option A: M 161Q-Survey of Calculus .....................4
- BIOB 160--Principles of Living Systems ....................4
- ENSC 110--Land Resources & Environmental Sciences ........2
- STAT 217Q-Intro to Statistics ..............................3
- STAT 217Q-Intro to Statistics ..............................3
- STAT 217Q-Intro to Statistics ..............................3
- STAT 217Q-Intro to Statistics ..............................3

**Sophomore Year**
- **Credits**
- WRIT 201-College Writing II.................................3
- GEO 101IN--Intro to Physical Geology......................4
- GPHY 111CS--Intro to Physical Geography...............4
- PHYS 205-College Physics I.................................4
- ENSC 243IN--Soils.................................................3
- GPHY 284--Intro to GIS Science & Cartog...............5
- University Core and Electives............................5

**Junior Year**
- **Credits**
- Take one of the following:
  - NRSM 240--Natural Resource Ecology..................3
  - BIOM 370-General Ecology.................................3
  - GPHY 384--Adv GIS & Spatial Analysis.................3
- Take one of the following:
  - PSCI 362-Natural Resource Policy.....................3
  - NRSM 430--Natural Resource Law.......................3
- Unit Core and Electives From Junior and Senior List Below..............................................21

**Senior Year**
- **Credits**
- GPHY 357--Fundamentals & Application in Mapping........3
- GPHY 484K-Adv GIS & Spatial Analysis.................3
- ENSC 444--Watershed Hydrology.............................3
- ENSC 445--Watershed Analysis...............................3
- ENSC 499R--Seminar/Capstone...............................3
- ENSC 545--Landscape Pedology............................3
- Unit Core and Electives From Junior and Senior List Below..............................................9

**Junior and Senior Electives**
Complete a minimum of 21 credits of listed electives below, meeting the following requirements:
- A. No more than four (4) credits from Human System electives count toward the 22 credit requirement.
- B. Up to three (3) elective credits may be received for advisor approved ENSC 490 or ENSC 492.
- C. At least fourteen (14) credits at the 300-level or above.

**Ecology Electives (at least 2 courses):**
- BIOM 415--Micro Diverse, Ecol & Evol......................3
- AGSC 428--Cropping Systems.................................3
- ENSC 410R--Biodiversity: Survey & Monitoring........3
- ENSC 443-Forb Ecological Pedology......................3
- ENSC 448-Stream Restoration Ecology..................3
- ENSC 461-Restoration Ecology............................3
- NRSM 455--Riparian Ecology & Management..............3
- NRSM 435--Habitat Inventory & Analysis...............3
- BOIE 408-Rocky Mtn Vegetation...........................2
- BOIE 416-Alpine Ecology.....................................3
- BOIE 428-Freshwater Ecology.............................3

**Soil and Water Electives (at least 2 courses):**
- ENSC 353--Environmental Biogeochemistry...............3
- BIOM 452--Soil & Environmental Microbiology........3
- ENSC 460--Soil Remediation.................................3
- ENSC 465--Environmental Biophysics......................3
- ENSC 468--Ecosystem Biogeochemistry....................3
- ERTH 307--Principles of Geomorphology................4
- ERTH 432--Surface Water Resources........................3
- GEO 420--Hydrogeology......................................3

**Technical Electives:**
- GPHY 457-Adv GIS Mapping GIS............................3
- CE 201--Intro to Surveying................................3
- CE 463--Photogrammetry..................................2
- STAT 410--Methods for Data Analysis..................3

**Human Systems Electives (no more than 6 credits):**
- NRSM 421--Holistic Thought & Management...............4
- ENCS 392--Econ of Natural Resources....................3
- GPHY 121D--Human Geography..............................3
- SOCI 470--Environmental Sociology......................3

**Other Electives:**
- BIOM 433--Plant Physiology...............................3
- BIOM 453--Plant Systems.................................3

Because some of our courses are offered during alternate years, the proposed scheduling of courses in junior and senior years may need to be modified. Work with your advisor for your individual schedule.

A minimum of 120 credits is required for graduation; at least 42 of these credits must be in courses numbered 300 and above.

**SOIL SCIENCE MINOR (NON-TEACHING)**

- ENSC 245IN--Soils.................................................3
- ENSC 351--Nutrient Cycling................................3
- ENSC 345--Soil & Environ Chemistry......................3
- BIOM 452--Soil & Environmental Microbiology........3
- ENSC 453--Soil & Environ Physics............................3
- ENSC 454--Landscape Pedology............................3
- 5 or 6 credits from the following:
  - ENSC 444--Watershed Hydrology........................3
  - ENSC 460--Soil Remediation...............................3
  - ENSC 461--Restoration Ecology............................3

**SOIL SCIENCE MINOR (NON-TEACHING)**

- ENSC 245IN--Soils.................................................3
- ENSC 353--Environmental Biogeochemistry...............3
- BIOM 452--Soil & Environmental Microbiology........3
- ENSC 454--Landscape Pedology............................3
- ENSC 465--Environmental Biophysics......................3
- Take 2 courses from the following:
  - ENSC 444--Watershed Hydrology........................3
  - ENSC 460--Soil Remediation...............................3
  - ENSC 461--Restoration Ecology............................3
  - ENSC 468--Ecosystem Biogeochemistry..................3

**Natural Resources and Rangeland Ecology**

*Department of Animal and Range Sciences*

http://animalrange.montana.edu/

Students who complete the requirements for a B.S. degree in Natural Resources and Rangeland Ecology in the Department of Animal and Range Sciences will be eligible for a variety of natural resource jobs with state and federal agencies or private industries, or pursue a Master of Science degree. The two options available within this degree offer students an opportunity to study the interaction of livestock and wildlife and their rangeland habitats. Emphasis is placed on soil, water and vegetation attributes which influence habitat ecology and management for livestock and wildlife. The curriculum in both these options has been designed to allow students to score at the highest level for employment with federal agencies.

**Rangeland Ecology and Management Option**

This option is designed to emphasize management of rangeland environments. Courses in resource inventory, watershed, rangeland restoration and vegetation ecology are required to give the student a background in ecological principles used to manage rangelands in the western United States. Students in this option can select courses which focus on production agriculture or other natural resource areas. This option is designed to train students for employment with state or federal land management agencies, as well as private industry or graduate school.

**Wildlife Habitat Ecology and Management Option**

This option provides students with a broad background in wildlife habitat, rangeland ecology, and wildlife-livestock interactions common in the western United States. The focus will be on wildlife habitat, major vegetation types, rangeland livestock production, soils, and water within the framework of total resource management. Habitat management under a variety of uses...
and goals will be discussed. Courses specifically designed for this option include classes in wildlife habitat ecology, habitat restoration, wildlife-livestock habitat issues and wildlife-livestock nutrition. Students who graduate with a degree in this option will be eligible for employment in private industry, state and federal land agencies, or pursue a Master of Science degree.

Curricula in Natural Resources and Rangeland Ecology

**RANGELAND ECOLOGY AND MANAGEMENT OPTION**

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 100-Intro to Animal Science</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 101-Natural Resource Conserv</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 102-Montana Range Plants Lab</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOB 121IN-Intro to General Chem</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHMY 12IN-Eco-Economic Way of Thinking</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>15</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRSM 235-Range and Pasture Monitoring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>NRSM 240-Natural Resource Ecology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>AGSC 342-Forages</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHMY 125-Intro to Organic &amp; Biochem</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOO 230-Identification of Seed Plants</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENSC 245IN-Soils</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMGT 205-Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Communication Fundamentals</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WRIT 201-College Writing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WRIT 221-Intermediate Tech Writing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>15</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>WILD 325-Wildlife Livestock Range Nutrition</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 350-Wealth of Western Wildlands</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 351-Biomes of West Wildlands</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>NRSM 353-Grazing Ecology &amp; Mgmt</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 350-Fire Ecology &amp; Mgmt</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WILD 501-Principles of F&amp;W Livestock</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CPHY 284-Intro to GIS Science</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENSC 461-Restoration Ecology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGSC 454-Agrostology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOO 455-Plant Systematics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>18</td>
<td>17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRSM 455-Riparian Ecology &amp; Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WILD 438-Wildlife Habitat Ecology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 453-Habitat Inventory &amp; Analysis</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOE 370-General Ecology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOO 455-Plant Physiology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENSC 454-Landscape Pedology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>15</td>
<td>12</td>
</tr>
</tbody>
</table>

**WILDLIFE HABITAT ECOLOGY AND MANAGEMENT OPTION**

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 100-Intro to Animal Science</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 101-Natural Resource Conserv</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>NRSM 102-Montana Range Plants Lab</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOB 121IN-Intro to General Chem</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 12IN-Eco-Economic Way of Thinking</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>15</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRSM 235-Range and Pasture Monitoring</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>WILD 325-Wildlife Livestock Range Nutrition</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 350-Wealth of Western Wildlands</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NRSM 351-Biomes of West Wildlands</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>NRSM 353-Grazing Ecology &amp; Mgmt</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WILD 501-Principles of F&amp;W Livestock</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CPHY 284-Intro to GIS Science</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENSC 461-Restoration Ecology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMGT 205-Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Communication Fundamentals</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WRIT 201-College Writing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WRIT 221-Intermediate Tech Writing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>15</td>
<td>13</td>
</tr>
</tbody>
</table>

**Plant Science**

*Department of Plant Sciences and Plant Pathology*

http://plantsciences.montana.edu/

Note: MSU’s programs in the biological sciences are distributed across multiple departments. MSU does not have a single Department of Biology. For additional options see pages 78 and 155.

Plant Science involves a thorough background in the liberal arts and a comprehensive understanding of the scientific principles underlying plant sciences. Plant systems are the fundamental basis for life on earth and are also a major contributor to the economy. Modern plant science encompasses many areas, impacting such diverse interests as agriculture, biotechnology, and recreational land management.

Faculty members who advise students and teach courses are also active researchers in their respective disci-
plines. Students learn current knowledge and technology through formal course work and gain valuable first-hand experience in departmental laboratories, greenhouses, and field research farms. Students are encouraged to gain additional learning experiences outside the classroom by working as research assistants in faculty programs, summer jobs, and internships with private industry and government agencies.

Each student works closely with a faculty advisor to formulate a program of study that is appropriate with the student’s career goals and also fits into either the Crop Science or Plant Biology options.

Crop Science Option

Continued increases in food and fiber crop production are essential for the future of humankind. Yet increased production places increased pressure on our soil, water, and other finite resources. The challenge for crop scientists is to implement crop and soil management schemes that maintain and/or increase production, but at the same time conserve our soil and water resources and preserve the delicate balance in the agroecosystem.

Course requirements in the Crop Science option are designed to acquaint students with the principles underlying crop and soil management. Thus soil fertility, plant physiology, crop production, crop breeding, and pest management, along with courses in the biological and physical sciences are included in this area of study.

Graduates from this option find careers in farming and ranching; as crop production specialists; in pest management; in seed, fertilizer, and chemical industries; with banks and other lending institutions; Cooperative Extension Service and with a government agency such as the Natural Resource Conservation Service.

Plant Biology Option

Plant biology provides a broad education in the plant sciences. The expertise of the Plant Sciences faculty provides an opportunity to focus at the cellular and molecular level, but opportunities also exist for emphasis in plant ecology and systematics. Course requirements include beginning and advanced courses in biology, microbiology, biochemistry, physiology, genetics, plant development, ecology, and systematics.

Graduates are prepared for post-graduate school, and academic and professional careers.

Curricula in Plant Science

Crop Science Option

Freshman Year  Credits
BIOM 170-Principles Biological Diversity...........4
BIOM 160-Principles of Living Systems..............4
CHMY 121-Intro to General Chemistry..............4
CHMY 123-Intro to Organic and Biochemistry....4
WRIT 101W-College Writing I .......................3
M 145Q-Math for Liberal Arts ......................3
BIOM 110CS-Introduction to Plant Biology .......3
University Core and Electives .......................5

Sophomore Year  Credits
Take one of the following:
BMGT 205-Management Communication Fundamentals .................3
WRIT 201-College Writing II......................3
WRIT 221-Intermediate Tech Writing .............3
BIOM 220-General Botany .........................3
BIOM 262-Introduction to Entomology ..........3
ENSC 245N-Seeds ....................................3
Take one of the following:
BIOM 318-Genetics ..................................3
STAT 216-Introduction to Statistics ..............3
University Core and Electives .....................9

Junior Year  Credits
AGSC 341-Field Crop Production ....................3
PSPP 342-Forages .....................................3
ENSC 371-Nutrient Cycling .........................3
ENSC 353-Weed Ecology & Mgmt ...............3
BIOM 421-Concepts of Plant Path  .................3
Take one of the following:
BIOM 375-Genetics................................3
BIOM 377-Practical Genetics ....................3
Take two of the following:
ACTG 220-Surveying of Accounting ..............3
AGBE 210FS-Economics of Agricultural Business ....3
AGBE 321-Economics of Agricultural Marketing ....3
AGBE 341-Farm & Ranch Management ..........3
AGED 355-Coop Bus Prin & Pract  ...............3
BMGT 335-Management & Organization ..........3
BMKT 325-Marketing ................................3
ENCS 245N-Seeds...................................3
BMKT 241-Sales .....................................3
MKTG 242-Intro to Global Marketing ..........3
University Core and Electives ....................6

Senior Year  Credits
Take one of the following:
AGSC 326-Sustainable Cropping Systems .......3
AGSC 439-Plant Physiology .....................3
Take two of the following:
BIOM 370-Genetic Ecology .......................3
AGSC 401-Integrated Pest Management ........3
ENSC 454-Landscape Pedology .................3
AGSC 450-Plant Disease Control ..............3
HORT 337-Soil Science .........................3
University Core and Electives ...................12

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

Plant Biology Option

Freshman Year  Credits
CHMY 141-College Chemistry I ....................4
CHMY 143-College Chemistry II .................4
COM 110US-Public Communication .............3
OR CLS 101US-University Seminar
WRIT 101W-College Writing I .....................3
M 161Q-Survey of Calculus .....................4
BIOM 318-Genetics ................................3
OR STAT 216Q-Introduction to Statistics ....3
University Core and Electives ...................5

Sophomore Year  Credits
CHMY 211-Elements of Organic Chemistry ....5
PHSX 205-College Physics I ......................4
PHSX 206-College Physics II ....................4
University Core and Electives ..................10

Junior Year  Credits
AGSC 358-Genetic Ecology .......................3
AGSC 455-Plant Biology .........................3
University Core and Electives ..................19

Senior Year  Credits
AGSC 450-Plant Physiology .....................3
BMGT 435-Plant Physiology ....................3
University Core and Electives ..................24

Additional Requirements:
A minimum of 20 credits of advisor-approved plant biology electives must be taken, at least 15 of which must be upper division. Up to 7 total credits may be included from BIOM/HORT 490R, BIOM/HORT 492, and PSPP/HORT 498 courses. Electives could come from any plant biology courses in the Plant Sciences and Plant Pathology Department (e.g., AGSC 454–Agrostology, AGSC 456R-Plant Systematics, BIOM 457-Plant Development, BIOM 458-Plant Cell Physiology), other plant courses in the Plant Sciences and Plant Pathology Department (e.g., BIOM 421–Concepts of Plant Pathology, BIOM 429-Mycology, etc.), and selected courses in the departments of Animal & Range Sciences, Land Resources & Environmental Sciences, Ecology, Microbiology, Cell Biology & Neuroscience, Earth Sciences, Mathematical Sciences, and Computer Science.

Pre-veterinary Program

Department of Immunology and Infectious Diseases
http://iim.montana.edu/

The department participates in MSU’s Genetics Minor and recommends this minor to students particularly interested in genetics. The pre-veterinary program prepares students for professional veterinary school leading to a Doctorate in Veterinary Medicine (DVM). Although
Montana does not have a college of veterinary medicine, Montana residents may obtain supplemental funding for their professional program through the Western Interstate Commission for Higher Education (WICHE) Program. This is a cooperative program with Washington State University College of Veterinary Medicine, Oregon State University College of Veterinary Medicine, and Colorado State University College of Veterinary Medicine. This program provides access for admission and enables Montana resident students to attend veterinary schools out-of-state, yet pay in-state rates for tuition. There is a separate WICHE application.

The pre-veterinary program will prepare students for acceptance to all veterinary schools in the WICHE program through both didactic coursework and internships. Application to other veterinary schools may vary in requirements. Acceptance to veterinary medical college is highly competitive and course requirements may change from year to year. Students are encouraged to meet with their advisor on a regular basis to keep abreast of any changes in requirements and suggested courses.

The pre-veterinary program is not an undergraduate major that results in a degree, but rather a program designed to fulfill the requirements for an application to a College of Veterinary Medicine. Students must choose and declare an undergraduate major after 3 semesters in the pre-veterinary curriculum. Students are encouraged to choose an undergraduate major as early as possible.

Pre-veterinary coursework may be applied toward a bachelor of science in any major including animal science, biotechnology, biology and microbiology. High school students are encouraged to take a significant number of science courses including chemistry, biology, mathematics and physics. Students unable to obtain adequate preparatory science courses in high school should begin the pre-veterinary curriculum with more basic courses than suggested below.

### Curricula in Pre-veterinary

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIB 170N-Principles of Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>(or BIB 256)</td>
<td></td>
</tr>
<tr>
<td>BIB 160-Principles of Living Systems</td>
<td></td>
</tr>
<tr>
<td>(or BIB 260)</td>
<td></td>
</tr>
<tr>
<td>CHMY 111-College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 145-College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>COM 110US-Public Communication</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>M 150 or M 161-College Calculus</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4-6</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>15-17</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM 380-Biochemistry</td>
<td>5</td>
</tr>
<tr>
<td>CHMY 211-Elements of Organic Chem</td>
<td>5</td>
</tr>
<tr>
<td>OR CHMY 321 and CHMY 323</td>
<td>4-4-4</td>
</tr>
<tr>
<td>PHSX 205IN-College Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 207-College Physics II</td>
<td>4</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4-6</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>15-17</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>BIB 375-General Genetics</td>
<td>3</td>
</tr>
<tr>
<td>OR ANSC 322-Principles of Breeding/Genetics</td>
<td>3-3</td>
</tr>
<tr>
<td>BIB 412-Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>OR ANSC 265 and ANSC 266 A&amp;P</td>
<td>3-3/1</td>
</tr>
<tr>
<td>Domestic Animals</td>
<td></td>
</tr>
<tr>
<td><strong>Recommended But Not Required Credits</strong></td>
<td></td>
</tr>
<tr>
<td>ARNR 321-Physiology of Reproduction</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 537-Disease of Domestic Livestock</td>
<td>4</td>
</tr>
<tr>
<td>BIBO 510B-Vertebrate Anatomy</td>
<td>4</td>
</tr>
<tr>
<td>BIBO 412-Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 320-Animal Nutrition</td>
<td>4</td>
</tr>
<tr>
<td>BIBO 340-Principles of Histology</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 369-General Microbiology I</td>
<td>4</td>
</tr>
<tr>
<td>BIBO 410-Immunology</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 265 &amp; ANSC 266 A&amp;P</td>
<td>4</td>
</tr>
<tr>
<td>BIOM 400-Medical Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>IMID 475-Pre-veterinary Internship</td>
<td>2-6</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>15-17</td>
</tr>
</tbody>
</table>

**Sustainable Food & Bioenergy Systems**

### Interdisciplinary Curriculum

This program is a unique interdisciplinary curriculum designed for students interested in the interconnected processes of crop production, processing, distribution, and utilization of food and bioenergy. The degree focuses on ecologically sound, socially just, and economically viable farming methods, food and health, and related food and bioenergy system topics. Students work closely with faculty to gain experience in interdisciplinary food system research projects. Internships are designed to provide experience with food processing, food cooperative management, alternative food distribution systems, and small business operations. A better understanding of the interconnections among food production, food policy, food security and health, helps prepare graduates capable of addressing interdisciplinary food system problems such as obesity, food insecurity and poverty, food safety, and loss of indigenous foods, among others.

**Career Opportunities:** Graduates from this option are prepared for careers in community nutrition, community food security, public health, Extension education, food and nutrition policy and education, food enterprise, culinary arts and management, community supported agriculture, food processing, food marketing, retailing and distribution.

### Agroecology Option

Agroecology explores how crops and pest organisms interact with their environment, and the application of technology to efficiently and sustainably produce crops. Agroecology focuses on the application of principles of population and community ecology, as well as environmental science, to cropland ecosystems. The curriculum is based on the philosophy that to be able to successfully predict management outcomes and thus make informed recommendations, one must understand fundamental principles of evolution, ecology, soil science, agronomy, and pest management.
The curriculum originates from a base in biological science which includes a broad knowledge of organisms (including plants, animals and microorganisms) and the physical and chemical characteristics of environments. In the Agroecology curriculum, students will develop a knowledge of the diversity of organisms and how they interact in natural and managed ecosystems. Furthermore, the curriculum will build on this knowledge in courses that demonstrate the application of ecology and environmental science principles. Students will also learn how new technologies like remote sensing and geographic information systems are modernizing agriculture. In later stages of the curriculum, students may select from an array of upper division courses in natural ecosystems, cropping systems, pest management, applied ecology, and policy and planning that enable them to specialize in food or bioenergy-related areas best suited to their own career vision.

Career Opportunities: Graduates from this option are prepared for careers in agricultural production, community nutrition, community food security, public health, Extension education, food and nutrition policy and education, food enterprise, culinary arts and management, community supported agriculture, food processing, food marketing, retailing and distribution.

Sustainable Livestock Production Option

Sustainable Livestock Production focuses on the biological understanding of animal agriculture and its continued presence in sustainable grazing systems as well as its potential role in sustainable farming systems. Students will be introduced to the principles, practices and issues impacting the production, processing and preservation of safe, wholesome, nutritious, and palatable meat along with the regulatory requirements for selling animal products. Sustainable Livestock Production focuses on the science of animal production, but expands student learning to a larger systems understanding to the role of domestic livestock in sustainable systems. In addition, students will be exposed to the role of strategic grazing in landscape management as well as using livestock to manage potential waste streams from other industries.

Career Opportunities: Graduates from this option are prepared for careers in both the production and allied industries associated with animal agriculture and will also prepare the student for opportunities in extension and graduate work.

Curricula in Sustainable Food and Bioenergy Systems

SUSTAINABLE FOOD SYSTEMS OPTION

Health and Human Development

Freshman Year Credits
SFBS 165--Intro to Sustainable Food & Bioenergy Systems .................................3
BIOL 170IN-Principles of Biological Diversity ..............................................4
ECNS 101IS-Econ Way Thinking ..........................................................3
BIOL 110CS-Introduction to Plant Biology ..............................................3
Take one of the following:
CHMY 122IN-Intro to General Chemistry .........................................4
CHMY 141-College Chemistry I ..........................................................4
Take one of the following:
M 121-College Algebra ................................................................3
M 145Q-Mathematics for Liberal Arts ..................................................3
SOCL 101IS-Intro to Sociology ..............................................................3
Take one of the following:
SFBS 296--Towne's Harvest Practicum .............................................3
SFBS 298--Internship .............................................................................3
University Core and Electives .............................................................4

Sophomore Year Credits
HDCF 239--Contemp Cons Issues ................................................................3
NUTR 221CS-Basic Human Nutrition .....................................................3
NUTR 226-Food Fundamentals ...............................................................3
NUTR 227-Food Fundamentals Lab .........................................................2
ENSC 110--Land Resource & Environmental Sciences .........................3
BIOC 103IN-Unseen Universe: Microbes .............................................4
AGSC 341--Field Crop Production ..........................................................3
Take one of the following:
BIOB 318-Biometry .............................................................................3
STAT 216Q-Introduction to Statistics .....................................................3
Take one of the following:
HORT 245-Plant Propagation .................................................................3
PSCL 2305-Intro to Pol.Sci. ......................................................................3
University Core and Electives .............................................................4

Junior Year Credits
ECCH 205--Energy & Sustainability .........................................................3
HDCF 371--Res Methods ..........................................................................3
NUTR 222--Food Service Systems Mgmt ..............................................3
NUTR 395--Practicum: Quantity Foods Prod & Mgmt .........................3
NUTR 351--Nutrition & Society ...............................................................3
ENSC 243N--Soils ..................................................................................3
AGSC 428--Sustainable Cropping Systems ...........................................3
Take two of the following:
AGBE 315--Ag in Global Context ..........................................................3
AGED 533-Coop Business Princ & Pract ..............................................3
ANSC 222-Livestock in Sustainable Systems ........................................3
HORT 345-Commercial Plant Production ............................................3
HORT 345--Organic Market Gardening ..................................................3
University Core and Electives .............................................................3

Senior Year Credits
Take one of the following:
SFBS 429--Small Bus Entre Food Hlth .................................................3
BMGT 469--Con Soc Entrepreneurship ..................................................3
NUTR 521-Nutrition in the Lifecycle ........................................................3
Take one of the following:
SFBS 451R--Sustainable Food Systems ................................................3
SFBS 451R--Sustainable Food Systems ................................................3
SFBS 498--Internship .............................................................................3
SFBS 499--Senior Thesis/Capstone .........................................................3
Take one of the following:
NASX 415--Native Food Systems ..........................................................3
PSCI 456--Politics of Food & Hunger .......................................................3
| Programs of Instruction – Arts and Architecture |

### AGROECOLOGY OPTION

#### Land Resources and Environmental Sciences

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 216Q</td>
<td>Introduction to Statistics</td>
</tr>
<tr>
<td>SFBS 298</td>
<td>Internship</td>
</tr>
<tr>
<td>BCH 104RN</td>
<td>Biochem of Health</td>
</tr>
<tr>
<td>NUTR 221CS</td>
<td>Basic Human Nutrition</td>
</tr>
<tr>
<td>ECNS 101IS</td>
<td>Econ Way of Thinking</td>
</tr>
<tr>
<td>BIOM 103IN</td>
<td>Unseen Universe: Microbes</td>
</tr>
<tr>
<td>BIOB 110CS</td>
<td>Introduction to Plant Biology</td>
</tr>
<tr>
<td>SFBS 146</td>
<td>Intro SFBS Seminar</td>
</tr>
<tr>
<td>M 145Q</td>
<td>Mathematics for Liberal Arts</td>
</tr>
<tr>
<td>SFBS 149</td>
<td>Capstone</td>
</tr>
</tbody>
</table>

#### Freshman Year Credits
- 30

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 146-Intro SFBS Seminar</td>
<td></td>
</tr>
<tr>
<td>BIOB 170IN-Principles Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>BIOB 109-Principles of Living Systems</td>
<td>4</td>
</tr>
<tr>
<td>BIOB 110CS-Introduction to Plant Biology</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>ENSC 110-Land Resource &amp; Environmental Sciences</td>
<td>3</td>
</tr>
<tr>
<td>M 121-College Algebra</td>
<td>3</td>
</tr>
<tr>
<td>M 145Q-Mathematics for Liberal Arts</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Sophomore Year Credits
- 30

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 101IS-Econ Way of Thinking</td>
<td></td>
</tr>
<tr>
<td>NUTR 221CS-Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>BCH 104RN-Biochem of Health</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 129-Intro to Organic &amp; Biochem</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 211-Elements of Organic Chem</td>
<td>4</td>
</tr>
<tr>
<td>ENSC 245IN-Soilsc</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 298-Internship</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 299-Towne’s Harvest Practicum</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 318-Biometry</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 293D-Intro to International Rel</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 2108S-Econ Ag Business</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 222-Livestock in Sustainable Syst</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 360-Gen Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>BSCB 262IN-Intro to Entomology</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 245IN-Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 111CS-Intro to Phys Geography</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>30</td>
</tr>
</tbody>
</table>

### SUSTAINABLE CROP PRODUCTION OPTION

#### Plant Sciences and Plant Pathology

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 146-Intro Sust Food/Bioenergy System</td>
<td></td>
</tr>
<tr>
<td>BIOB 170IN-Principles Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>ENSC 101IS-Econ Way Thinking</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 110CS-Introduction to Plant Biology</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS-Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 314-Field Crop Production</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 103IN-Unseen Universe:Microbes</td>
<td>3</td>
</tr>
<tr>
<td>HORT 105-Microlel Growing</td>
<td>3</td>
</tr>
<tr>
<td>UNIVERSITY CORE</td>
<td>2-3</td>
</tr>
<tr>
<td>SFBS 149</td>
<td>Capstone</td>
</tr>
<tr>
<td>PSCI 293D-Intro to International Relations</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 318-Biometry</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Freshman Year Credits
- 30

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 445R</td>
<td>Culinary Marketing: Farm to Table</td>
</tr>
<tr>
<td>BMGT 469-Com Soc Entrepreneurship</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 498</td>
<td>Internship</td>
</tr>
<tr>
<td>SFBS 499</td>
<td>Capstone</td>
</tr>
</tbody>
</table>

#### Sophomore Year Credits
- 30

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 299-Internship</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 296-Practicum: Towne’s Harvest</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 298-Internship</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 230D-Intro to International Relations</td>
<td>3</td>
</tr>
<tr>
<td>M 121-College Algebra</td>
<td>3</td>
</tr>
<tr>
<td>M 145Q-Math for Liberal Arts</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>30</td>
</tr>
</tbody>
</table>

### SUSTAINABLE LIVESTOCK PRODUCTION OPTION

#### Animal and Range Sciences

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 299-Practicum: Towne’s Harvest</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 298-Internship</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 296-Practicum: Towne’s Harvest</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS-Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 314-Field Crop Production</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 103IN-Unseen Universe:Microbes</td>
<td>3</td>
</tr>
<tr>
<td>HORT 105-Microlel Growing</td>
<td>3</td>
</tr>
<tr>
<td>UNIVERSITY CORE</td>
<td>2-3</td>
</tr>
<tr>
<td>SFBS 293D-Intro to International Relations</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 318-Biometry</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Freshman Year Credits
- 30

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGBE 2108S-Econ Ag Business</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 222-Livestock in Sustainable Syst</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 245IN-Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Sophomore Year Credits
- 30

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 222-Livestock in Sustainable Syst</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 129-Intro to Organic &amp; Biochem</td>
<td>4</td>
</tr>
<tr>
<td>NUTR 221CS-Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 314-Field Crop Production</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 103IN-Unseen Universe:Microbes</td>
<td>3</td>
</tr>
<tr>
<td>HORT 105-Microlel Growing</td>
<td>3</td>
</tr>
<tr>
<td>UNIVERSITY CORE</td>
<td>2-3</td>
</tr>
<tr>
<td>ANSC 232-Livestock Management-Sheep</td>
<td>1</td>
</tr>
<tr>
<td>NRSM 235-Rangeland Management</td>
<td>1</td>
</tr>
<tr>
<td>NRSM 235-Rangeland Management</td>
<td>1</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>30</td>
</tr>
</tbody>
</table>
COLLEGE OF ARTS AND ARCHITECTURE

Nancy Cornwell, Dean

Undergraduate Programs Available:

- B.A. and B.F.A. in Art
- B.A. in Environmental Design
- B.A. in Film and Photography
- B.A. in Music
- B.A. in Music Technology
- Bachelor of Music Education

The College of Arts and Architecture includes the School of Architecture, the School of Art, the School of Film and Photography, and the Department of Music. KUSM, Montana Public Broadcasting System (PBS) - MSU’s public television station - and Shakespeare in the Parks, a theatre outreach performance company, are also affiliated with the College. The curriculum provides for baccalaureate degree programs with majors in Architecture (Environmental Design), Art (Ceramics, Jewelry and Metalsmithing, Painting and Drawing, Printmaking, and Sculpture), Graphic Design, Art History, Art Education K-12 Broadfield Option, Film, Photography, Music, Music Technology and Music Education.

A Master of Architecture, Master of Arts in Art History, Master of Fine Arts in Art and Master of Fine Arts in Science and Natural History Filmmaking degrees are offered at the graduate level.

All College of Arts and Architecture students take a broad spectrum of humanities and science core courses to provide depth and substance to their artistic explorations.

Art

Department of Art
http://www.montana.edu/art/

The School of Art is committed to making available the best possible faculty, curriculum, facilities, and experiences for a professional education in the studio arts, graphic design, and art history. On both the undergraduate and graduate levels, the School seeks to prepare students for careers in the visual arts and to enrich the cultural lives of all University students. Additionally, the School recognizes its responsibility to serve as a cultural resource for the community, state, and nation.

The School of Art, fully accredited by the National Association of Schools of Arts and Design, was established in 1893 and its first graduate degree was conferred in 1932. As an academic department of the University, the School of Art is a subdivision of the College of Arts and Architecture and is affiliated with the School of Architecture, School of Film and Photography, and the School of Music.

The School’s faculty is composed of practicing artists, designers, and scholars, each teaching in the particular discipline of his or her professional involvement. The regular faculty is augmented by graduate teaching assistants and by visiting artists/scholars who are part of an active program of lectures, workshops, and critiques supported by the National Endowment for the Arts, the Montana Arts Council, and the Associated Students of Montana State University. The Helen E. Copeland Gallery located in Haynes Hall, and the Walter-Yoblonsky Gallery located in the Melvin Graduate Art Studios, display continuous exhibitions covering all aspects of the visual arts.

The curriculum is divided into seven areas of study: art history, ceramics, graphic design, jewelry and metalsmithing, painting, drawing, printmaking, and sculpture. Curricula within these areas lead to the Bachelor of Fine Arts (BFA) in Graphic Design and Studio Arts; and the Bachelor of Arts (BA) in Art History, Art Education K-12 Broadfield, and Liberal Arts Studio. Minors are also available in Art History (non-teaching) and Art Education K-12. The graduate degrees offered are the Master of Fine Arts in studio art (MFA) and the Master of Arts in Art History (MA). For information on the Master of Fine Arts and Master of Arts degrees, consult the graduate section of this bulletin.

Admission to Art Programs

During the spring semester of the first year in the School of Art, students are required to apply for admission to the remaining three-year curriculum leading to the Bachelor of Arts in Studio Arts, the Bachelor of Arts in Art Education, the Bachelor of Fine Arts in Studio Arts and the Bachelor of Fine Arts in Graphic Design. All applications for admission are subject to the ap-
proval of the School of Art Admissions Committee. Total enrollment in the program shall be limited by the teaching resources and space capacities of the School of Art. Spaces available each year will be awarded to those applicants with the greatest creative promise and highest scholastic achievement. The School of Art does not accept Advanced Placement Studio Art credits to fulfill Art requirements. AP Art credits may be used as university electives.

Admission of transfer students is selective and highly competitive; only those students whose past academic performance and portfolio submission indicate a probability of success are admitted. Students transferring from other academic departments within the university will be required to take ARTZ 105RA, ARTZ 106RA & ARTZ 108RA regardless of prior coursework. Portfolio review for transfer students will take place only during spring semester and at the end of summer session. Contact the School of Art for details and deadlines at 406-994-4501.

BFA Admission to Studio Arts and Graphic Design

In the Studio Arts Option-BFA and Graphic Design Option-BFA a portfolio review is required for all students before admittance to 300 level courses. Prospective students who are transferring from similar programs at other institutions must submit portfolios. Contact the School of Art for details and deadlines.

The curriculum for art majors is composed of both required and elective courses within the School, and supporting courses from the other schools and departments of the College of Arts and Architecture and the University. Students may be limited to two studio courses per semester based on space availability and teaching resources. Required courses outside of the School of Art have either specific application to the student’s particular concentration or general application to a liberal arts education. The purpose of the curriculum is to develop perceptual and technical skills and to establish a foundation of ideas which gives meaning and direction to this training. The many and varied departments within the University offer the art student a rich source of technical, philosophical, and scientific information.

Semester In Italy Program

Each spring the School of Art offers a semester of study in Italy. This program provides upper-level students with an enriching opportunity to participate in an intensive studio and art history experience by immersing participants in the art and culture of Italy. Course offerings vary from year to year.

Internship Program

It is possible for students to earn academic credit while working outside of the University, employed by businesses, individual artists, craftpersons, designers, or other agencies through the School of Art’s Art and Design Internship Program. To be eligible, students must be art majors and be of junior standing. Further, they must have the recommendation of their academic adviser and approval by the Director of the School of Art. Accepted students enroll for internship credits under ARTZ 498 and GDSN 498.

Computer Notebook Requirement

Laptop Computers are required for all upper level graphic design courses. Contact the School of Art for specifications at 406-994-4501.

GPA Requirement

Art majors must maintain a cumulative GPA of 2.5 or higher to remain in the curriculum.

Program Fee

Because of the unique nature of equipment and materials used in the School of Art, all majors are assessed an additional fee. Students in some courses will also be required to purchase additional materials on their own. Please inquire at the School of Art office for specific fees.

Curricula in Art

- Options Leading to a B.F.A. in Art
  - Graphic Design Option
  - Studio Arts Option
- Options Leading to a B.A. in Art
  - Art Education K-12 Broadfield Option
  - Art History Option
  - Liberal Arts Studio Option
- Art Minors
  - Art History Minor (Non-teaching)
  - Art Education K-12 Minor

GRAPHIC DESIGN OPTION - B.F.A.

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTZ 105RA--Visual Language-Drawing</td>
<td>3</td>
</tr>
<tr>
<td>ARTZ 106RA--Visual Language-2D Foundations</td>
<td>4</td>
</tr>
<tr>
<td>ARTZ 108RA--Visual Language-3D Foundations</td>
<td>4</td>
</tr>
<tr>
<td>ARTZ 200RA--Art of World Civilization I</td>
<td>4</td>
</tr>
<tr>
<td>ARTZ 201RA--Art of World Civilization II</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 153RA--Web Design</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

 Portfolio Review is required before admittance to 200 level studies.

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTZ 211RA--Drawing I</td>
<td>4</td>
</tr>
<tr>
<td>PHOT 113RA--Understanding Photo</td>
<td>3</td>
</tr>
<tr>
<td>GDSN 222--Design Principles</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 224--Form and Content</td>
<td>4</td>
</tr>
<tr>
<td>Art Studio Beginning</td>
<td></td>
</tr>
<tr>
<td>(must include one 2D &amp; one 3D)</td>
<td></td>
</tr>
</tbody>
</table>

Take one of the following: 4

- ARTZ 221--Painting I
- ARTZ 231RA--Ceramics I
- ARTZ 251--Sculpture I
- ARTZ 261--Metals I
- ARTZ 271--Printmaking I

Art History Elective

Take one of the following: 3

- ARTH 302--Survey of Ancient Art
- ARTH 312--Decorative Arts & Environment
- ARTH 360RA--Hist of Asian Art & Arch
- ARTH 400--Art & Architecture of Egypt
- ARTH 402--Greek Art & Architecture
- ARTH 406--Roman Art & Architecture
- ARTH 410FA--Medieval Art
- ARTH 421--Late Gothic Painting
- ARTH 422--Early Renaissance-15th Century Art
- ARTH 423--Hist of Printmaking (1450-1945)
- ARTH 424--High Renaissance & Mannerism
- ARTH 426--Baroque Art in Italy & Southern Europe 1600-1750
- ARTH 427--Baroque Art in Northern Europe
- ARTH 430--19th Century Art
- ARTH 432--Art in the Age of Revolution
- ARTH 438BA--Beginnings of Modern Art
- ARTH 440--20th Century Art
- ARTH 451--Contemporary Art
- ARTH 495--Field Studies

University Core and Electives 4 4

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
</tr>
</tbody>
</table>

 Portfolio Review is required for all students before admittance to 300 level design courses.

Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTZ 211RA--Drawing I</td>
<td>4</td>
</tr>
<tr>
<td>ARTZ 231RA--Ceramics I</td>
<td>4</td>
</tr>
<tr>
<td>ARTZ 251--Sculpture I</td>
<td>4</td>
</tr>
<tr>
<td>ARTZ 261--Metals I</td>
<td>4</td>
</tr>
<tr>
<td>ARTZ 271--Printmaking I</td>
<td>4</td>
</tr>
</tbody>
</table>

Advanced Graphical Design studio electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDSN 367--Identity Systems</td>
<td>5</td>
</tr>
<tr>
<td>GDSN 368--Art Design</td>
<td>10</td>
</tr>
<tr>
<td>GDSN 369--Public Design</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 371--Motion Graphics</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 372--Advanced Web Design</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 373--Illustration</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 374--Digital Visualization</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 375--Letterpress</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 376--Screenprinting</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDSN 367--Identity Systems</td>
<td>5</td>
</tr>
<tr>
<td>GDSN 368--Art Design</td>
<td>10</td>
</tr>
<tr>
<td>GDSN 369--Public Design</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 371--Motion Graphics</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 372--Advanced Web Design</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 373--Illustration</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 374--Digital Visualization</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 375--Letterpress</td>
<td>4</td>
</tr>
<tr>
<td>GDSN 376--Screenprinting</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
</tr>
</tbody>
</table>
**PROGRAMS OF INSTRUCTION – ARTS AND ARCHITECTURE**

**Senior Year**

**F S**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTZ 108RA</td>
<td>Visual Language-3-D</td>
</tr>
<tr>
<td>ARTZ 211RA</td>
<td>Drawing I</td>
</tr>
<tr>
<td>ARTZ 261</td>
<td>Metals I</td>
</tr>
<tr>
<td>ARTZ 271</td>
<td>Printmaking I</td>
</tr>
</tbody>
</table>

**Take one of the following:**

- Art History Elective

**Junior Year**

**F S**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTZ 211RA</td>
<td>Drawing I</td>
</tr>
<tr>
<td>ARTZ 261</td>
<td>Metals I</td>
</tr>
<tr>
<td>ARTZ 271</td>
<td>Printmaking I</td>
</tr>
</tbody>
</table>

**Take one of the following:**

- Art History Elective

**Advanced Studio Elective**

**Take two of the following:**

- Advanced Studio Elective

**Junior Year, Semester in Italy Option:**

**F S**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTZ 211RA</td>
<td>Drawing I</td>
</tr>
<tr>
<td>ARTZ 261</td>
<td>Metals I</td>
</tr>
<tr>
<td>ARTZ 271</td>
<td>Printmaking I</td>
</tr>
</tbody>
</table>

**Take one of the following:**

- Art History Elective

**Senior Year**

**F S**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTZ 211RA</td>
<td>Drawing I</td>
</tr>
<tr>
<td>ARTZ 261</td>
<td>Metals I</td>
</tr>
<tr>
<td>ARTZ 271</td>
<td>Printmaking I</td>
</tr>
</tbody>
</table>

**Take one of the following:**

- Art History Elective

**Advanced Studio Elective**

**Take two of the following:**

- Advanced Studio Elective
Art History Elective
Take one of the following: ................................. 3
ARTH 392--Survey of Ancient Art
ARTH 312--Decorative Arts & Environment
ARTH 308IA-Hist of Asian Art & Arch
ARTH 409-Art & Architecture of Egypt
ARTH 402--Greek Art & Architecture
ARTH 406--Roman Art & Architecture
ARTH 410BA-Medieval Art
ARTH 421--Late Gothic Painting
ARTH 422--Early Renaissance-15th Century Art
ARTH 423--Printmaking (1450-1945)
ARTH 424--High Renaissance & Mannerism
ARTH 426--Baroque Art in Italy & Southern Europe 1600-1700
ARTH 427--Baroque Art in Northern Europe
ARTH 430--19th Century Art
ARTH 432--Art in the Age of Revolution
ARTH 438IA-Beginnings of Modern Art
ARTH 440-20th Century Art
ARTH 451--Contemporary Art
ARTH 455--Field Studies
EDU 382-Assessment, Curric., Instruction 2
EDU 497-Methods: 5-12 Art 3
EDU 995-Practicum: 5-12 3
HDCF 356-Exceptional Needs 3
University Core and Electives 1-2 15 15

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

ART EDUCATION K-12 BROADFIELD OPTION - B.A.

Freshman Year F S
ARTZ 159A-Visual Language-Drawing
ARTH 159BA-Visual Language-2D Foundations 4
ARTH 159BA-Visual Language-2D Foundations 4
ARTH 200A-Art of World Civilization I 4
ARTH 201A-Art of World Civilization II 4
EDU 202--Early Field Experience 1
HDCF 150IS--Human Development 3
EDU 202--Early Field Experience 1
EDU 202--Early Field Experience 1
University Core and Electives 4 15 15

Portfolio Review is required before admittance to the 200 level.

Sophomore Year F S
ARTZ 211RA-Drawing I 4
Art Studio-Beginning 8 4
Take three of the following:
ARTZ 221--Painting I
ARTZ 231A-Ceramics I
ARTH 251--Sculpture I
ARTZ 261--Metals I
ARTH 271--Printmaking I
EDU 211D-Multicultural Education 3
EDU 370--Integrating Tech into Education 1
PHOT 113RA-Understanding Photo 5
University Core and Electives 5 16 14

Junior Year F S
ARTZ 312--Intermediate Drawing 5
Art Studio-Beginning 4 4
Take two of the following:
ARTZ 221--Painting I
ARTZ 231A-Ceramics I
ARTH 251--Sculpture I
ARTZ 261--Metals I
ARTH 271--Printmaking I
Art History-Elective 5

Take one of the following:
ARTH 392--Survey of Ancient Art
ARTH 312--Decorative Arts & Environment
ARTH 308IA-Hist of Asian Art & Arch
ARTH 409-Art & Architecture of Egypt
ARTH 402--Greek Art & Architecture
ARTH 406--Roman Art & Architecture
ARTH 410BA-Medieval Art
ARTH 421--Late Gothic Painting
ARTH 422--Early Renaissance-15th Century Art
ARTH 423--Printmaking (1450-1945)
ARTH 424--High Renaissance & Mannerism
ARTH 426--Baroque Art in Italy & Southern Europe 1600-1700
ARTH 427--Baroque Art in Northern Europe
ARTH 430--19th Century Art
ARTH 432--Art in the Age of Revolution
ARTH 438IA-Beginnings of Modern Art
ARTH 440-20th Century Art
ARTH 451--Contemporary Art

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

ART HISTORY OPTION - B.A.

Freshman Year F S
ARTZ 159BA-Visual Language-2D Foundations 4
ARTH 159BA-Visual Language-2D Foundations 4

Sophomore Year F S
Art History (Group I)
Take one of the following: ................................. 3
ARTH 392--Survey of Ancient Art
ARTH 409-Art & Architecture of Egypt
ARTH 402--Greek Art & Architecture
ARTH 406--Roman Art & Architecture
ARTH 410BA-Medieval Art

Take one of the following: ................................. 3
ARTH 421--Late Gothic Painting
ARTH 422--Early Renaissance-15th Century Art
ARTH 424--High Renaissance & Mannerism
ARTH 426--Baroque Art in Italy & Southern Europe 1600-1700
ARTH 427--Baroque Art in Northern Europe
ARTH 432--Art in the Age of Revolution

Take one of the following: ................................. 3
ARTH 450--19th Century Art
ARTH 438IA-Beginnings of Modern Art
ARTH 440-20th Century Art
ARTH 451-Contemporary Art

Foreign Language
Take two of the following: ................................. 4
FRCH 101--Elementary French I
FRCH 102D--Elementary French II
or these two:
GRMN 101--Elementary German I
GRMN 102D--Elementary German II
or these two:
SPNS 101-Elementary Spanish I
SPNS 102D-Elementary Spanish II
PHOT 113RA-Understanding Photo 3
Humans in Elec...requirement 3

Take one course from the English, History or Philosophy Department.
University Core and Electives 2-5 15 15

Junior Year F S
ARTH 492--Individual Problems 1-5
Art History (Group III)
Take one of the following: ................................. 3
ARTH 450--19th Century Art
ARTH 438IA-Beginnings of Modern Art
ARTH 440-20th Century Art
ARTH 451-Contemporary Art

Art History (Group IV)
Take one of the following: ................................. 3
ARTH 312--Decorative Arts & Environments
ARTH 308IA-Hist of Asian Art & Arch
ARTH 423--Printmaking (1450-1945)
Art History Electives (art rubric)
Take three of the following: ................................. 5-6
ARTH 592--Survey of Ancient Art
ARTH 312--Decorative Arts & Environments
ARTH 409-Art & Architecture of Egypt
ARTH 402--Greek Art & Architecture
ARTH 406--Roman Art & Architecture
ARTH 410BA-Medieval Art
ARTH 421--Late Gothic Painting
PROGRAMS OF INSTRUCTION – ARTS AND ARCHITECTURE

ARITH 422--Early Renaissance-15th Century Art
ARITH 425--Hist of Printmaking (1450-1945)
ARITH 424--High Renaissance & Mannerism
ARITH 426--Baroque Art in Italy & Southern Europe 1600-1700
ARITH 427--Baroque Art in Northern Europe
ARITH 430--19th Century Art
ARITH 432--Art in the Age of Revolution
ARITH 438IA-Beginnings of Modern Art
ARITH 440--20th-21st Century Art
ARITH 451--Contemporary Art

Sophomore Year

Course  Credits
ARTH 211A--Drawing I ...................... 4
PHOT 113A--Understanding Photo ............. 3
Take three of the following:..................... 4—8
ARTH 221--Painting I
ARTH 231RA--Ceramics I
ARTH 251--Sculpture I
ARTH 261--Metals I
ARTH 271--Printmaking I
GDSN 225--Design Principles

Art History Elective
Take one of the following:..................... 3
ARTH 302--Survey of Ancient Art
ARTH 312--Decorative Arts & Environment
ARTH 506RA--Hist of Asian Art & Arch
ARTH 400--Art & Architecture of Egypt
ARTH 402--Greek Art & Architecture
ARTH 406--Roman Art & Architecture
ARTH 410RA--Medieval Art
ARTH 421--Late Gothic Painting
ARTH 422--Early Renaissance-15th Century Art
ARTH 425--Hist of Printmaking (1450-1945)
ARTH 424--High Renaissance & Mannerism
ARTH 426--Baroque Art in Italy & Southern Europe 1600-1700
ARTH 427--Baroque Art in Northern Europe
ARTH 430--19th Century Art
ARTH 432--Art in the Age of Revolution
ARTH 438IA-Beginnings of Modern Art
ARTH 440--20th-21st Century Art
ARTH 451--Contemporary Art

University Core and Electives .............. 4—4

Junior Year

Course  Credits
Semester in Italy Option ....................(15)
Take two of the following:..................... 4—4
ARTH 221--Painting I
ARTH 231RA--Ceramics I
ARTH 251--Sculpture I
ARTH 261--Metals I
ARTH 271--Printmaking I
GDSN 225--Design Principles

Advanced Studios
Take one of the following:..................... 5
ARTH 312--Decorative Arts & Environment
ARTH 322--Intermediate Painting
ARTH 332--Intermediate Ceramics
ARTH 352--Intermediate Sculpture
ARTH 361--Metals II
ARTH 373--Intermediate Printmaking-Lithography
ARTH 374--Intermediate Printmaking-Serigraphy
ARTH 375--Intermediate Printmaking-Intaglio
ARTH 376--Intermediate Printmaking-Relief
ARTH 379--Alternate Print Media

Take one of the following:..................... 3
ARTH 302--Survey of Ancient Art
ARTH 312--Decorative Arts & Environment
ARTH 506RA--Hist of Asian Art & Arch
ARTH 400--Art & Architecture of Egypt
ARTH 402--Greek Art & Architecture
ARTH 406--Roman Art & Architecture
ARTH 410RA--Medieval Art
ARTH 421--Late Gothic Painting
ARTH 422--Early Renaissance-15th Century Art
ARTH 425--Hist of Printmaking (1450-1945)
ARTH 424--High Renaissance & Mannerism
ARTH 426--Baroque Art in Italy & Southern Europe 1600-1700
ARTH 427--Baroque Art in Northern Europe
ARTH 430--19th Century Art
ARTH 432--Art in the Age of Revolution
ARTH 438IA-Beginnings of Modern Art
ARTH 440--20th-21st Century Art
ARTH 451--Contemporary Art

University Core and Electives .............. 6—8

Senior Year

Course  Credits
Semester in Italy Option ....................(15)
ARTH 400--CAREERS in Art .................... 1
Advanced Studios
Take two of the following:..................... 5—5
ARTH 312--Intermediate Drawing
ARTH 322--Intermediate Painting
ARTH 332--Intermediate Ceramics
ARTH 352--Intermediate Sculpture
ARTH 361--Metals II
ARTH 373--Intermediate Printmaking-Lithography
ARTH 374--Intermediate Printmaking-Serigraphy
ARTH 375--Intermediate Printmaking-Intaglio
ARTH 376--Intermediate Printmaking-Relief
ARTH 379--Alternate Print Media

University Core and Electives .............. 9—10

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

ART HISTORY MINOR
(NON-TEACHING)

Course  Credits
ARTH 300A--Art of World Civilization I ........ 4
ARTH 401A--Art of World Civilization II .......... 4
ARTH 402--Individual Problems ................ 1

One credit must be on a topic from group I

9

Take six of the following, at least one from each group:

Group I - Ancient Medieval
ARTH 302--Ancient Art .......................... 3
ARTH 400--Art & Architecture of Egypt .......... 3
ARTH 402--Greek Art & Architecture ............ 3
ARTH 406--Roman Art & Architecture ............ 3
ARTH 410RA--Medieval Art ........................ 3

Group II - Renaissance & Baroque
ARTH 421--Late Gothic Painting ................. 3
ARTH 422--Early Renaissance-15th Cent. Art .... 3
ARTH 424--High Renaissance & Mannerism ....... 3
ARTH 427--Baroque Art in Northern Europe .... 3
ARTH 432--Art in the Age of Revolution ......... 3

Group III - Modern & Contemporary
ARTH 430--19th Century Art .................... 3
ARTH 438IA-Beginnings of Modern Art ........... 3
ARTH 440--20th-Century Art .................... 3
ARTH 451--Contemporary Art .................... 3

Group IV - Non-Western, Diversity, Theory
ARTH 312--Decorative Arts & Environment .... 3
ARTH 506RA--Hist of Asian Art & Arch ........... 3
ARTH 425--Hist of Printmaking (1450-1945) .... 3

27

ART EDUCATION K-12 MINOR

Course  Credits
ARTH 105RA--Visual Language-2-D ............... 4
ARTH 106RA--Visual Language-3-D ............... 4
ARTH 108RA--Visual Language-4-D ............... 4

20

Portfolio Review is required before admittance to 200 level studios.

LIBERAL ARTS

STUDIO OPTION - B.A.

Freshman Year

Course  Credits
ARTH 105RA--Visual Language-2-D ............... 3
ARTH 105RA--Visual Language-2-D ............... 3

15 15

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

The Honors College...
Environmental Design
School of Architecture
http://arch.montana.edu/

The School of Architecture offers a four year Bachelor of Arts in Environmental Design undergraduate program which combined with our three-semester graduate program leads to a fully accredited Master of Architecture degree. The Master of Architecture degree is a first-professional degree.

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit US professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree, that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

Montana State University, College of Arts and Architecture, School of Architecture offers the following NAAB-accredited degree program:

Master of Architecture
(Pre-professional degree + 42 graduate credits)

The next accreditation visit for this degree program will take place in 2014. The School of Architecture seeks to prepare students for a lifelong critical engagement in the arts and science of architecture. Located in “the last best place” of the Northern Rockies we are in an extraordinary position to engage questions regarding the relationship between the natural and built environments. To that end, we teach and practice a moral, ethical, and aesthetic responsibility to society and the natural world in the design of the built environment. It is in our design studios, that this philosophy is most clearly demonstrated. Each studio is conceived to build upon the previous studio in a manner that develops a student’s mastery of the science of architecture while at the same time exposing the student to the rich diversity of our faculty’s philosophical beliefs. Within a structured sequence of increasingly complex problems emphasis is placed on teaching both an iterative design process and the visualization skills necessary to demonstrate the resultant design proposals. The science of architecture is continuously evolving and will do so over the life of every architect. We are committed to preparing our students to enter the profession with both the contemporary scientific knowledge and emerging technical expertise to further this evolution while at the same time ensuring that our graduates are grounded in the fundamental processes, composition, and drawing skills that have been central to architecture throughout its history. In addition to the science of architecture we are equally committed to ensuring that our graduates acquire a critical philosophy with which they can engage the design of the built environment.

Knowing how to build is a matter of science and technology but knowing what to build is a question of morality, ethics, and aesthetic responsibility. In this regard the faculty shares a commitment to the stewardship of our environment. This is particularly important in the Northern Rockies where our historic fabric of cities, rural communities, and the natural landscape coexist in a tenuous balance. Focusing on the broad principles of creating a sustain-able social, cultural, economic, and physical environment we utilize the region, from its major cities to its national parks, as the canvas for our teaching, research and creative activities.

Architecture

Briefly defined, architecture is the art and science of designing buildings that provide appropriate accommodation for human activities. Professional practice requires a person with the unique combination of creative ability, technical knowledge, human understanding, and administrative skill. The undergraduate Environmental Design curriculum, which leads to the Bachelor of Arts in Environmental Design degree, prepares students to enter the graduate program in Architecture at MSU or serves as a basis for application to other graduate programs or for employment as a non-architect in environmental design fields. However, the Bachelor of Arts in Environmental Design degree by itself does not qualify students to become registered architects. Students wishing to become registered architects must complete the graduate program of study and receive the accredited Master of Architecture degree. A Bachelor of Architecture degree is no longer offered at MSU.

Once admitted to the Environmental Design program, and after completing their fourth year design studios, students with an acceptable academic record may apply to the Master of Architecture professional program. Specific dates for graduate applications can be obtained from the main office of the School of Architecture. The program offers a professional education as well as exposure to other academic disciplines, and provides the foundation for an internship with a practicing architect, required after graduation.

In most states, a graduate with a professional degree in architecture needs the equivalent of three additional years of varied experience in an architectural office to qualify for the examination for a professional license. A person is not authorized to practice architecture until the architectural licensing examination is passed and a license is issued. Other areas of employment open to the architecture graduates include construction, government service, industry, and education.

Take one class from the following:.........................5
ARTZ 312-Intermediate Drawing
ARTZ 322-Intermediate Painting
ARTZ 323-Intermediate Ceramics
ARTZ 332-Intermediate Sculpture
ARTZ 373-Intermediate Printmaking Lithography
ARTZ 374-Intermediate Printmaking Serigraphy
ARTZ 375-Intermediate Printmaking Intaglio
ARTZ 376-Intermediate Printmaking Relief
ARTZ 379-Alternate Print Media
EDU 397-Methods: K-8 Art..........................(3)
EDU 497-Methods: 5-12 Art..........................(3)

97
In addition to the college preparatory curriculum, high school students planning on enrolling in architecture are especially encouraged to take art courses such as basic design and drawing.

Students must begin the undergraduate program in the fall semester because the first course of the design studio sequence is offered fall semester only. Students that have completed their university core requirements or have completed a previous degree may enroll in an accelerated first year design sequence offered in the summer semester.

Admission of transfer students is selective and highly competitive; only those students whose past academic performance and portfolio submission indicate a probability of success are admitted.

Admission to the Environmental Design Program
1. Admission to the first year, the Pre-Environmental Design Program, is open. During the spring semester of the first year of the Pre-Environmental Design Program, students are invited to apply for admission to the remaining three-year curriculum leading to the Bachelor of Arts in Environmental Design degree. All applications for admission are subject to the approval of the Second Year Admissions Committee. Total enrollment in the program shall be limited by the teaching resources and space capacities of the School of Architecture. An enrollment quota will be established prior to each admissions cycle.
2. To be considered for admission to the second year of the program, applicants must:
   a. Be in good scholastic standing with a cumulative GPA of 3.0 or higher.
   b. Have satisfactorily completed all required course work of the first year of the Environmental Design Program.
   c. Be enrolled full time during the fall and spring semesters of the year of application. This is a demanding program and students must demonstrate their ability to succeed while maintaining a full-time course schedule.
   d. Have a design portfolio that indicates creative potential. Transfer students from other architecture or environmental design programs must have, prior to acceptance and advanced design year placement, an overall grade-point average of 3.0 or above and a high quality, creative portfolio. Transfer students planning to attend the fall semester must submit their application and portfolio to the Environmental Design Program by May 1. Applications received after that date will be considered on a space-available basis only.
3. Application procedures for admission to the Environmental Design Program:
   a. An application for admission, including portfolio requirements, may be obtained from the School of Architecture after March 1. The completed application form, plus portfolio of design and graphic work, are to be submitted to the School of Architecture by May 1.
   b. Applicants are required to submit a portfolio including examples of their design and graphic work.
   c. An applicant who has applied previously for admission and has not been accepted or who fails to enroll in the environmental design program after acceptance or who fails to complete ARCH 253 must re-apply in the regular manner.

Spaces available each year will be awarded to those applicants with the highest scholastic achievement and who show the greatest creative and professional promise. The Second Year Admissions Committee reserves the right to leave available spaces unfilled if it determines that the remaining applicants have not performed at an acceptable level in the first year of the Environmental Design Program. Applicants who are not selected have the right to meet with the Second Year Admissions Committee, Undergraduate Coordinator and Director for a review of their application materials.

Admission of transfer students is selective and highly competitive; only those students whose past academic performance and portfolio submission indicate a probability of success are admitted.

Architecture Internship Program
This is an optional enrichment program for students who, for a short period in their education, would benefit at least as much from professional experience as academic experience. The goals of the program are those of the required architecture courses plus those which can be sought only in the office context, such as familiarization with the relationship of all aspects of professional practice.

Students must obtain their own employment in an architecture firm for a continuous period of not less than 12 weeks.

Students must apply in writing to the coordinator of the program by the fifth week of the semester prior to the internship during the student’s fourth year in Environmental Design. The Internship Coordinator and Director reviews all applications and makes the decision concerning acceptance into the program. A student meeting the criteria listed below may still be denied acceptance if the faculty determines that the student would benefit more from a formal design studio. The criteria for admission are:
1. A minimum 3.0 overall cumulative grade point average and a minimum 3.0 in all architecture courses.
2. Completion of all required courses as tabulated through the third year.

Foreign Study Program
This is an optional enrichment program which allows qualified students to participate in an intensive semester of foreign study. Students pay the additional costs of travel, lodging, and administration related to this program in addition to normal tuition and fees. The program is typically offered both Spring and Summer semesters, subject to funding constraints, and is organized and directed by a faculty member(s) from the School of Architecture.
The criteria for acceptance into the Foreign Study Program are as follows:
1. A high degree of self-motivation and self-discipline as demonstrated by performance in required course work.
2. A minimum 3.0 overall cumulative grade point average and a minimum 3.0 in all architecture courses.
3. Completion of ARCH 121IA, ARCH 322IA and ARCH 323IA.
4. Completion of all required courses as tabulated through the third year.

Admission to the program requires submission of a request in writing to the coordinator of the program by the fifth week of the semester prior to the program. A cash deposit may be required at this time. Requests will be reviewed by the faculty for approval.

Standard of Work in Architecture Courses
Any student receiving two consecutive grades of C- or lower in any design sequence course will be required to repeat the last course in which a C- or lower was received.

Financial
Costs for an architectural education are similar to other programs in the university. An academic exposure to both rural and urban settings through class field trips, the integration of computer technology, networking, printing as well as other program enhancements are an important part of an architect’s education. In order to meet this need and help defer costs of the field trips, computer integration, lecture series and program enhancements, a Program Fee is assessed to each student in the pre-environmental design, environmental design, and architectural programs that reflects the student’s degree status in the program. For current Program Fee costs, students may contact the School of Architecture. Students are required to purchase their own personal notebook computer, which meets the specifications of the School of Architecture, during the second year of the Environmental Design undergraduate program. The computer will be an essential tool for use throughout the Professional Program.

Beyond normal tuition, fees, room, board, and supplies, an architectural student requires drawing equipment and materials for drawing and models during the school year. This can be expected to add at least another $600 per year to the cost. Inquiries for financial aid or assistance should be sent directly to the Office of Financial Aid Services at Montana State University.

Curriculum in Environmental Design

ENVIRONMENTAL DESIGN

<table>
<thead>
<tr>
<th>First Year</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 121IA--Intro to Design</td>
<td>F</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 151RA-Design Fundamentals I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ARCH 152RA-Design Fundamentals II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 151Q-Pre Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>or M 171Q- Calculus I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PHSX 265-College Physics I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>14 17</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Second Year</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 241-Building Construction I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ARCH 243-Architectural Structures I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ARCH 244-Architectural Structures II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ARCH 253-Architectural Design I</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>ARCH 261-Architectural Graphics I</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>ARCH 262-Arch Graphics II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ARCH 322IA-World Architecture I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ARCH 323IA-World Architecture II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Third Year</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 331-Environmental Ctrl I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ARCH 332-Environmental Ctrl II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ARCH 340-Building Construction II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ARCH 354-Architectural Design II</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>ARCH 355-Arch Design III</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>ARCH 363-Arch Graphics III</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 313-Professional Practice</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ARCH 456-Arch Design IV</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCH 450-Community Design Center</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>or ARCH 498-Internship</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>or ARCH 414-Arch Study Abroad</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>or ARCH 428-Foreign Study History</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>or ARCH 458-Arch Design VI</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Non-Architecture Electives</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 12</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 414, 428, and 450 are offered both fall and spring semesters in Fourth Year to provide diverse options. ARCH 498 is offered on demand.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

The School of Architecture reserves the right to retain student work for exhibition and instructional purposes.

Additional Professional Program Requirements (M.Arch)
For students interested in obtaining a Bachelor of Arts in Environmental Design degree leading to a Master of Architecture degree, one graduate level design studio must be taken during a summer semester to complete the Master of Architecture program. For additional advising information please contact the School of Architecture at 160 Cheever Hall, 406-994-4255.

Additional Professional Program Requirements (MCEM)
Students interested in obtaining a Bachelor of Arts in Environmental Design degree and considering entry into the Master of Construction Engineering Management Program will be required to take additional Math, English, Natural Science, Business and Engineering courses from those listed above. Students interested in this Construction Engineering Management focus should contact the Department of Civil Engineering, 3900 Cobleigh Hall, 406 994-2111 to obtain the specific course requirements.

Film and Photography
The School of Film and Photography
http://sfp.montana.edu

The School of Film and Photography (SFP) prepares students to meet the challenges of a rapidly expanding media environment as informed critical thinkers and professionally trained creative artists. Our students develop their own voices as tomorrow’s leaders through intensive hands-on exploration of motion picture, photography, theatre and new media production.

The School of Film and Photography offers a Bachelor of Arts degree with concentrations (options) in Film and Photography, as well as a minor in Photography.

The two degree options share a common foundation dedicated to the relationships between film and photography as integrated arts and technologies that profoundly shaped the twentieth century and serve as the foundation of new media in the twenty first century. This integrated foundation permits students to take additional courses in Film or Photography while they complete

PROGRAMS OF INSTRUCTION – ARTS AND ARCHITECTURE 99
the requirements of the option they have selected as their concentration.

Both options also provide flexibility for students to broaden their education with course work outside of the School of Film and Photography. All of our students are encouraged to consider the benefits of study abroad and/or minorin in another area of interest. While we aim to provide professional film and photography training, we place equal importance on providing our students with a broad education to prepare them for a wide range of future opportunities not confined to these industries.

The Film and Photography options are in heavy demand. In order to preserve the quality of student education, only a limited number of students who meet gate requirements are permitted to continue in each program beyond the first year. For more information about the gate requirements in each option see the individual program descriptions below.

Transfer Students

Students who intend to transfer to The School of Film and Photography should seek prior approval of credit taken elsewhere in order to be certain that these credits will fulfill requirements in the Film or Photography options. In no case may a class completed with a grade below “C” elsewhere be applied toward the program requirements for the degree. Any class that is not an equivalent class within the Montana university system must be approved by the SFP Director or Advisor on the basis of a review of the syllabus of the course taken elsewhere. A challenge exam may be required for any transfer credit at the discretion of the SFP Director or Advisor.

Course and Program Fees

Course fees are assessed to all students enrolled in foundation courses FILM 112 and PHOT 113. Students who pass the gate into either the Film or Photography option are charged a program fee per semester (subject to annual increase).

THE FILM OPTION

Students in the Film Option gain hands-on experience in all aspects of motion picture production, supported by theatrical production work. Students have opportunities to engage in film production throughout the program, starting in the first year and culminating in a senior thesis film project. At the same time, students study film history, film aesthetics, and the film industry, to broaden their understanding of the film medium and inform their personal filmmaking goals.

Film Option Gate Requirements

Upon completion of all of the four required foundation courses and two university Core requirements, WRIT 101 and University Seminar (US), interested students may apply for acceptance into the Film option. The Film option will accept no more than 48 students each year. Selection will be based on the average of grades (GPA) earned in the required foundation courses and the successful completion of WRIT 101 and US.

In order to apply for acceptance into the Film option for the following year, students must submit an application form by April 30. Students must also submit a portfolio consisting of one individual film project completed in FILM 112 and a written statement. Portfolios will determine acceptance in case of a tie based solely on GPA. Portfolios are due by the last day of spring semester finals week.

All applicants will be notified of the gate outcome on or before May 30th. If not successful, students may reapply to the gate the following year. Students who wish to reapply may retake any courses during the intervening year to improve their chances of success.

Film Option Curriculum

Please note that some Film program-related courses are listed under different headings, including:

- THTR 304 – Theatre Production
- MUST 380 – Interdisciplinary Projects I
- MUST 382 – Interdisciplinary Projects II

Foundation Courses (required for gate acceptance; typically taken in freshman year)

- FILM 100H – Introduction to Film & Photography............3
- FILM 106IA – Film in America..........................3
- FILM 112 – Aesthetics of Film Production 1.................3
- PHOT 113RA – Understanding Photography.................3
- WRIT 101W – College Writing I........................3
- US – University Seminar (topic of choice) ...............3

*FILM 112, WRIT 101W and University Seminar are typically taken in freshman year

Film Option Requirements (following gate acceptance)

- FILM 212 - Aesthetics of Film Production II ..........4
- FILM 251 – Scriptwriting ......................................3
- FILM 254 – Acting for Film ..................................3
- Any three of the following Film Studies courses: .........9
- FILM 260D – International Film & Television (3)
- FILM 381 – Studies in Film (3)
- FILM 419 – Film & Documentary Theory (3)
- FILM 481 – Advanced Studies in Film (3)
- FILM 494 – Film Studies Seminar (3)
- OR other film-related studies course(s) approved by advisor (3)
- Any two of the following Production courses: .............8
- FILM 371 – Non-Fiction Production (4)
- FILM 372 – Fiction Production (4)
- THTR 304 – Theatre Production (4)
- FILM 499 – Senior Project (fall or spring) .................5
- SFP Electives (at least 4 other SFP courses*) min. 12
- Non-SFP Electives (at least 3 courses***) .........min. 9

Total Required SFP Credits 56

* SFP Electives are any courses offered in the School of Film & Photography including THTR 304, MUST 380 and MUST 382 that are not serving to fulfill any requirements listed above. Any of the studies or production courses listed above in excess of the number required in each category can be taken as SFP Electives. This requirement is intended to permit Film and Photography students to explore their individual interests in greater depth in one area or more broadly in both areas.

** Non-SFP Electives are any courses offered outside the School of Film & Photography, not including THTR 304, MUST 295, MUST 380 and MUST 382, that are not serving to fulfill university CORE requirements. This requirement is intended to encourage Film and Photography students to develop an area of knowledge to inform their pursuits as creative artists. Completion of a minor outside of the School of Film and Photography will fulfill this requirement.

A minimum of 120 credits is required for graduation, 42 of these credits must be in courses numbered 300 or above.

THE PHOTOGRAPHY OPTION

The Photography option offers both artistic and applied approaches to the medium, providing a solid foundation for those entering a professional field and those choosing to pursue postgraduate education. Accredited by the National Association of Schools of Art and Design, the Photography option sets high standards for production and is one of the few comprehensive four-year photography degree programs in a sizable geographical area of the north central and northwest United States. Coursework covers everything from traditional silver-based darkroom techniques to alternative processes as well as emphasis in digital technologies across the curriculum.
Photography Option

Gate Requirements

Upon completion of all of the four required Photography foundation courses and two university Core requirements, WRIT 101, and University Seminar (US), interested students may apply for acceptance into the Photography option. The Photography option will accept no more than 36 students each year. Selection will be based on the average of grades (GPA) earned in the required foundation courses, the successful completion of WRIT 101 and US, and a portfolio review based on work completed in PHOT 213 Intermediate Photography.

In order to apply for acceptance into the Photography option for the following year, students must submit an application form by April 30. Portfolio submissions will be accepted immediately after the scheduled final critique of assignments in PHOT 213. All applicants will be notified of the gate outcome on or before May 30th. If not successful, students may reapply to the gate the following year. Students who wish to reapply may reapply any courses during the intervening year to improve their chances of success.

Those accepted into the program after the freshman year will be required to purchase a Mac laptop computer that meets the specifications of the department by the fall semester of their sophomore year. Students will be notified of these specifications upon a successful portfolio review outcome in May.

Photography Option Curriculum

Foundation Courses (required for gate acceptance; typically taken in freshman year)

- FILM 100IH – Introduction to Film & Photography
- FILM 112 – Aesthetics of Film Production
- PHOTO 113RA – Understanding Photography
- PHOTO 213 – Intermediate Photography
- WRIT 101 – College Writing
- ARTH 201IA – Art of World Civilization I
- ARTZ 108RA – 3-D Foundations
- ARTZ 105RA – Drawing
- ARTZ 200IA – Art of World Civilization II

* FILM 112, WRIT 101W and University Seminar are offered both fall and spring semesters and may be taken in either semester.

Photography Option Requirements (following gate acceptance)

- PHOTO 255 – Intro Color Photo
- PHOTO 258 – View Camera
- Four of the following Film & Photo Studies courses (must include 303 or 304)
- FILM 260D – International Film & TV
- PHOTO 305 – Early History of Photo
- PHOTO 304 – Recent History of Photo
- PHOTO 381 – Studies in Film
- PHOTO 401 – Contemp Issues in Photog
- FILM 449 – Film & Documentary Theory
- PHOTO 481 – Advanced Studies in Film
- OR other photography-related studies course(s) approved by advisor

Any two of the following Photography production courses:

- PHOTO 331 – Professional Practices
- PHOTO 350 – Advanced Color Photography
- PHOTO 352 – Advanced Lighting Practices
- PHOTO 359 – Alternative Photographic Techniques

SFP Electives (at least 4 courses)

- PHOTO 255 – Intro Color Photo
- PHOTO 350 – Advanced Color Photography
- PHOTO 352 – Advanced Lighting Practices
- PHOTO 359 – Alternative Photographic Techniques

Any two of the following Photography Production courses:

- PHOTO 499 – Senior Project

Total Required SFP Credits: 37

* SFP Electives are any courses offered in the School of Film & Photography including THTR 304, MUST 295, MUST 380 and MUST 382 that are not serving to fulfill any requirements listed above. Any of the studies or production courses listed above in excess of the number required in each category may be taken as SFP Electives. This requirement is intended to permit Film and Photography students to explore their individual interests in greater depth in one area or more broadly in both areas.

** Non-SFP Electives are any courses offered outside the School of Film & Photography that are not serving to fulfill university Core requirements. This requirement is intended to encourage Film and Photography students to develop an area of knowledge to inform their pursuits as creative artists. Completion of a minor outside of the School of Film and Photography will fulfill this requirement.

Photography Students are strongly recommended to take at least one of ARTH 100RA 2D Foundations, ARTH 100RA 3D Foundations, or ARTH 105RA Drawing, and ARTH 200IA Art of World Civilization I or ARTH 201IA Art of World Civilization II. These Art History courses may also be taken as Photography Studies electives.

A minimum of 120 credits is required for graduation. 42 of these credits must be in courses numbered 300 and above.

THE PHOTOGRAPHY MINOR (NON-TEACHING)

The School of Film and Photography offers a Photography minor on a space-available basis. The minor consists of 28 credits. Typically, the minor will require a minimum of 2.5 years to complete. Photography minors must meet the same gate eligibility requirements as majors described above, excluding FILM 112. Accepted Photo minors are required to purchase a Mac laptop computer.

Photography Minor Curriculum

Foundation Courses (required for gate acceptance)

- FILM 100IH – Introduction to Film & Photography
- PHOTO 113RA – Understanding Photography
- PHOTO 213 – Intermediate Photography
- WRIT 101 – College Writing
- US – University Seminar

* WRIT 101W and University Seminar are offered both fall and spring semesters and may be taken in either semester.

Photography Minor Requirements (following gate acceptance)

- PHOTO 255 – Intro Color Photo
- PHOTO 258 – View Camera

Either of the following Photography History courses:

- PHOTO 303 – Early History of Photo
- PHOTO 304 – Recent History of Photo

Any two of the following Photography Production courses:

- PHOTO 499 – Senior Project

Total Required Credits: 28

Music

School of Music
http://montana.edu/wwwmusic

The School of Music at Montana State University offers dynamic programs in music, music technology, and music education, preparing our students for various professions in music and music education, along with life-long musical enhancement.

Inspired by the belief that music is central to human ways of life, the School affirms the University’s mission to serve the people and communities of Montana by providing a musically enriched environment.

The School is committed to contributing to the musical world through performance, scholarship, composition and leadership, and nurturing the musical expression, understanding, discovery, and creativity of its faculty and students.
The School of Music offers classes to all students regardless of major. Some music courses satisfy University core requirements. Interested students may study band and orchestral instruments, voice, piano, and guitar. Membership in School of Music ensembles is open to all students regardless of major. Some ensembles require an audition. All incoming music majors must demonstrate their level of musicianship through auditions, theory and aural perception pre-tests, and a keyboard placement exam prior to acceptance in the program.

Curricula in Music

BACHELOR OF ARTS IN MUSIC

The Bachelor of Arts in Music degree emphasizes the study of music within a broad program of general study. A non-teaching minor is offered by the School of Music.

All music majors must enroll in Applied Music each semester of residency. All students will be placed, by audition, at the appropriate level of applied study. Advancement to the next level will be by performance jury and with the approval of the applied music instructor. A recital, or an appearance in a recital as soloist, must be completed before advancement to MUSI 395. Successful completion of at least one semester of MUSI 395 (Applied Music III) before student teaching. Music majors are required to fulfill concert attendance through MUSI 100 every semester in residence.

BACHELOR OF MUSIC EDUCATION

The Bachelor of Music Education (K-12 Broadfield) degree leads to certification to teach music at all levels of the public schools. A selection of courses in music education, music theory, and music history are offered at the graduate level. A Master of Education degree with an emphasis in music is available through the Department of Education. Please see http://www.montana.edu/ehhd/educ/curriculumGrad/edm/profedOption/k12music.shtml for more information.
PROGRAMS OF INSTRUCTION – ARTS AND ARCHITECTURE

BACHELOR OF ARTS IN MUSIC TECHNOLOGY

The Bachelor of Arts in Music Technology offers undergraduate students an integrated experience in composition, sound design, audio technology, and interdisciplinary collaboration, within a broad program of general study. Music Technology courses provide students with the range of skills and experience they need to forge their own pathways in this constantly-changing field.

All Music Technology majors must enroll in Applied Music for a minimum of three semesters. Advancement to the next level will be by performance jury and with the approval of the applied music instructor. Successful completion of one semester at the MUSI 295 level or higher is required for graduation. All students must successfully complete a minimum of two semesters of large ensemble performance.

Students without previous experience reading standard musical notation may need to complete MUSI 103 (Fundamentals of Musical Creation) before starting the Music Theory course sequence, as determined by placement examination, in consultation with the Head of Music Technology and the Music Theory faculty.

All students will be placed, by audition, at the appropriate level of performance study. Placement in MUSI 195 will be at the sole determination of the studio professor. Students with less previous experience on their principal instrument are responsible for obtaining preparatory instruction and basic music-reading skills to reach the 195 level. Basic preparatory skills on guitar may be obtained via MUSI 160, MUSI 161, and /or MUSI 260 (Beginning Guitar/Intermediate Guitar), as determined by placement evaluation with the Guitar faculty.

Music majors are required to fulfill concert attendance through MUSI 100 every semester in residence, with the exception of Pre-Music Technology majors who have not yet taken Introduction to Digital Music (MUST 115).

Other requirements for Music Technology majors: Music Technology majors must complete either MUSI 301 or MUSI 302. Music Technology majors must receive the grade of “C” or better in all music content courses. Further, a grade of “C-” or better is required in all courses that will be counted toward the 42 upper-division credits required in all degrees. Courses with a passing grade of D-, D, or D+ may only be counted toward the overall 120 credit requirement. Music Technology majors must complete either MUST 382 (Interdisciplinary Projects 2) or CAA 490R (Collaborative Research/Creative Activity).

The Music Technology major requires each entering student to declare the pre-major and complete an initial course sequence before applying for the major. This gate ensures that students will have sufficient studio time and individual instruction, and that School of Music resources can meet the needs of the student population. For the Bachelor of Arts in Music Technology, the pre-major requirements are:

1. MUSI 140 and 141 (Aural Perception I and II)
2. MUSI 105 and 106 (Theory I and II)
3. MUSI 135 and 136 (Keyboard Skills I and II)
4. MUST 115 (Introduction to Digital Music)
5. MUST 125 (MIDI and Electro-Acoustic Composition)
6. Placement into MUSI 195 in one of the applied studios, or placement by audition in MUSI 260 (Intermediate Guitar), or successful completion of MUSI 161 (Beginning Guitar II) with a grade of “C” or better. Music Technology students wishing to study piano as their primary instrument may be accepted for applied study (MUSI 195) by the following methods:
   a. By earning an A- or A in MUSI 135 and MUSI 136.
   b. By earning a grade of “C” or better in a minimum of two semesters of Advanced Keyboard Skills (MUSI 230, MUSI 231, MUSI 232, or MUSI 233); or
   c. By audition and subsequent permission of the instructor.

Music Technology students wishing to study piano as a secondary instrument may be admitted to MUSI 195 only by fulfilling requirements #2 and #3 of the above.

Each spring, any Music Technology pre-major who has successfully completed all of these requirements may
submit an application and portfolio for the gate. Successful completion is defined as a grade of “C” or better, with an average of “C” or better in each of the Theory sequence pairs (MUSI 140 & 141 and MUSI 105 & 106).

Any student who is not admitted past the gate may re-submit one additional time the following spring. When any of the required first-year courses have been attempted at MSU, a student’s grade may change only by retaking that specific course in the School of Music (i.e., no transfer credits or other course substitutions will count toward re-submission).

Students admitted past the gate may declare the Music Technology Major. Evaluation for the gate is based on three components:

1. GPA in the pre-gate course sequence
2. Composition portfolio submitted with the application
3. Service credits for participation and volunteerism in the pre-gate year.

Undergraduate Music Technology majors are required to be enrolled for a minimum of nine credits each semester, and to make consistent progress toward the degree requirements each semester until graduation. Any exceptions will be at the sole discretion of the School Director and the Head of Music Technology. (For example, post-baccalaureate students pursuing a second bachelor’s degree in Music Technology may be exempt from the 9-hour requirement.)

Music Technology is a broad field encompassing a wide variety of topics, and Music Technology programs at different institutions vary significantly in emphasis and curriculum order. Therefore, transfer credits for Music Technology courses (MUST 115, 220, 125, 341, 380, 382, 384, plus Music Technology electives) will not generally be awarded. The Head of Music Technology and the Music School Director reserve the right to award transfer credits in exceptional circumstances, at their sole discretion.

Course fees are assessed to all students enrolled in MUST 115 and MUST 125. Annual program fees (subject to annual increase) are assessed to all Music Technology majors admitted past the gate. Course fees and program fees support emergent equipment needs and maintenance of the computer lab and individual studios. These fees will enable Music Technology students to accomplish their work efficiently and to gain necessary experience with the most up-to-date tools of the trade.

### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 100</td>
<td>Concert Attendance</td>
<td>0.0</td>
</tr>
<tr>
<td>MUSI 140</td>
<td>Introduction to Digital Music</td>
<td>1.0</td>
</tr>
<tr>
<td>MUSI 141</td>
<td>Aural Perception I</td>
<td>1.0</td>
</tr>
<tr>
<td>MUSI 105</td>
<td>Music Theory I</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 106</td>
<td>Music Theory II</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 135</td>
<td>Keyboard Skills I</td>
<td>1.0</td>
</tr>
<tr>
<td>MUSI 136</td>
<td>Keyboard Skills II</td>
<td>1.0</td>
</tr>
<tr>
<td>MUSI 195</td>
<td>Applied Music I (or)</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 160</td>
<td>Beginning Guitar I/II</td>
<td>2.0</td>
</tr>
<tr>
<td>MUST 115</td>
<td>Introduction to Digital Music</td>
<td>3.0</td>
</tr>
<tr>
<td>MUST 125</td>
<td>MIDI &amp; Electro-Acoustic Composition</td>
<td>3.0</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 100</td>
<td>Concert Attendance</td>
<td>0.0</td>
</tr>
<tr>
<td>MUSI 295</td>
<td>Applied Music II (or)</td>
<td>2.0</td>
</tr>
<tr>
<td>MUSI 260</td>
<td>Intermediate Guitar*</td>
<td>1.0</td>
</tr>
<tr>
<td>MUSI 195</td>
<td>Applied Music I*</td>
<td>1.0</td>
</tr>
<tr>
<td>MUSI 220</td>
<td>Recording I (or)</td>
<td>3.0</td>
</tr>
<tr>
<td>MUST 380</td>
<td>Interdisciplinary Projects Film</td>
<td>3.0</td>
</tr>
<tr>
<td>EEE 217</td>
<td>Science of Sound (or)</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 485</td>
<td>Acoustic Composition</td>
<td>2.0</td>
</tr>
<tr>
<td>MUST/FILM 259</td>
<td>Multimedia Audio Production</td>
<td>3.0</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>31</strong></td>
</tr>
</tbody>
</table>

### Junior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 100</td>
<td>Concert Attendance</td>
<td>0.0</td>
</tr>
<tr>
<td>MUSI 195</td>
<td>295-Applied Music I/II*</td>
<td>2.0</td>
</tr>
<tr>
<td>Ensemble</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>MUSI 301</td>
<td>Music History I (or)</td>
<td>1.0</td>
</tr>
<tr>
<td>MUSI 302</td>
<td>Music History II</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 307A</td>
<td>World Music</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 384</td>
<td>Film Scoring</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 341</td>
<td>Sound Design and Synthesis</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 382</td>
<td>Interdisciplinary Projects II (or)</td>
<td>3.0</td>
</tr>
<tr>
<td>CAA 490R</td>
<td>Collaborative Rich/ Creative Activity</td>
<td>3.0</td>
</tr>
<tr>
<td>EEE 217</td>
<td>Science of Sound (or)</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 485</td>
<td>Acoustic Composition</td>
<td>2.0</td>
</tr>
<tr>
<td>MUST 305</td>
<td>Orchestration for New Media</td>
<td>2.0</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>29</strong></td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 100</td>
<td>Concert Attendance</td>
<td>0.0</td>
</tr>
<tr>
<td>Music Elective (or)</td>
<td>Evaluation</td>
<td>6.0</td>
</tr>
<tr>
<td>MUSI 498</td>
<td>Internship</td>
<td>6.0</td>
</tr>
<tr>
<td>Computer Science or Business Elective</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Upper Division Electives</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td>9.0</td>
<td></td>
</tr>
<tr>
<td>MUSI 303</td>
<td>Music History of the 20th Century</td>
<td>3.0</td>
</tr>
<tr>
<td>MUST 499</td>
<td>Senior Project/Capstone Experience</td>
<td>3.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 or above.

Of the available elective credits:
- 14 must be in the Humanities, Social Sciences, or Fine Arts except music.
- 3 credits must be in Computer Science or Business.
- 10 credits may be free electives (music or non-music).
- The remaining 6 elective credits must be non-music.

---

**MUSIC MINOR (NON-TEACHING)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSI 105</td>
<td>Music Theory I</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 136</td>
<td>Music Theory II</td>
<td>3.0</td>
</tr>
<tr>
<td>MUSI 140</td>
<td>Aural Perception I</td>
<td>1.0</td>
</tr>
<tr>
<td>MUSI 141</td>
<td>Aural Perception II</td>
<td>1.0</td>
</tr>
<tr>
<td>MUST 195</td>
<td>Applied Music I</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>28</strong></td>
</tr>
</tbody>
</table>

---

**COLLEGE OF BUSINESS**

Kregg Aytes, Ph.D., Dean
Harry Benham, Ph.D., Interim Associate Dean for Academic Affairs and Director, The Bracken Center for Excellence in Undergraduate Business Education
Bruce Raymond, Ph.D., Associate Dean for Administration and Marketing
Christine Lamb, Ed.D., Assistant Dean

Undergraduate Programs Available:
- Accounting
- Finance
- Management
- Marketing
- Business Minors

The College of Business at Montana State University is a vibrant and exciting place where the academic and professional success of students comes first. An extraordinary faculty offers both an innovative, nationally recognized curriculum, and a unique learning environment for undergraduate students. Distinguishing features of the program include small classes, exceptional faculty members in every classroom (no graduate student instructors), rigorous course work, an interactive, personalized learning environment, and high-performing students. Each student has a faculty advisor who is available to mentor the student on both academic and career choices.

In October of 2011, the College of Business received a $25 Million gift from Jake Jabs for the purpose of building a new building for the College of...
Business and enhancing the College’s programs. With this gift, the College of Business will become an even more vibrant and exciting place where the academic and professional success of students will continue to come first.

The College is fully accredited by AACSB International—the Association to Advance Collegiate Schools of Business (AACSB), the premium accrediting association for business programs. AACSB has awarded its mark of distinction to only fifteen percent of all business programs worldwide. Not only does this accreditation certify that the College meets AACSB’s rigorous standards for business education, but it also signals to local, regional, and national employers that the College’s graduates are well-prepared for careers in business.

The College’s commitment to student-centered learning is articulated in the College’s vision and mission statements:

**Vision Statement**

The College of Business at Montana State University will provide a locally revered and nationally recognized business education for undergraduate students and in selected areas of graduate study. The programs of study will be distinguished by the personalized attention accorded to students, a diverse and contemporary curriculum, and the commitment of the faculty to create an extraordinary classroom environment and facilitate career opportunities for students.

**Mission Statement**

The mission of the College of Business is to provide excellence in undergraduate and select graduate business education.

To accomplish this, the College:

- Fosters an integrated and experiential learning environment
- Encourages critical thinking, quantitative reasoning, effective communication, ethical decision making, social responsibility, and life-long learning.

The College is committed to the teacher-scholar model in which faculty members are simultaneously engaged in the creation and dissemination of knowledge. In keeping with the University’s land-grant mission, the College provides service and outreach to a variety of stakeholders.

**Learning Objectives**

Based on the College’s mission, the College has established the following learning objectives for its students:

- **Knowledge of Business:** Students will have strong working knowledge of fundamental concepts in accounting, finance, management, marketing, information technology, strategy, and law.
- **Critical Thinking:** Students will learn to think effectively and persuasively, assimilate and evaluate information to solve business problems.
- **Quantitative Reasoning:** Students will be able to interpret, represent, and evaluate quantitative information and integrate such information into business decisions and recommendations.
- **Effective Written Communication:** Students will be able to develop and organize ideas, adopt an appropriate tone, employ correct grammar, sentence structure and mechanics, use appropriate vocabulary, and correctly cite sources for facts, quotations, and ideas.
- **Effective Oral Communication:** Students will be able to develop and organize ideas, successfully employ technology in support of a message, speak extemporaneously with minimal hesitations and fillers, adopt an appropriate tone, use appropriate vocabulary, employ correct grammar and sentence structure, and manage presentation pacing and timing effectively.
- **Ethical Decision Making and Social Responsibility:** Students will recognize the ethical and societal implications of proposed actions; employ decision-making tools to evaluate the ethical and societal effects of a variety of options; and make sound decisions in accordance with the analysis and evaluation of options.
- **Life-Long Learning:** Students will be immersed in an environment that encourages life-long learning through extensive opportunities to learn in team settings and to develop effective team skills; to develop research skills to advance learning; and to strengthen critical thinking skills.

Throughout the business curriculum, students receive significant exposure to each of these learning objectives. The level of student learning related to each objective is assessed in the senior year.

**The Gary K. Bracken Center for Excellence in Undergraduate Business Education**

The College’s commitment to undergraduate student success is embodied in The Gary K. Bracken Center for Excellence in Undergraduate Business Education, which is both a physical place and a philosophy.

The Bracken Center is physically located within the College of Business in Reid Hall, where it offers access to internship and career information, employer interviews, state-of-the-art conference rooms for student use and the Bracken Business Communication Clinic (BBCC). The BBCC is staffed by business communication professionals who coach students on oral presentations and written assignments, including basic grammar, punctuation, sentence structure and tenses, and business themes, content and organization of material.

The philosophy of the Bracken Center is reflected in its mission to facilitate excellence in undergraduate business education through a high quality learning environment. The foundation for student success is based on “Three Pillars.”

1. “Learning to Do” - Excellent Academic Preparation
   - Innovative, challenging, and practical curriculum
   - Small classes taught exclusively by faculty, not by graduate students
   - Focus on experiential, hands-on learning

2. “Learning to Act” - Developing Professional Skills
   - Student commitment to the student PRIDE Code of Excellence
   - Emphasis on team work and oral and written communication
   - Guidance in finding internships and jobs, including “Meet the Recruiters” events and resume and interviewing assistance.

3. “Learning to Be” - Nurturing Personal Growth
   - Individualized attention to help students recognize their strengths and interests
   - Faculty advisors/mentors assigned to all students from their very first day on campus
• Study abroad opportunities supported by fellowships to help pay for travel expenses

The College considers student professionalism and personal development to be essential complements to academic excellence. Business students in conjunction with the faculty have therefore developed a Student PRIDE Code of Excellence to help guide students in their academic, professional, and personal choices:

**Student PRIDE Code of Excellence**

We, the students of the MSU College of Business, understand that in choosing to enroll at MSU we are investing in our professional futures. Therefore, we proudly commit to the following Code of Excellence:

- **Performance**
  - I am accountable for and take pride in my own learning and conduct.
- **Respect**
  - I treat with respect all members of my community, including peers, staff, and faculty.
- **Integrity**
  - I am ethical in all that I do.
- **Diligence**
  - I do my best work at all times.
- **Engagement**
  - I challenge myself to invest proactively in my academic, professional, and personal development.

The College offers a wide array of opportunities for students to develop their academic, professional and personal skills, including:

- First Year and Senior Seminars consisting of no more than 20 students.
- Courses in which students serve as consultants for real firms and not-for-profit organizations.
- Minors in Accounting; Business Administration; Entrepreneurship and Small Business Management; International Business; and Management of Information Technology (see below for more detail on these minors).
- Student clubs, including Accounting/Beta Alpha Psi, Beta Gamma Sigma, Finance, International Business, HR/Management, Marketing, and Students in Free Enterprise (entrepreneurship).
- Internships at local, regional and national companies and government agencies.
- Study abroad opportunities and short term international programs, including a most-expenses-paid internship in Tokyo, Japan. The Bracken Center offers scholarships specifically to support international activities.
- David B. Orser Executive Speakers Forum which brings several high-profile professionals to the College annually to interact with students and offer insights into business.

The Bracken Center also provides assistance to faculty members to support their teaching and research activities.

**The Alderson Program in Entrepreneurship and the Jake Jabs Center for Entrepreneurship for the New West**

The Alderson Program in Entrepreneurship enables students to study entrepreneurship through the College’s 30-credit minor in Entrepreneurship and Small Business Management. The culmination of the program is the capstone course—BMGT 463 Entrepreneurial Experience. Students in BMGT 463 gain valuable experience working with start-up or growth companies and may also provide assistance to scientists at MSU in commercializing their scientific discoveries. This partnership not only allows students to apply knowledge gained from their academic work to businesses, but also makes a significant contribution to the economic development of the state of Montana. The Alderson Program has been recognized twice by Entrepreneur Magazine as one of the top 10 entrepreneur-emphasis programs in the U.S.

The mission of the Jake Jabs Center for Entrepreneurship for the New West is to help Montana businesses flourish by connecting them to Montana State University students and resources. The Center connects clients with BMGT 463 student teams and provides funding for students to travel to all parts of Montana. The Center also offers the Entrepreneur-in-Residence program, which brings in experienced entrepreneurs to spend a week with students and faculty, as well as the Family Business Day on the Road program, which offers business skills to communities across Montana. The Center will provide funding for student and faculty Entrepreneurship Fellows as well as provide other opportunities in entrepreneurship.

**Degree Programs**

The College grants two degrees: a Bachelor of Science in Business, with options in Accounting, Finance, Management, and Marketing; and a Master of Professional Accountancy. For information about the College’s Master of Professional Accountancy program, please see the The Graduate School section elsewhere in this catalog.

The College of Business undergraduate curriculum is structured on a four-stage model. The four stages include the University Core, the Business Pre-Core, the Business Core, and the option courses. Courses are numbered to reflect their position within the curriculum. 100-level courses are generally taken in the freshman year, 200-level courses in the sophomore year, 300-level courses in the junior year, and 400-level courses in the senior year.

The University Core, which is required of all MSU students, is described elsewhere in this catalog.

The Business Pre-Core consists of 100- and 200-level courses that are necessary to develop fundamental knowledge and skills in business, accounting, mathematics, statistics, economics, information technology, and communication. Completion of the Business Pre-Core is required for formal admission to the College. The Business Pre-Core includes:

- BGEN 194US - Seminar*
- BMGT 205 - Professional Communication Fundamentals
- BMIS 211 - Introduction to Business Decision Support
- ACTG 201 - Principles of Accounting I
- ACTG 202 - or Managerial Accounting (BMGT and BMKT students)
- ACTG 225 - Principles of Acct II (ACTG and FIN students)
- M 161 - Survey of Calculus
- ECNS 202 - Principles of Macroeconomics
- ECNS 204 - Microeconomics
- STAT 216 - Introduction to Statistics
- STAT 217 - Intermediate Statistical Concepts
- BMGT 240IS - or Business Research Methods

*Students transferring into the College of Business, either from another institution or from another MSU department, who have already earned credit for a University Seminar (US) course must take BGEN 204 instead of BGEN 194US.
Admission to the College of Business is competitive, and the number of students admitted each term is limited by the instructional, classroom, and resource constraints of the College. To be considered for admission, students must submit a completed admission application prior to the deadlines below. Students who meet all performance criteria and have a 3.00 or higher cumulative MSU GPA will be given priority admission. Applications from transfer students and students with cumulative grade point averages less than 3.00 will be considered on a case-by-case basis with preference based on academic performance. Applications from students with a cumulative grade point average less than 2.50 will not be considered.

To graduate with a Bachelor of Science degree in Business, a student must earn a C- or better in all required business courses.

Applications for formal admission to the College will be considered twice a year. The application deadlines for admission are as follows:

- Admission for Fall/Summer Term on or before May 1st
- Admission for Spring Term on or before December 1st

Applications are available in the College of Business Student Services Office, 338 Reid Hall. Notification of admission decisions will be made via the student’s official MSU e-mail.

The Montana Board of Regents has established a common policy on minimum course grades across all campuses in the Montana University System. According to the policy, a grade of C- or better is required to satisfy requirements for pre-requisite and required courses in majors, minors, and certificate programs and for all core requirements. Further, a grade of C- or better is required in all courses that will be counted toward the 42 upper-division credits required in all degrees. Courses with a passing grade of D-, D, or D+ may only be counted toward the overall 120 credit requirement. This policy creates a minimum requirement, which may be superseded by more stringent requirements within specific majors. Any such requirements are explained within the descriptions of those curricula.

Advising and Student Services

The College’s Office of Student Services coordinates new and transfer student orientation, continuing student registration, formal admission to the College, and certification of College degree requirements. Each student is also assigned a faculty advisor to consult about the student’s career-related goals and objectives.

Acceptance of Transfer Credits and Residency Requirements

University undergraduate programs in business administration normally concentrate professional business courses in the last two years of a four-year program. The objective is to allow students the opportunity to build a foundation of work in the arts, sciences, and humanities prior to beginning professional course work. As a result of this approach and because of the standards and requirements of AACSB - International, most students transferring into the College from another university should do so no later than the end of their sophomore year.

Students taking their first two years of work at a junior college or at another four year institution should take only those business courses offered at the freshman or sophomore level at Montana State University. Lower-division business courses may not be used to satisfy upper-division course requirements of the College of Business.

If at all possible, students should complete courses which will transfer to Montana State University as the equivalent to the Business Pre-Core.

All students transferring to the College of Business must meet the College of Business residency requirement. Students are required to complete at least the following 28 credits in residence at MSU.

Minimum of 12 credits of upper division required option courses/4 courses ..........12
Plus a minimum of 12 credits of upper division required BGEN, BFIN, BMGT, BMIS, or BMKT courses/4 courses ..........12
BGEN 499, Capstone ..................................................4
Total 28

For additional guidance on transferring to Montana State University, see the Admissions section of this catalog and contact the Office of Student Services, College of Business at business@montana.edu.
Pre-Professional Requirements for the Master of Business Administration (MBA)

The College does not offer a Master of Business Administration degree. The following courses are recommended for non-business undergraduate students who are considering graduate study in business at another institution. These courses provide the “common body of knowledge” required for most MBA programs. Completion of these courses can reduce the time required to obtain an MBA, but students should correspond with the Graduate Admissions Officer at their intended graduate school to confirm the acceptability of these courses.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Master of Professional Accountancy

The College of Business offers the Master of Public Accountancy degree. This demanding and highly reputed program should be considered by students who are interested in pursuing CPA certification or advanced financial positions. Information about this program can be found in The Graduate School section of the catalog.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Curricula in Business

ACCOUNTING OPTION

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 194US--Seminar</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ECNS 202--Principles of Macroeconomics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 161Q--Survey of Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Non-Business, Non-Economics and General Electives and University Core</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

| *Students transferring into the College of Business, either from another institution or from another MSU department, who have already earned credit for a University Seminar (US) course must take BGEN 204 instead of BGEN 194US. |

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 201--Principles of Financial Accounting</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ACTG 202--Principles of Managerial Accounting</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ACTG 225--Principles of Act II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMGT 205--Professional Communication Fundamentals</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMIS 211--Introduction to Business Decision Support</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ECNS 204--Microeconomics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT 216Q--Introduction to Statistics</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 327--Intermediate Fin Acct &amp; Reporting I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ACTG 328--Intermediate Fin Acct &amp; Reporting II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ACTG 321R--Acct Information Systems I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMGT 335--Management and Organization</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BGEN 309--Career Perspectives</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BMIS 311--Management Information Systems</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMGT 322--Operations Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMGT 325--Principles of Marketing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BFIN 322--Business Finance</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BGEN 361--Principles of Business Law</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Non-Business, Non-Economics and General Electives and University Core</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

Finance

Finance is the art and science of managing money. Financial management involves corporations raising and employing funds in order to maximize shareholders’ wealth. The investments field involves balancing the expected return and risk characteristics of securities in order to make optimal portfolio investment decisions. Financial institutions and markets serve as conduits through which the economy matches supply and demand of investable funds so that scarce resources are allocated efficiently. Career opportunities include credit, financial, and securities analysts, bank examiners, loan officers, comptrollers, treasurers, portfolio managers, financial services representatives, financial planners, and insurance underwriters.

FINANCE OPTION

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 194US--Seminar</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ECNS 202--Principles of Macroeconomics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 161Q--Survey of Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Non-Business, Non-Economics and General Electives and University Core</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

| *Students transferring into the College of Business, either from another institution or from another MSU department, who have already earned credit for a University Seminar (US) course must take BGEN 204 instead of BGEN 194US. |

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 201--Principles of Financial Accounting</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ACTG 202--Principles of Managerial Accounting</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ACTG 225--Principles of Act II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMGT 205--Professional Communication Fundamentals</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 327--Intermediate Fin Acct &amp; Reporting I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ACTG 328--Intermediate Fin Acct &amp; Reporting II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ACTG 321R--Acct Information Systems I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMGT 335--Management and Organization</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BGEN 309--Career Perspectives</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BMIS 311--Management Information Systems</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMGT 322--Operations Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMGT 325--Principles of Marketing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BFIN 322--Business Finance</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BGEN 361--Principles of Business Law</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Non-Business, Non-Economics and General Electives and University Core</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
**Management Option**

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 201--Principles of Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 202--Principles of Managerial Acct</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 205--Professional Communication Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 202--Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>M 16Q-Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>Non-Business, Non-Economics and General Electives and University Core</td>
<td>12</td>
</tr>
<tr>
<td>Business Management Option</td>
<td>15</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMIS 211-Introduction to Business Decision Support</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 458--Commercial Bank Management Fund</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 491--Special Topics (on demand)</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 240--Business Research</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 457--Management Experience</td>
<td>3</td>
</tr>
<tr>
<td>Management Electives</td>
<td>15</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMGT 355--Management and Organization</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 411--Financial Statement Analysis</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 457--Financial Markets &amp; Institutions</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 421--Real Estate and Investment Analysis</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 456--Financial Mgmt for Entrepreneurial</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 466--Investments II</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 458--Commercial Bank Management (on demand)</td>
<td>3</td>
</tr>
<tr>
<td>Non-Business, Non-Economics and General Electives and University Core</td>
<td>15</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMGT 406--Negotiation and Motivation</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 465--International Management Fund</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 315--Telecommunications Systems</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 415--Management of Web Services</td>
<td>3</td>
</tr>
<tr>
<td>Management Electives</td>
<td>15</td>
</tr>
</tbody>
</table>

**Programs of Instruction – Business**

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGEN 499--Business Senior Seminar</td>
<td>4</td>
</tr>
<tr>
<td>BMGT 329--Human Resource</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 466-Middle Management Skills</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 475--Management Experience</td>
<td>3</td>
</tr>
<tr>
<td>Management Electives</td>
<td>6</td>
</tr>
<tr>
<td>Non-Business, Non-Economics and General Electives and University Core</td>
<td>2</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMIS 211-Introduction to Business Decision Support</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 221--Intermediate/Technical Writing</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 240IS--Business Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>Non-Business, Non-Economics Electives and University Core</td>
<td>3</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMGT 355--Management and Organization</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 302--Career Perspectives</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 311--Management Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 322--Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 325--Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 322--Business Finance</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 361--Principles of Business Law</td>
<td>3</td>
</tr>
<tr>
<td>Non-Business, Non-Economics Electives and University Core</td>
<td>3</td>
</tr>
</tbody>
</table>

All business majors must be formally admitted to the College of Business in order to enroll in all upper-division (300-400 level) option courses (ACTG, BFIN, BGEN, BMGT, BMIS, BMKT) and BGEN 499, Business Senior Seminar.

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above; 54 credits must be non-business/non-economics rubrics (although ECNS 101, ECNS 202, ECNS 204, BMGT 240S may be included); University Core credit requirements must be satisfied.

All students transferring to the College of Business must meet the College of Business residency requirement.


**MARKETING OPTION**

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGEN 194US-Seminar*</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 202-Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>M 161Q-Survey of Calculus</td>
<td>3</td>
</tr>
<tr>
<td>Non-Business, Non-Economics and General Electives and University Core</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>15 15</td>
</tr>
</tbody>
</table>

*Students transferring into the College of Business, either from another institution or from another MSU department, who have already earned credit for a University Seminar (US) course must take BGEN 204 instead of BGEN 194US.

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 201-Principles of Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 202-Principles of Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 205-Professional Communication Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 211-Introduction to Business Decision Support</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 204IS-Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Non-Business, Non-Economics and General Electives and University Core</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>15 15</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMGT 335-Management and Organization</td>
<td>3</td>
</tr>
<tr>
<td>BGEN 302-Career Perspectives</td>
<td>1</td>
</tr>
<tr>
<td>BMIS 311-Management Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 322-Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 325-Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 322-Business Finance</td>
<td>3</td>
</tr>
<tr>
<td>BGEN 361-Principles of Business Law</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 342R-Marketing Research</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 337-Consumer Behavior</td>
<td>3</td>
</tr>
<tr>
<td>Non-Business, Non-Economics and General Electives and University Core</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>15 15</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGEN 499-Business Senior Seminar</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 436-Sales and Sales Management</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 343-Pro Integrated Marketing Comm</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 499-Marketing Management</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following (3 credits):</td>
<td></td>
</tr>
<tr>
<td>BMKT 441-International Marketing</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 444-Retail Management</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 446-Marketing for Entrepreneurs</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 447-Marketing Mix Design</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 498-Internship</td>
<td>3 or 5</td>
</tr>
<tr>
<td>*Approved Restricted Elective - One course (3 credits) of a 300- or 400-level course pre-approved by the student’s faculty advisor.</td>
<td></td>
</tr>
<tr>
<td>All business majors must be formally admitted to the College of Business in order to enroll in all upper-division (300-400 level) option courses (ACTG, BFIN, BGEN, BMGT, BMIS, BMKT) and BGEN 499, Business Senior Seminar. A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 500 and above; 54 credits must be non-business/non-economics rubrics (although ECNS101, ECNS 202, ECNS 204, BMKT 2408S may be included); University Core credit requirements must be satisfied. All students transferring to the College of Business must meet the College of Business residency requirements.</td>
<td></td>
</tr>
</tbody>
</table>

**Business Minors**

The following business minors are offered by the College of Business. All minors are open to students from majors outside of business.

- Accounting (not available to accounting-option students)
- Business Administration (not available to business-major students)
- Entrepreneurship and Small Business Management
- International Business
- Management of Information Technology

The Accounting minor is not available to business students in the accounting option, and the Business Administration minor is not available to students in any option in the College of Business. The Entrepreneurship, International Business, and Information Technology minors are open to students in any major.

In accordance with the Board of Regents’ policy, students must earn a C- or better in all courses in a minor.

**ACCOUNTING MINOR**

The course work in the Accounting minor helps students understand the role that accounting plays in business decisions. Students who minor in accounting will learn how to prepare and analyze income statements, balance sheets, cost/managerial reports, and tax returns.

Students must complete all of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMIS 211-Introduction to Business Decision Support</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 201-Principles of Fin Acct</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 223-Principles of Acct II</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 327-Inter Fin Acct &amp; Reporting I</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 321R-Accounting Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 410-Principles of Federal Tax Ind</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 415-Governmental &amp; Not-for-Profit Acct I</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 355-Management and Organization</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 322-Business Finance</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 204IS-Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Total Required Credits</td>
<td>24</td>
</tr>
</tbody>
</table>

*ACTG 328 is a prerequisite for this course.

**BUSINESS ADMINISTRATION MINOR**

Students seeking a minor in business administration must complete the following courses.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>BMGT 205-Professional Communication Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 201-College Writing II</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221-Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 201-Principles of Fin Acct</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 202-Principles of Manageral Accounting</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 355-Management and Organization</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 325-Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 322-Business Finance</td>
<td>3</td>
</tr>
<tr>
<td>BGEN 361-Principles of Business Law</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 204IS-Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Total Required Credits</td>
<td>30</td>
</tr>
</tbody>
</table>

*Of the four required courses denoted with an *, three must be taken in residence at MSU.

In accordance with the Board of Regents’ policy, students must earn a C- or better in all courses in a minor.
ENTREPRENEURSHIP AND SMALL BUSINESS MANAGEMENT MINOR

Enrollment in the minor is open to business and non-business students. Program objectives include:

- To provide the knowledge, skills and expertise necessary for successful entrepreneurial careers.
- To provide a general overview of the field of business and management.
- To provide entrepreneurial expertise and economic stimulus to the region and the state.

Students seeking the Entrepreneurship and Small Business Management minor will take the following courses.

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 202-Principles of Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 205-Principles of Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 335-Management and Organization</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 335-Management and Organization II</td>
<td>3</td>
</tr>
<tr>
<td>BFIN 322-Business Finance</td>
<td>3</td>
</tr>
<tr>
<td>BGEN 361-Principles of Business Law</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 311-Management Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 314-Business Web Site Design</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 412-Design of E-Commerce Sites</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 414-Data-Driven Web Services</td>
<td>3</td>
</tr>
</tbody>
</table>

Take two (6 credits) of the following:

- BMIS 415-Telecommunications Management
- BMIS 416-Contemporary Support Systems
- ACTG 421-Accounting Information Systems II

30

INTERNATIONAL BUSINESS MINOR

The objectives of the International Business minor are:

- To provide students a broad-based interdisciplinary educational experience that will enable students to succeed in a culturally diverse global business environment.
- To enable students to acquire the basic skills and knowledge necessary for a career in international business.
- To provide students a flexible yet rigorous program that suits each student’s own individual needs and interests.

Foreign language study is not required but is strongly recommended. As many as 14 credits of language study may be applied toward the minor as electives. The 17 credits of electives must come from at least three different disciplines including, for example, language, geography, history, political science, religious studies or business. A study abroad experience is also strongly recommended.

Students completing the International Business minor will complete the following courses. Students are responsible for fulfilling the appropriate prerequisites for all courses.

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 201-Principles of Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 204-Principles of Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 311-Management Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 314-Business Web Site Design</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 412-Design of E-Commerce Sites</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 414-Data-Driven Web Services</td>
<td>3</td>
</tr>
</tbody>
</table>

30

MANAGEMENT OF INFORMATION TECHNOLOGY MINOR

Enrollment in the minor is open to business and non-business students. Program objectives include:

- To provide perspectives, concepts, and tools to evaluate and exploit business opportunities and challenges presented by changing information technology.
- To develop managerial skills.
- To facilitate organizational change that accompanies adoption and implementation of new information technologies.
- To understand and cope with the complexities of business risk including data security and regulatory compliance.
- To examine the linkages between information technology, business strategy, and creating competitive advantage.

Students seeking the Management of Information Technology minor will complete the following courses.

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 201-Principles of Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 204-Principles of Managerial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 311-Management Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 314-Business Web Site Design</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 412-Design of E-Commerce Sites</td>
<td>3</td>
</tr>
<tr>
<td>BMIS 414-Data-Driven Web Services</td>
<td>3</td>
</tr>
</tbody>
</table>

30

**General electives are selected in consultation with a College of Business International Business minor advisor from an approved list available on the College web site and in Reid 457, the Bracken Center, of lower- and upper-division elective courses which can include up to 14 credits of language study.

***Restricted electives are selected in consultation with a College of Business International Business minor advisor from an approved list available on the College web site and in Reid 457, the Bracken Center, of upper-division courses.

COLLEGE OF EDUCATION, HEALTH AND HUMAN DEVELOPMENT

Larry J. Baker, Dean

Undergraduate Programs Available:

- Teacher Education Program
- Department of Education
- Department of Health and Human Development
- B.S. in Elementary Education
- B.S. in Secondary Education
- B.S. in Technology Education
- Teaching Minors
- B.S. in Community Health
- B.S. in Early Childhood Education and Child Services
- B.S. in Family and Consumer Sciences
- B.S. in Food and Nutrition
- B.S. in Health and Human Performance
- B.S. in Health Enhancement (Health and Physical Education) K-12
- B.S. in Sustainable Food & Bioenergy Systems

The College of Education, Health and Human Development provides studies for those persons interested in careers in the helping professions associated with education, school counseling, family and consumer sciences, physical education, movement science, health, counseling, and nutrition. These functions are carried out within the College’s two departments, the Department of Education, and the Department of Health and Human Development.

The Department of Education is composed of three units: Curriculum and Instruction, for the preparation of undergraduate and graduate teacher
education majors who seek teaching careers in either elementary or secondary schools; Educational Leadership, offering graduate programs in K-12 administration; and Adult and Higher Education offering graduate programs for those seeking advanced study in adult education and higher education administration.

The Department of Health and Human Development administers a variety of curricula that prepares students for various careers including community health, dietetics, exercise science, early childhood education and child services, family and consumer sciences, kinesiology, nutrition science, and sustainable food and bioenergy systems. Teaching careers are offered in family and consumer sciences and health enhancement K-12 (health and physical education). A post-baccalaureate dietetics internship is also offered.

Graduate Programs Available:
In addition to its baccalaureate degree programs, the college offers programs leading to the Master of Science in Health and Human Development and the Master of Education, the Education Specialist degree, and the Doctor of Education with emphasis in Administration, Adult and Higher Education, or Curriculum and Instruction.

The college cooperates with other agencies in Montana in the improvement of educational programs and services through its Center for Community-School Development and Field Services, Child Development Center, Early Childhood Education Distance Partnership, Human Development Clinic, and other public service centers and activities.

Montana State University is a member of the American Association of Colleges for Teacher Education and is accredited by the Northwest Association of Secondary and Higher Schools. Professional programs for the preparation of elementary and secondary teachers at the baccalaureate level are accredited by the Teacher Education Accreditation Council, as are the master’s level programs for the preparation of elementary school principals, high school principals, and guidance counselors, and the doctoral program in education administration. All education programs are approved by the Montana Board of Public Education. Mental Health, Marriage and Family, and School Counseling programs are accredited by the Council for Accreditation of Counseling and Related Educational Programs of the American Counseling Association. The Dietetics program is accredited by Accreditation Council for Education in Nutrition and Dietetics for the Academy of Nutrition and Dietetics.

TEACHER EDUCATION PROGRAM

Selection of Candidates for Teaching
Montana State University is one of the units in the University System charged with the responsibility of recommending candidates for teacher licensure. In discharging this responsibility, the College of Education, Health and Human Development attempts to encourage, prepare, and recommend for licensure only those students who show promise of teaching excellence. Consequently, certain criteria have been established for admission to the Teacher Education Program, and screening procedures have been provided at several points in the program.

Criteria for Selection and Retention
Admission to the Teacher Education Program: Any student who wishes to enter the Teacher Education Program must complete an “Application for Admission.” These forms are available at www.montana.edu/ehhd/educ/advising/index.shtml. The plan must be signed by the advisor(s), and the forms turned into the Advising Center, Reid Hall 132. Students should apply to the Teacher Education Program during the semester prior to taking their methods/practicum coursework.

For Elementary Education majors, the requirements for admission to the Teacher Education Program are:

1. a cumulative grade-point average of at least 2.75 with no grade below a “C”
2. approval of advisors
3. no record of immoral conduct related to the teaching profession nor been judged guilty of a criminal offense as outlined by Sec. 20-4-110 of the MCA
4. a 2.5 grade-point average in the communication and quantitative areas of the university core course requirements (9 credits minimum) with no grade lower than a “C” (courses designated core US, W, and Q)
5. completion of all required courses prior to beginning student teaching
6. certification in first aid with CPR
7. application and approval for student teaching
8. recommendation and approval for licensure

Application and Approval for Student Teaching: Certain requirements must be met by all students desiring to student teach:

1. maintenance of the same standards required for admission into the program including satisfactory clearance on a federal criminal background check
2. completion of all required courses prior to beginning student teaching
3. certification in first aid with CPR
4. proof of liability
5. approval of advisors

Student teaching is limited to seniors. Application must be made to the Director of Field Placement and Licensure no later than the following times:

• For student teaching in the Fall – apply by the end of the first week in December.
• For student teaching in the Spring – apply by the end of the second week in April.

If special services or accommodations (for a disability) are needed or required while student teaching, requests must be submitted to the Director of Field Placement and Licensure and arrangements will be made.

Recommendation and Approval for Licensure: The requirements for recommendation by Montana State University for licensure include:

1. a cumulative grade-point average of at least 2.5
2. a 2.5 grade-point average in the teaching major, minor, professional area, and “Prerequisites for Elementary Methods Courses” with no grade below a “C” in any of these areas
3. a 2.5 grade-point average in the communication and quantitative areas of the university core course requirements (9 credits minimum) with no grade lower than a “C” (courses designated core US, W, and Q)
4. approval of the advisors
5. no record of immoral conduct related to the teaching profession nor been judged guilty of a criminal offense as outlined by Sec. 20-4-110 of the MCA
• completion of all courses in the Teacher Education Program as outlined in the individual’s approved plan
• maintenance of the same standards as are required for student teaching (item 2 above)
• approval of advisors and the Director of Field Placement and Licensure
• attaining a passing score on the Praxis II exam in every teaching major and minor before teacher licensure can be obtained
  - A list of specific tests and passing scores can be obtained from the MSU Field Placement and Licensure Office.
  - A copy of the Praxis II score must be on file in the MSU Field Placement and Licensure Office
  - before a recommendation form can be submitted to the Montana Office of Public Instruction.
• All Education majors must meet Montana requirements for the Professional Educator Preparation Program Content Standards.

Residency Requirements for Professional Education Courses
In each of the teacher licensure programs, students must take at least half of the professional courses that are required prior to student teaching while attending classes on the Montana State University-Bozeman campus. (Credits earned through correspondence, extension, Extended Studies, or distance education at Montana State University-Bozeman do not qualify as residential credits.) Also, most methods courses and the teaching practicum experience(s) must be taken at the MSU-Bozeman campus, and students must also enroll for student teaching through MSU-Bozeman.

In all secondary teacher education programs, students will take a total of 32-34 professional education credits. Twelve of these credits will be in student teaching through MSU-Bozeman. Of the remaining 54-56 credits, students must take a minimum of 29 credits (including experience) while attending classes on the MSU-Bozeman campus.

All students working toward teacher licensure in elementary and/or secondary education must enroll at Montana State University-Bozeman campus according to the above described criteria in order to successfully complete the program.

Second Degree and Non-degree Licensure
Students already holding valid Bachelor’s degrees may fulfill licensure requirements by completing a second undergraduate degree, or in some cases, a non-degree program. Students should contact the Field Placement and Licensure Office for further information. Non-degree and second-degree students must meet the same standards for program entrance and student teaching as first-degree students.

To be recommended for licensure, a person must have completed a minimum of 10 credits from Montana State University-Bozeman specific programs.

Teacher Education Admission, Retention, Graduation, and Licensure Criteria
The education of a teacher is multi-faceted. It requires assimilation of subject knowledge, basic skills, and teaching knowledge (pedagogy) concurrent with the development of appropriate professional, behavioral, and social attributes for successful teaching. Graduates of the Montana State University-Bozeman Teacher Education Program are required to demonstrate these program basics before entering the field of teaching.9

9The program does not discriminate on the basis of race, color, creed, religion, national origin, gender, sexual orientation, age, marital status, or disability. When requested, the University will provide reasonable accommodations to otherwise qualified students with disabilities.

This program policy is an extension of, and in conformity with, the Department of Education Admission, Retention, Graduation, and Licensure Policies and Procedures.

Policy
The Elementary and Secondary Teacher Education Programs endeavor to select applicants who have the ability to become highly competent teachers. As an accredited teacher education program, the curriculum in teacher education adheres to the standards and guidelines of the pre-service program outlined by the Montana Office of Public Instruction (OPI) and the Teacher Education Accreditation Council (TEAC). Within these guidelines, the Teacher Education Faculty have the freedom and ultimate responsibility for the selection and evaluation of its students; the design, implementation, and evaluations of its curriculum; and the determination of who should be recommended for a degree and state licensure. Admission and retention decisions are based not only on prior satisfactory academic achievement, but also on a range of factors which serve to ensure that the candidate can demonstrate the program basics required in the Teacher Education Program.

The Department has the responsibility to the public to assure that its graduates can become fully competent and caring teachers. Thus, it is important that persons admitted possess the intelligence, integrity, compassion, and physical and emotional capacity necessary for teaching in K-12 classrooms.

Professional Expectations For Prospective Teachers
The Professional Expectations for prospective teachers required by the Department of Education at Montana State University include communication competencies, intellectual (conceptual, integrative, and quantitative) abilities for problem solving and effective teaching, and professional, behavioral, and social competencies relevant to the performance of a professional educator.

Communication competencies are demonstrated by behaviors such as:
• Using the appropriate grammar (syntax, inflection, and word choice) in oral communication
• Speaking distinctly and with confidence
• Communicating with sensitivity to the situation and circumstances of professors, students, peers, and colleagues
• Using correct spelling, standard English language mechanics, and meaningful word choice in written expression

Intellectual competencies are demonstrated by behaviors such as:
• Ability to master relevant content in subjects commonly taught in K-12 schools
• Ability to master pedagogical principles and their application in field settings at a level deemed appropriate by the faculty
• Ability to comprehend, memorize, analyze, and synthesize material
• Ability to develop reasoning and decision-making skills appropriate to the practice of teaching

Professional, behavioral, and social competencies are demonstrated by behaviors such as:
• Completing assignments and meeting responsibilities on time
• Participating fully in class and field settings
• Seeking assistance from instructors and supervisors when appropriate
• Developing positive relationships with peers and education professionals
• Working effectively in groups, actively listening to other viewpoints, and treating individuals with respect
• Perceiving a wide range of interpersonal cues from others and responding appropriately
• Displaying openness to new ideas and constructive criticism and using that criticism to improve performance
• Recognizing one’s own strengths and weaknesses and taking personal responsibility to respond appropriately
• Displaying professional appearance, poise, flexibility, and a positive attitude
• Prioritizing responsibilities
• Taking initiative
• Using good judgment, tact, and discretion

Department of Education
Department of Education
The Department of Education has three program areas: Curriculum & Instruction, Educational Leadership, and Adult & Higher Education. As the undergraduate teacher education unit, Curriculum & Instruction provides programs in elementary education and secondary education.

Curriculum & Instruction also offers a masters degree program for advanced professional development for practicing teachers and other education professionals, and a doctoral program (Ed.D.) for those preparing to teach in education departments at the university level.

The Educational Leadership program offers a masters level certification and degree program for the principalship, and a doctoral level certification program (Ed.D.) to prepare individuals for the superintendency.

The program in Adult and Higher Education offers Masters and Doctoral level programs for those seeking careers in Higher Education or other post-secondary educational venues.

Mission Statement
The mission of the Department of Education is to prepare highly qualified professional educators and administrators through exemplary campus and distance based programs and field placements in quality public and private schools. In addition, the department contributes to the State of Montana and the nation through the faculty’s active research and outreach efforts.

Undergraduate Teacher Education Program—Conceptual Framework
The Teacher Education Program at MSU believes that learning to teach in educational settings is a complex task requiring a thoughtful blending of content mastery with carefully guided field experiences. In order to meet the multiple demands of an ever-changing profession, we ensure that students demonstrate their competencies in guided field experiences through every phase of our program. Thus, students who graduate from the Teacher Education Program at MSU are engaged in and committed to:

1. Content Mastery
The Teacher Education Program at MSU has been designed to provide students with a rich and well-balanced education grounded in the liberal arts & sciences and current educational theory, research, and practice. Students participate in learning communities within our program in which they develop in-depth content knowledge for their work as classroom teachers and school leaders. Our graduates understand the central concepts, tools of inquiry, and structures of the disciplines and can create standards-based learning experiences that are meaningful for students.

2. Understanding Development and Diversity of Learners
Graduates of the Teacher Education Program understand how K-12 students learn and develop and can provide learning opportunities which are adapted to diverse learners and support their intellectual, social, and personal development. Our graduates are committed to building a caring, respectful, and supportive learning environment and are prepared to provide access to the necessary tools to help every student learn. They are also cognizant of and committed to Montana’s American Indian cultures and the values embodied by the Indian Education for All Act.

3. Pedagogical and Technological Proficiency
We believe that professional educators must have sound pedagogical content knowledge and be skilled in the use of research-based instructional practices. Our graduates understand and use a variety of instructional strategies to foster students’ motivation for learning and encourage their conceptual understandings through the development of critical thinking, problem solving, and performance/work force skills. Our graduates understand the principles of Differentiated Instruction and can integrate these concepts and practices into their teaching. The graduates of our Teacher Education Program also demonstrate knowledge of effective verbal and nonverbal communication techniques and effectively use educational technol-
ogy to foster active inquiry, collaboration, and supportive interaction in the classroom.

4. Excellence in Instructional Design and Assessment

It is essential for teachers to understand and practice alignment in curriculum, standards, and assessments. Our program is committed to current models of instructional design in which our candidates focus on defining learning outcomes and determining evidence that all learners have met pedagogical goals. Our graduates plan instruction based upon knowledge of subject matter, students, the community, and curriculum goals. They also understand how to use pre-, formative, and summative analysis of student learning, for individuals, small groups, or whole class settings to ensure the intellectual, social, and personal development of every learner.

5. Professionalism in Practice and Reflection

Continuous improvement of the education profession depends upon the systematic practice of professional reflection, inquiry, and collaboration to discover new and more effective educational approaches. Our graduates demonstrate the ability to reflect on classroom decision-making with regard to content, diversity, pedagogy, and assessment in order to improve teaching and learning. They are reflective practitioners who examine their own biases and endeavor to provide equitable educational opportunities for students. They also demonstrate an understanding that education happens in a context and develop effective relationships with family and community members. As candidates move from campus to the K-12 classroom, they are expected to adhere to and model our program’s Professional Expectations and Montana’s Code of Ethics for teachers.

### ELEMENTARY EDUCATION

**Department of Education**

http://www.montana.edu/wwweduc/

The Department of Education offers a teacher education program for students seeking teaching careers in grades kindergarten through eight (K-8). The Elementary Education major is designed to provide a basic general education and a wide breadth of experience in the sciences, language arts, humanities, social studies, art, music, mathematics, and health enhancement necessary for a classroom teacher at these grade levels.

Prospective elementary school teachers follow a program of study the first two years which is essentially the same for all students. There is sufficient flexibility, however, for specialization in the various teaching options available.

One of the major attributes of the elementary education program at Montana State University is its extensive field-based component. This includes service learning experiences in the freshman year, and micro-teaching experiences in the After School Partnership in the sophomore year, and two practicum teaching seminars prior to student teaching. During these semesters, students spend the equivalent of four half-days for a minimum of eight weeks in supervised settings working directly with children while concurrently completing methods courses on campus. The final field-based experience is student teaching where students spend fourteen weeks in a supervised teaching school setting.

The elementary education K-8 curriculum and four options within the program are available in the department. Early childhood education, mathematics, science, and special education are offered to permit students to specialize in these specific areas in addition to completing the elementary school curriculum. The options, while not providing additional endorsements in the specialties addressed, do allow for added study in each area.

Graduate degree programs are offered for students who wish to pursue advanced programs in curriculum and instruction (See The Graduate School’s web site at http://www.montana.edu/).

### COURSEWORK REQUIRED FOR ELEMENTARY EDUCATION K-8

See "Teacher Education Program" for entrance requirements.

#### EDUCORE® – Discovering the Nature of the Disciplines

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 101</td>
<td>U.S. Teaching &amp; Learning</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101</td>
<td>W. College Writing</td>
<td>3</td>
</tr>
<tr>
<td>M 153Q</td>
<td>Geometry and Geometric Measurement for K-8 Teachers</td>
<td>3</td>
</tr>
<tr>
<td>EDU 211</td>
<td>Multicultural Education</td>
<td>3</td>
</tr>
<tr>
<td>TE 250</td>
<td>CS Technology &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>EDU 201</td>
<td>IA Creative Arts &amp; Lifelong Learning</td>
<td>3</td>
</tr>
<tr>
<td>M 102</td>
<td>or 102 H Social Studies</td>
<td>3</td>
</tr>
<tr>
<td>or II or Western Civilization for II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EDU 222</td>
<td>IS Ed Psych and Child Development</td>
<td>3</td>
</tr>
<tr>
<td>IN Met</td>
<td>thorough courses below</td>
<td></td>
</tr>
<tr>
<td>R Met</td>
<td>thorough course below</td>
<td></td>
</tr>
</tbody>
</table>

#### PROFESSIONAL Content – Building a Strong Foundation

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPHR 121</td>
<td>GPHR 141; ANTY</td>
<td>3</td>
</tr>
<tr>
<td>M 132 Number and Operations for K-8 Teachers</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 294 Higher Mathematics for K-8 Teachers</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Approved STEM elective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIO106N</td>
<td>or approved elective Life Science</td>
<td>3</td>
</tr>
<tr>
<td>GEO101;</td>
<td>or approved elective Earth Science</td>
<td>3</td>
</tr>
<tr>
<td>ERTH 101;</td>
<td>or approved elective Physical Science</td>
<td>3</td>
</tr>
<tr>
<td>or Native American Studies</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PSCI 210</td>
<td>American Government</td>
<td>3</td>
</tr>
<tr>
<td>EDU 350</td>
<td>Emergent Literacy</td>
<td>3</td>
</tr>
<tr>
<td>EDU 331</td>
<td>Literature &amp; Literacy for Children</td>
<td>3</td>
</tr>
<tr>
<td>EDU 370</td>
<td>Integrating Technology into Education</td>
<td>2</td>
</tr>
<tr>
<td>EDU 382</td>
<td>Assessment, Curriculum &amp; Instruction</td>
<td>3</td>
</tr>
<tr>
<td>EDU 397</td>
<td>K-8 Health Enhancement</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 356</td>
<td>Exceptional Children</td>
<td>3</td>
</tr>
<tr>
<td>EDU 342</td>
<td>Managing the Learning Environment</td>
<td>2</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
<td>11-13</td>
</tr>
</tbody>
</table>

#### K-8 TEACHING METHODS – Developing Instructional Materials

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 395 Practicum: K-8 (After School Partnership)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 438 Literacy Assessment, Diagnosis &amp; Instruction</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 397 K-8 Language Arts Methods</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 397 K-8 Creative Arts Methods</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 397R K-8 Social Studies Methods</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 397 K-8 Math Methods</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 397 K-8 Science Methods</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 395 Practicum: K-8 (Classroom)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 495 Student Teaching</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

#### TOTAL CREDITS

120

**NOTE:** A student must be admitted into the Teacher Education Program before enrolling in a K-8 Teaching Methods class.
Recommended Program Sequence

ELEMENTARY EDUCATION K-8

Freshman Year (31-32 credits)
EDU 101US Teaching & Learning..................................3
WRIT 101W College Writing...........................................3
EDU 222IS Ed Psych & Child Development..................3
Life Science BIOB100N; BIO103IN; or approved elective...........3
Math 132—Number and Operations for K-8 Teachers..............3
EDU 204IA—Creative Arts & Lifelong Learning....................3
History HSTA 101H or 102H or HST101H or 102H.............4
Human Cultures GPH212I; GPHY 141; or approved elective...........3
Certification in first aid and CPR required prior to student teaching semester.

Sophomore Year (29-30 credits)
EDU 370 Integrating Technology into Education..................3
TE50CS Technology & Society..................................3
Physical Science PHSX 103N; PHSX201N; CHMY102; or approved elective....3-4
Math 294 Higher Mathematics for K-8 Teachers..................3
Native American Studies NASX 105, or 205, or 232..........3
EDU 351 Literature & Literacy for Children..................3
Approved STEM Elective ........................................3
PSCI 210 American Government.................................3
EDU 331 Literature & Literacy for Children..................3
Approved Elective ...........................................3

Junior Year (31-33 credits)
EDU 392 Assessment, Curr, & Instruction........................3
HDCF 356 Exceptional Needs..................................3
EDU 350 Emergent Literacy..................................3
EDU 211D Multicultural Ed ..................................3
Elective......................................................3-7
EDU 458 Lit Assessment, Diagnosis, & Instruction..................3
EDU 397 K-8 Creative Arts Methods............................3
EDU 397 K-8 Science Methods..................................3
EDU 342 Managing the Learning Environment................3
EDU 395 Teaching Practicum I................................3

Senior Year (27 credits)
EDU 397 K-8 Language Arts Methods............................3
EDU 397 K-8 Math Methods....................................3
EDU 397 K-8 Social Studies Methods..........................3
Math 120—Number and Operations for K-8 Teachers..............3
EDU 395 Teaching Practicum II................................3
Student Teaching................................................12

TOTAL CREDITS: 120

Certification in first aid and CPR required prior to student teaching semester.

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

EARLY CHILDHOOD EDUCATION OPTION

The early childhood education option leads to a permissive special competency designed for students in elementary education or K-12 teachers seeking credits for licensure renewal.

Individuals receiving this competency will receive specialized training in working with children age eight and under and their families in the areas of developmentally appropriate practices and curriculum, parent involvement, and integrating children with special needs. Individuals who have completed the requirements (and the 20 credits) will have a permissive special competency added to their elementary licensure.

Earl classroom education option students are to follow the elementary education K-8 curriculum, with these additions:

- EDU 271 Paraprof Experience in Early Childhood.............3
- EDEC 350-Environments in Early Childhood Ed...........3
- EDEC 385—Integrated Curriculum in Early Childhood Ed........4
- HDCF 458—Assessment & Intervention...................4
- Take one of the following:
  - EDU 410—Student Teaching: K-8............................5
  - EDEC 496—Early Childhood Advanced Practicum........3

Students choosing this option voluntarily select a program that requires additional coursework beyond the 120 credits required for a standard four-year degree.

MATHEMATICS OPTION

This option is offered to allow students to concentrate in mathematics in addition to majoring in the elementary education curriculum. It is primarily intended for students who plan to teach middle school mathematics and also desire elementary education background. The program is also attractive to students who plan to teach upper intermediate grades and desire a stronger mathematics background. This option does not lead to State endorsement in mathematics. However, a notation will appear on the student’s transcript.

All mathematics education option students are to follow the elementary education K-8 curriculum, with these additions:

Choose two of the following:
- M 169Q—Secrets of the Infinite.......................3
- M 147Q—Language of Mathematics..................3
- M 151Q—Precalculus..................................3
- M 161Q—Survey of Calculus..........................4
- M 171Q—Calculus I..................................4
- M 420—Geom, Measurements, & Data Mid Gr........3
- M 424—Alg Think & Num Sense Mid Gr..............3
- STAT 217Q—Intro to Statistics.......................3
- Or another approved Mathematics course..............15

Students choosing this option voluntarily select a program that requires additional coursework beyond the 120 credits required for a standard four-year degree.

SCIENCE EDUCATION OPTION

All science option students are to follow the elementary K-8 curriculum, with these additions:

(Note: Some of the listed courses may be taken in the regular elementary education K-8 curriculum, thus decreasing the number of credits required in this option.)

**Biological Science**
Choose 1 lab (4cr.)
- BIOL 101N Principles of Living Systems
- BIOL 170 Principles of Biological Diversity
Choose 1 (5-4cr.)
- BIOM 103IN Unseen Universe: Microbes
- BIOE 103CS Environmental Science & Society
- BIO 160 Principles of Living Systems
- BIO 170 Principles of Biological Diversity

**Earth Science**
Choose 1 lab (4cr.)
- GEOL 101N Earth System Science
Choose 1 (5-4cr.)
- CHMY 121IN Intro to Environmental Geology
- AST 110IN Mysteries of the Sky

**Physical Science**
Choose 1 Chemistry Lab (4 cr.)
- CHMY 121IN Intro to General Chemistry
- CHMY 141 College Chemistry I
Choose 1 Physics Lab (3-4cr.)
- PHSX 201IN Physics By Inquiry
- PHSX 205 College Physics I
Choose 1 (5-4cr.)
- CHMY 121IN Intro to General Chemistry
- CHMY 141 College Chemistry I
- PHSX 103IN The Physics of How Things Work
- PHSX 201IN Physics By Inquiry
- PHSX 205 College Physics I
- PHSX 207 College Physics II

15
SPECIAL EDUCATION OPTION

The Department of Elementary Education recognizes that many of its elementary education majors understand the necessity of gaining skills in the area of special education. Courses from related fields have been selected which provide preparation for pre-service teachers to gain additional knowledge and skills beneficial to working with exceptional needs. This option does not lead to State endorsement in special education. However, a notation will appear on the student’s transcript.

All special education option students are to follow the elementary education K-8 curriculum with these additions:

Add:  credits
EDU 458-Literacy Assessment, Diagnosis & Instruction ........................................3
HDCF 357-Exceptional Needs Lab ..................................1
HDCF 458-Assessment & Intervent ......................................4

Restricted electives:
Take other approved Special Education
Course offerings from MSU-Billings
or other universities .................................................9

Students choosing this option voluntarily select a program that requires additional coursework beyond the 120 credits required for a standard four-year degree.

SECONDARY EDUCATION
College of Education

The Department of Education offers teacher education programs for students seeking teaching careers in specific subject areas for grades five through twelve. Most of the programs are administratively inter-departmental, with the exception of General Science Broadfield, Social Studies Broadfield, and Technology Education Broadfield, which are totally administered and housed within the Department of Education. Therefore, students who wish to complete any of the aforementioned majors will enroll in the Department of Education, whereas students who wish to complete any of the other majors will enroll in the departments offering the teaching options in their chosen areas.

In addition to its secondary programs, the Department of Education provides foundation coursework which is valuable to teachers at all levels in such areas as history and philosophy of education, multicultural education, educational psychology, assessment, curriculum, instructional technology, and exceptionality.

Teaching minors, that is, preparation for a second teaching field in addition to the major field, are offered by many departments. Teaching minors are required to accompany some teaching majors but are not required for broadfields or extended majors. Graduate degree programs are available for secondary teachers who are already licensed (See The Graduate School’s web site at http://www.montana.edu/)

All students in secondary education programs must apply for admission to the Teacher Education Program at the beginning of the semester prior to taking their methods course(s) in their major(s) and minor(s). Application to the Secondary Education program should be turned into the Education Advising Center, Reid Hall 132.

PROFESSIONAL REQUIREMENTS FOR SECONDARY EDUCATION

All prospective teachers are required to take courses in certain areas of professional education. A grade of “C” or better is required in all professional education courses. (“C-” is not acceptable.) See “Teacher Education Program” for entrance requirements.

Prerequisite:  Credits
Take one of the following:
HDCF 150IS-Lifespan Human Devlpmt ..................3
EDU 382-Assessment, Curric, Instruction ..................2
EDU 408--Professional Issues: 5-12 ......................2
EDU 4XX--Teaching methods in minor ...................3
EDU 4YY--Teaching methods in major .....................3
HDCF 356-Exceptional Needs 0-21 ..................3
EDU 211D-Multicultural Education .........................3
EDU 408--Professional Issues: 5-12 ......................2
HDCF 556-Exceptional Needs 0-21 ..................3

Note: A student must be admitted into the Teacher Education Program before enrolling in a methods class (EDU 4XX or EDU 4YY).

Secondary level endorsement will cover grades five through twelve for all applicants graduating from approved programs. Within the approved programs, emphasis must be placed on student growth and development, behavior, and reading and writing skills. Student teaching and observation periods when combined, must cover both 7-12 and 5-6 grade levels.

SEQUENCING YOUR REQUIRED EDUCATION COURSES

The faculty in the Department of Education recommends that any student completing a secondary education program adhere to the following sequence. We want to make sure that you have met all prerequisites when you attempt to enroll in our courses. As you fall behind in this time-line, all subsequent courses should be moved back in time as well.

Note: While we recommend this sequence, there will be some variance, especially between courses taken by the end of the junior year and first-semester senior year.

Freshman Year
1st Semester
HDCF 150IS-Lifespan Human Devlpmt
or
EDUC 160-Early Childhood through Adolescent Development
2nd Semester
EDU 202--Early Field Experience
Sophomore Year
1st Semester
EDU 225--Ed Psy & Adolescent Dev
Sophomore-Junior Years
Sophomore Year - 2nd Semester
EDU 370--Integrating Tech into Education
EDU 382-Assessment, Curric, Instruction
HDCF 356-Exceptional Needs 0-21
EDU 211D-Multicultural Education
Junior-Junior Years
Junior Year - 2nd Semester through Senior Year
EDU 4XX-Teaching methods in minor
EDU 4YY-Teaching methods in major
EDU 395-Practicum: 5-12
Followed by (these two courses will be your last sequence of courses in Secondary Education):
EDU 495--Student Teaching: 5-12
EDU 408-Professional Issues: 5-12

Teaching Options Available

Option 1: Major in Secondary Education

Students enroll/major in the Department of Education,
• General Science Broadfield
• Social Studies Broadfield
• Technology Education Broadfield

Option 2: Subject Area Majors with Teaching Options

Students enroll/major in the appropriate departments outside of the Department of Education. (Also, see “Teacher Education Program” for entrance requirements.)
PROGRAMS OF INSTRUCTION – EDUCATION, HEALTH AND HUMAN DEVELOPMENT

- Agricultural Education Broadfield
- Art Education K-12 Broadfield
- Biology
- Chemistry
- English
- Family and Consumer Sciences Education/Extension
- Health Enhancement Broadfield
- History
- Mathematics
- Modern Languages K-12 (French, German, Spanish)
- Music (School Music K-12)
- Physics

Option 3: Teaching Minors
- Art K-12
- Biology
- Chemistry
- Earth Science
- Economics
- Family and Consumer Sciences
- Government
- History
- Mathematics
- Modern Languages (French, German, Spanish)
- Physics
- Psychology
- Reading K-12
- Technology Education

GENERAL SCIENCE
BROADFIELD OPTION

The General Science Broadfield program prepares and provides licensure for prospective middle and senior high school teachers for all school science areas. (See “Teacher Education Program” for entrance requirements.)

PROGRAM SEQUENCE

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 170N-Prin Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>BIOC 160-Principles of Living Systems</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 141-General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 143-General Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>EDU 202-Early Field Experience</td>
<td>1</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>HDCF 150IS-Lifespan Human Develmt</td>
<td>3</td>
</tr>
<tr>
<td>EDEC 160-Early Childhood through</td>
<td></td>
</tr>
<tr>
<td>Adolescent Development</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>M 170-Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td>M 181-Calculus &amp; Anal Geom I</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Elective</td>
<td>7</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 213-Elements Organic Chem</td>
<td>5</td>
</tr>
<tr>
<td>EDU 225-Ed Psy &amp; Adolescent Dev</td>
<td>3</td>
</tr>
<tr>
<td>EDU 370-Integrating Tech into Education</td>
<td>2</td>
</tr>
<tr>
<td>GEO 101IN-Intro to Physical Geol</td>
<td>1</td>
</tr>
<tr>
<td>GPHY 111CS-Intro to Physical Geog</td>
<td>4</td>
</tr>
<tr>
<td>PSX 205-College Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PSX 207-College Physics II</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>HSTR 101IH-Western Civilization I</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 102IH-Western Civilization II</td>
<td>4</td>
</tr>
<tr>
<td>EDEC 160-Early Childhood through</td>
<td>3</td>
</tr>
<tr>
<td>Adolescent Development</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 101IH-Western Civilization I</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 102IH-Western Civilization II</td>
<td>4</td>
</tr>
<tr>
<td>ASTR 371-Solar System Astronomy</td>
<td>4</td>
</tr>
<tr>
<td>HDCF 356-Exceptional Needs (0-21)</td>
<td></td>
</tr>
<tr>
<td>Take one of the following Biology groups:</td>
<td></td>
</tr>
<tr>
<td>BIOC 411-Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>or BIOC 435-Plant Physiology</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>NASX 232D-Montana Indians:Cult,Hist,Current Issues</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 101IH-American History I</td>
<td>4</td>
</tr>
<tr>
<td>HSTA 102IH-American History II</td>
<td>4</td>
</tr>
<tr>
<td>NASX 304-Native American Beliefs &amp; Phil</td>
<td></td>
</tr>
<tr>
<td>NASX 430-Am Indian Educ.</td>
<td></td>
</tr>
<tr>
<td>University Core and Elective</td>
<td>6</td>
</tr>
<tr>
<td>Credits</td>
<td>33-35</td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOC 375-General Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BOE 370-General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOC 420-Evolution</td>
<td></td>
</tr>
<tr>
<td>EDU 382-Assessment, Curric, Instruction</td>
<td>2</td>
</tr>
<tr>
<td>EDU 211D-Multicultural Education</td>
<td>1</td>
</tr>
<tr>
<td>EDU 494-SeminarLab Safety</td>
<td></td>
</tr>
<tr>
<td>ASTR 371-Solar System Astronomy</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following Biology groups:</td>
<td></td>
</tr>
<tr>
<td>BIOC 411-Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>or BIOC 435-Plant Physiology</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>NASX 405--Gender Issues in Nat Am Studies</td>
<td>3</td>
</tr>
<tr>
<td>NASX 304-Native American Beliefs &amp; Phil</td>
<td></td>
</tr>
<tr>
<td>NASX 340-Native American Literature</td>
<td></td>
</tr>
<tr>
<td>NASX 430-Am Indian Educ.</td>
<td></td>
</tr>
<tr>
<td>Fine Arts Core Elec</td>
<td></td>
</tr>
<tr>
<td>Student Teaching Semester:</td>
<td></td>
</tr>
<tr>
<td>EDU 495-Student Teaching</td>
<td>12</td>
</tr>
<tr>
<td>EDU 408-Professional Issues</td>
<td>12</td>
</tr>
<tr>
<td>Credits</td>
<td>26-30</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 395-Practicum: 5-12</td>
<td>3</td>
</tr>
<tr>
<td>EDU 497-Methods: 5-12</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>RLIST 217IH-Religion and Science</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 417 451-Sci Tech Soc 1500-1800</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 419-Modern Science</td>
<td>3</td>
</tr>
<tr>
<td>Fine Arts Core Elec</td>
<td></td>
</tr>
<tr>
<td>Fine Arts Core Elec</td>
<td></td>
</tr>
<tr>
<td>Student Teaching Semester:</td>
<td></td>
</tr>
<tr>
<td>EDU 495-Student Teaching</td>
<td>12</td>
</tr>
<tr>
<td>EDU 408-Professional Issues</td>
<td>12</td>
</tr>
<tr>
<td>Credits</td>
<td>26-30</td>
</tr>
</tbody>
</table>

A minimum of 128 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Six credits of core electives must be designated global and should be taken in association with listed core electives.

SOCIAL STUDIES
BROADFIELD OPTION

(See “Teacher Education Program” for entrance requirements.)

The Social Studies Broadfield program prepares prospective middle and high school teachers to teach an array of social science areas. Upon completion of this program of study, graduates gain licensure to teach history, government, and other school-level social science subjects.

PROGRAM SEQUENCE

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Seminar Core</td>
<td></td>
</tr>
<tr>
<td>EDU 202-Early Field Experience</td>
<td>1</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>HDCF 150IS-Lifespan Human Develmt</td>
<td>3</td>
</tr>
<tr>
<td>EDEC 160-Early Childhood through</td>
<td></td>
</tr>
<tr>
<td>Adolescent Development</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 101IH-Western Civilization I</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 102IH-Western Civilization II</td>
<td>4</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Seminar Core</td>
<td></td>
</tr>
<tr>
<td>EDU 202-Early Field Experience</td>
<td>1</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>HDCF 150IS-Lifespan Human Develmt</td>
<td>3</td>
</tr>
<tr>
<td>EDEC 160-Early Childhood through</td>
<td></td>
</tr>
<tr>
<td>Adolescent Development</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 101IH-Western Civilization I</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 102IH-Western Civilization II</td>
<td>4</td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 395-Practicum: 5-12</td>
<td>3</td>
</tr>
<tr>
<td>EDU 497-Methods: 5-12</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>NASX 405--Gender Issues in Nat Am Studies</td>
<td>3</td>
</tr>
<tr>
<td>NASX 304-Native American Beliefs &amp; Phil</td>
<td></td>
</tr>
<tr>
<td>NASX 340-Native American Literature</td>
<td></td>
</tr>
<tr>
<td>NASX 430-Am Indian Educ.</td>
<td></td>
</tr>
<tr>
<td>Fine Arts Core Elec</td>
<td></td>
</tr>
<tr>
<td>Fine Arts Core Elec</td>
<td></td>
</tr>
<tr>
<td>Student Teaching Semester:</td>
<td></td>
</tr>
<tr>
<td>EDU 495-Student Teaching</td>
<td>12</td>
</tr>
<tr>
<td>EDU 408-Professional Issues</td>
<td>12</td>
</tr>
<tr>
<td>Credits</td>
<td>26-30</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 497-Methods: 5-12 Social Studies</td>
<td>3</td>
</tr>
<tr>
<td>EDU 395-Practicum: 5-12</td>
<td></td>
</tr>
<tr>
<td>EDU 497-Methods: 5-12</td>
<td>3</td>
</tr>
<tr>
<td>HSTR/401W or PSCI elective (upper division 300-400)**</td>
<td>6</td>
</tr>
<tr>
<td>HSTA/401W or PSCI elective (upper division 300-400)**</td>
<td>6</td>
</tr>
<tr>
<td>PSCI elective (upper division 300-400)**</td>
<td>9</td>
</tr>
<tr>
<td>Credits</td>
<td>32</td>
</tr>
</tbody>
</table>

A minimum of 128 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

*Upper-level HIST electives: 15-21 credits total: at least 6 credits in U.S. history; at least 6 credits in non-Western history, e.g., Asian history; at least 6 credits in European history; at least 6 credits in history of race, class and gender requirements.

NR: a course may satisfy more than one upperdivision requirement, e.g., HSTA 408 Gender in America will satisfy both the U.S. history and race, class, and gender requirements.
Technology education is an integrated discipline designed to develop technological literacy as part of all students’ fundamental education. Through the study of past, present, and future technological systems, and their resources, processes, and impacts on society students will better understand the role of technology in society.

The Technology Education Program at MSU is for individuals wishing to teach technology at the middle or high school level or work within industry where a broad understanding of technological concepts is important.

Two technology education options are available to allow for diversity in personal interests and career aspirations. The Broadfield Teaching Option is designed for in-depth study of Technology Education. The Industrial Technology Option is tailored for those individuals who are pursuing a career in industry which requires a broad background in technology.

The Technology Education Program is sequenced into three phases to develop a progression of inter-related information. The foundation phase constitutes the introduction to technology. This introduction forms the base for future study and an understanding of basic technological concepts.

The synthesis phase begins the in-depth study of the primary technology education components of communication, construction, manufacturing, and power/energy. During this phase students in the teaching option are involved in professional education course work and students in the industrial technology option begin selecting course work which is tailored to meet specific career goals.

The capstone phase of the program is structure to integrate the information and experiences of the preceding phases through applied learning activities. Students in the teaching option teach at the middle/high school level.

TECHNOLOGY EDUCATION

College of Education

Students in the non-teaching option intern in business and/or industry areas related to their career interests.

TECHNOLOGY EDUCATION

BROADFIELD TEACHING OPTION

PROGRAM SEQUENCE

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 121HN-Intro to General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>COM 110US-Public Communication</td>
<td>3</td>
</tr>
<tr>
<td>EDU 202-Early Field Experience</td>
<td>1</td>
</tr>
<tr>
<td>WRIT 101W-College Writing</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 150S-LifeSpan Human Development</td>
<td>3</td>
</tr>
<tr>
<td>TE 101-Intr-To Technology Ed</td>
<td>1</td>
</tr>
<tr>
<td>EEE 101-Basic Electronics/Comp Networks</td>
<td>2</td>
</tr>
<tr>
<td>DRFT 151 -Technical Graphics</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TE 207-Materials and Processes</td>
<td>4</td>
</tr>
<tr>
<td>EDU 223-Ed Psy &amp; Adolescent Dev</td>
<td>3</td>
</tr>
<tr>
<td>M 151Q-Precalculus</td>
<td>4</td>
</tr>
<tr>
<td>TE 230-24-D Comp-Aided Drafting</td>
<td>3</td>
</tr>
<tr>
<td>TE 250S-Technology and Society</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 205-College Physics</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>AGED 333-Construction Technology</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 241-Build Const</td>
<td>3</td>
</tr>
<tr>
<td>EDU 211D-Multicultural Education</td>
<td>3</td>
</tr>
<tr>
<td>TE 330-Power/Energy Tech</td>
<td>3</td>
</tr>
<tr>
<td>TE 331-Electronic &amp; Video Communication</td>
<td>4</td>
</tr>
<tr>
<td>HDCF 356-Exceptional Needs 021</td>
<td>3</td>
</tr>
<tr>
<td>TE 410-Comp Aid &amp; Industrial Mach &amp; Ma</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TE 355-Teaching Practices</td>
<td>1</td>
</tr>
<tr>
<td>TE 406-Curr &amp; Facilities Plan</td>
<td></td>
</tr>
<tr>
<td>TE 417-Manufacturing Technology</td>
<td>3</td>
</tr>
<tr>
<td>EDU 395-Practicum: 5-12</td>
<td>1</td>
</tr>
<tr>
<td>EDU 497-Methods: 9-12 Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
</tr>
<tr>
<td>Student Teaching Semester</td>
<td></td>
</tr>
<tr>
<td>EGU 495-Student Teaching: 5-12</td>
<td>12</td>
</tr>
<tr>
<td>EGU 408-Professional Issues: 5-12</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

TEACHING MINORS

- Art K-12
- Biology
- Chemistry
- Earth Science
- Economics
- Family and Consumer Sciences
- French K-12
- German K-12
- Government
- History
- Mathematics
- Physics
- Psychology
- Reading K-12
- Spanish K-12
- Technology Education

ART K-12

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

INDUSTRIAL TECHNOLOGY OPTION

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 151Q-Precalculus</td>
<td>4</td>
</tr>
<tr>
<td>COM 110US-Public Communication</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W-College Writing</td>
<td>3</td>
</tr>
<tr>
<td>TE 101-Intr-To Technology Ed</td>
<td>1</td>
</tr>
<tr>
<td>EEE 101-Intr-To Electrical Fundamentals</td>
<td>2</td>
</tr>
<tr>
<td>DRFT 131 -Technical Graphics</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>
## Take one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 361</td>
<td>Elements of Physical Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 211</td>
<td>Elements of Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>BIO 370</td>
<td>General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 100</td>
<td>Principles of Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 160</td>
<td>Principles of Living Systems</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 370</td>
<td>General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 420</td>
<td>Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 408</td>
<td>Rocky Mountain Vegetation</td>
<td>2</td>
</tr>
<tr>
<td>BIOL 416</td>
<td>Alpine Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 360</td>
<td>General Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>BIOM 100N</td>
<td>Principles of Inorganic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 361</td>
<td>Elements of Physical Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>BIOM 362</td>
<td>Elements of Physical Chemistry Lab</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 311</td>
<td>Analytical Chem-Quant Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 401</td>
<td>Advanced Inorganic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>EDU 497</td>
<td>Methods: 5-12 Science</td>
<td>3</td>
</tr>
</tbody>
</table>

## Take one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO 312</td>
<td>Dinosaur Paleontology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 310</td>
<td>Invertebrate Paleontology</td>
<td>3</td>
</tr>
<tr>
<td>EDU 497</td>
<td>Methods: 5-12 Science</td>
<td>3</td>
</tr>
</tbody>
</table>

Students who are required to take more than 8 credits listed above in their major must take additional elective physical science courses in the Earth Sciences, Geography, or Geology rubric with the advice and consent of their minor advisor in Earth Sciences.

## ECONOMICS

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

### Departmental Courses Required

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 101IS</td>
<td>Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 202</td>
<td>Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 203</td>
<td>Interpreting Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 311</td>
<td>Intro Micro with Econ Ed APs</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 313</td>
<td>Money and Banking</td>
<td>3</td>
</tr>
</tbody>
</table>

One additional ECNS course at the 300 or 400 level; seminars, 5492, or 4901s) may be substituted for the three-course sequence: ECNS 101, ECNS 202, and ECNS 204.

## FAMILY AND CONSUMER SCIENCES

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTZ 322</td>
<td>Int Painting</td>
<td>3</td>
</tr>
<tr>
<td>ARTZ 352</td>
<td>Int Sculpture</td>
<td>3</td>
</tr>
<tr>
<td>ARTZ 376</td>
<td>Printmaking Relief</td>
<td>3</td>
</tr>
<tr>
<td>ARTZ 377</td>
<td>Printmaking Intaglio</td>
<td>3</td>
</tr>
<tr>
<td>ARTZ 379</td>
<td>Alternate Print Media</td>
<td>3</td>
</tr>
<tr>
<td>EDU 497</td>
<td>Methods: 5-12 Art</td>
<td>3</td>
</tr>
</tbody>
</table>

## CHEMISTRY

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCHE 300</td>
<td>Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 141</td>
<td>College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 143</td>
<td>College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 211</td>
<td>Elements of Organic Chem</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 351</td>
<td>Elements of Physical Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 362</td>
<td>Elements of Physical Chem Lab</td>
<td>3</td>
</tr>
<tr>
<td>EDU 497</td>
<td>Methods: 5-12 Science</td>
<td>3</td>
</tr>
</tbody>
</table>

## EARTH SCIENCE

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO 101N</td>
<td>Intro to Physical Geology</td>
<td>4</td>
</tr>
<tr>
<td>GPHY 111CS</td>
<td>Intro to Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>ERTH 307</td>
<td>Principles of Geomorphology</td>
<td>3</td>
</tr>
<tr>
<td>ERTH 305</td>
<td>Weather and Climate</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 250</td>
<td>Mineralogy</td>
<td>4</td>
</tr>
<tr>
<td>GEO 211</td>
<td>Earth History and Evolution</td>
<td>3</td>
</tr>
</tbody>
</table>

## GEOMEDIAN K-12

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRMN 101</td>
<td>Elementary German I</td>
<td>4</td>
</tr>
<tr>
<td>GRMN 102D</td>
<td>Elementary German II</td>
<td>4</td>
</tr>
<tr>
<td>GRMN 201D</td>
<td>Intermediate German I</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 220D</td>
<td>German Language &amp; Cult</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 330</td>
<td>Adv Gram Comp I</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 331</td>
<td>Adv Gram Comp II</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 401</td>
<td>Linguistics-Phonetics</td>
<td>3</td>
</tr>
</tbody>
</table>

Select three credits from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML 344</td>
<td>Inst Perspectives</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 550</td>
<td>German Culture &amp; Civilization</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 903IH</td>
<td>Issues of German Cinema</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 515</td>
<td>Survey of German Literature</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 320</td>
<td>Contemporary German Literature</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 450R</td>
<td>Sem: German Lit &amp; Cult</td>
<td>3</td>
</tr>
</tbody>
</table>

EDU 497: Methods: K-12 Modern Language ...... (4)

## GOVERNMENT

Take all of the following: 9 credits

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSCI 219IS</td>
<td>Intro to American Government</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 214</td>
<td>Principles of Political Science</td>
<td>3</td>
</tr>
</tbody>
</table>

Take two of the following: (American Institution or Advisor approved courses)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSCI 202</td>
<td>Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 300</td>
<td>Legislative Process</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 314</td>
<td>Political Parties and Elections</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 317</td>
<td>American Constitutional Law</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 392</td>
<td>Media and Politics</td>
<td>3</td>
</tr>
</tbody>
</table>

Take two of the following: Political Processes and International / Political Theory or Advisor approved courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSCI 356</td>
<td>Politics of Food and Hunger</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 451</td>
<td>Ancient &amp; Medieval Pol Sci</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 439</td>
<td>International Human Rights</td>
<td>3</td>
</tr>
</tbody>
</table>

The Department offers a Teaching Minor in History to strengthen the academic portfolios of non-majors preparing for teaching careers. Students are required to consult with the Department’s certification officer prior to declaring the Teaching Minor.

## HISTORY

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSTR 101IH</td>
<td>Western Civilization II</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 162IH</td>
<td>Western Civilization II</td>
<td>4</td>
</tr>
</tbody>
</table>

Take one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSTR 130D</td>
<td>Latin American History</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 135D</td>
<td>Modern Middle East</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 140D</td>
<td>Modern Asia</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 14S</td>
<td>Reinventing Japan</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 160D</td>
<td>Modern World History</td>
<td>4</td>
</tr>
</tbody>
</table>

Take a course in each of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSTR 110D</td>
<td>Religion, Conflict and Politics</td>
<td>4</td>
</tr>
<tr>
<td>EDU 497</td>
<td>Methods: 5-12 Social Studies</td>
<td>3</td>
</tr>
</tbody>
</table>

The Department offers a Teaching Minor in History to strengthen the academic portfolios of non-majors preparing for teaching careers. Students are required to consult with the Department’s certification officer prior to declaring the Teaching Minor.

## PROGRAMS OF INSTRUCTION – EDUCATION, HEALTH AND HUMAN DEVELOPMENT

- BIOLOGY
- CHEMISTRY
- EARTH SCIENCE
- FRENCH K-12
- GERMAN K-12
- ECONOMICS
- FAMILY AND CONSUMER SCIENCES
- GOVERNMENT
- HISTORY
MATHMATICS

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 171Q-Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>M 172Q-Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>M 273Q-Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>M 242-Methods of Proof</td>
<td>3</td>
</tr>
<tr>
<td>M 328-Higher Math for Sec Teachers</td>
<td>3</td>
</tr>
<tr>
<td>M 329-Modern Geometry</td>
<td>3</td>
</tr>
<tr>
<td>M 428-Math Modeling for Teachers</td>
<td>3</td>
</tr>
<tr>
<td>STAT 332-Statistics for Scientists and Engineers</td>
<td>3</td>
</tr>
<tr>
<td>EDU 497-Methods: 9-12 Mathematics</td>
<td>3</td>
</tr>
</tbody>
</table>

PHYSICS

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>PHYSX 220-Gen &amp; Mod Phys I</td>
<td>4</td>
</tr>
<tr>
<td>PHYSX 290-Hons Gen &amp; Mod Phys I</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>PHYSX 222-Physics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYSX 242-Hons Gen &amp; Mod Phys II</td>
<td>4</td>
</tr>
<tr>
<td>PHYSX 224-Physics III</td>
<td>4</td>
</tr>
<tr>
<td>PHYSX 301-Intro Theoretical Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYSX 361-Physical Measurements I</td>
<td>2</td>
</tr>
<tr>
<td>PHYSX 362-Laboratory Electronics II</td>
<td>2</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>PHYSX 320-Classic Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHYSX 425-Elec &amp; Magnetism I</td>
<td>5</td>
</tr>
<tr>
<td>Physics elective (200 level or above)</td>
<td>3</td>
</tr>
<tr>
<td>Approved elective in Biology, Chemistry, or Earth Science</td>
<td>3</td>
</tr>
<tr>
<td>EDU 497-Methods: 5-12 Science</td>
<td>3</td>
</tr>
</tbody>
</table>

PSYCHOLOGY

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYX 100IS-Intro to Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 223-Research Design &amp; Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 225-Research Design &amp; Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 350-Physiological Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 354-Sensation &amp; Perception</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 370-Psychology of Learning</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 390-Memory and Cognition</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 390-Abnormal Psychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 360-Social Psychology</td>
<td>3</td>
</tr>
<tr>
<td>EDU 497-Methods: 5-12 Social Studies</td>
<td>3</td>
</tr>
</tbody>
</table>

READING K-12

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 432-Lit &amp; Literacy for Yng Adults</td>
<td>3</td>
</tr>
<tr>
<td>EDU 456-Literacy, Diagnosis &amp; Instruction</td>
<td>3</td>
</tr>
<tr>
<td>EDU 401-Intro Lit Leadership Ed</td>
<td>3</td>
</tr>
<tr>
<td>EDU 498-Internship</td>
<td>2</td>
</tr>
<tr>
<td>EDU 330-Literature &amp; Literacy for Children</td>
<td>3</td>
</tr>
<tr>
<td>EDU 320-Intensive Literacy</td>
<td>3</td>
</tr>
<tr>
<td>EDU 397-Language Arts</td>
<td>3</td>
</tr>
<tr>
<td>EDU 481-Literacy Across the Curriculum</td>
<td>2</td>
</tr>
</tbody>
</table>

SPANISH K-12

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPNS 101-Elementary Spanish I</td>
<td>4</td>
</tr>
<tr>
<td>SPNS 102D-Elementary Spanish II</td>
<td>4</td>
</tr>
<tr>
<td>SPNS 201D-Intermediate Spanish I</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 220D-Spanish Language &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 323-Adv Grammar &amp; Phonetics</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 324-Spanish Adv Conversat &amp; Comp</td>
<td>3</td>
</tr>
<tr>
<td>Select three credits from the following:</td>
<td>9</td>
</tr>
<tr>
<td>SPNS 361-Hispanic Texts &amp; Cinema</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 416-Spanish Culture &amp; Revolution</td>
<td>3</td>
</tr>
</tbody>
</table>
| SPNS 335IH -Travel in Lat Am Lit & Film | 3 
| Select three credits from the following: | 9   |
| SPNS 320-Spanish Culture & Civilization | 3   |
| SPNS 330-Latin Amer Cult & Civ      | 3       |
| SPNS 325-Survey of Spanish Lit      | 3       |
| SPNS 332-Contemp Latin Amer Literature | 3 |
| EDU 497-Methods: K-12 Modern Language | 4     |

TECHNOLOGY EDUCATION

A student must receive a grade of C or better in all the courses required for this minor and have a GPA of 2.50 or higher.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>TE 327-Materials and Processes</td>
<td>4</td>
</tr>
<tr>
<td>AGED 333-Construction Technology</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 241-Building Construction</td>
<td>3</td>
</tr>
<tr>
<td>TE 406-Curr &amp; Facilities Plan</td>
<td>3</td>
</tr>
<tr>
<td>TE 101-Intro to Technology Ed</td>
<td>1</td>
</tr>
<tr>
<td>TE 230-240 Comp-Aided Drafting</td>
<td>3</td>
</tr>
<tr>
<td>TE 330-Alternate Power/Energy Tech</td>
<td>3</td>
</tr>
<tr>
<td>TE 331-Electronic Communication Tech</td>
<td>3</td>
</tr>
<tr>
<td>TE 353-Manufacturing Technology</td>
<td>3</td>
</tr>
<tr>
<td>EDU 497-Ag. &amp; Tech Ed</td>
<td>3</td>
</tr>
</tbody>
</table>

Programs of Instruction – Education, Health and Human Development

Health and Human Development

College of Education, Health and Human Development
http://www.montana.edu/hhd/

The Department of Health and Development prepares students for careers that are dedicated to the enrichment of human well-being. Consequently, rewarding career opportunities are available to graduates within education and human service professions in private and public settings. Specific areas of study include community health, dietetics/nutrition science, exercise science/kinesiology, early childhood education and child services, and family and consumer sciences. Students interested in teaching can pursue programs in family and consumer sciences and health enhancement (health and physical education) K-12.

Health and Human Development offers graduate master’s-level degrees with options in counseling, including marriage and family counseling, mental health counseling, and school counseling; family and consumer sciences, including early childhood education; family financial planning; exercise and nutrition sciences; and food, family and community health. (See the graduate catalog for further information on graduate programs.)

In addition to the career options, the department offers recreational activity courses in skiing, bowling, and billiards. Physical activity courses are offered as a service to the general student population with no prerequisite. User fees vary depending on the activity. Each student enrolling in an activity course will be asked to sign an activity course waiver and release form.

Mission Statement

The Department of Health and Human Development strives to enrich human well-being through teaching, research, and outreach.

Degrees and Options

The department offers six Bachelor of Science degrees. They include a B.S. in Community Health; a B.S. in Early Childhood Education and Child Services; a B.S. in Family and Consumer Sciences with Teaching or Non-teaching options; a B.S. in Food and Nutrition with op-
tions in Dietetics, Nutrition Science; a B.S. in Health Enhancement K-12 (health and physical education teaching); and a B.S. in Health and Human Performance with options in Exercise Science or Kinesiology. For students who wish to pursue an interdisciplinary B.S. in Sustainable Food and Bioenergy Systems, the department offers an option in Sustainable Food Systems.

The department offers a Master of Science in Health and Human Development with options in Counseling (including marriage and family counseling and mental health counseling); Family and Consumer Sciences (including early childhood education); Family Financial Planning; Exercise and Nutrition Sciences (including exercise physiology and nutrition in sport and coaching sciences); and Food, Family and Community Health (including sustainable food systems and family and community health.

The department offers a Master of Education in School Counseling.

Minor Fields of Study

Minors provide a concentration of courses outside the student’s major and are intended to complement major course work. The minor is posted on the student’s transcript. A non-teaching minor is available in Coaching. A teaching minor is available in Family and Consumer Sciences. (See the course requirements on minors in the appropriate section of this catalog.)

Degree Requirements

Bachelor of Science degrees in Community Health, Early Childhood Education and Child Services, Family and Consumer Sciences (non-teaching), Food and Nutrition, and Health and Human Performance shall be conferred upon the successful completion of specified requirements and a minimum of 120 credits. The Bachelor of Science degrees in the teaching options of Family and Consumer Sciences and Health Enhancement K-12 (health and physical education) shall be conferred upon the successful completion of specified requirements and a minimum of 128 credits. All undergraduate students must complete a minimum of 42 upper division credits.

The Master of Science in Health and Human Development shall be conferred upon completion of specified requirements and a minimum of 30 credits for the options of Family and Consumer Sciences, Exercise and Nutrition Sciences, and Food, Family and Community Health Sciences. A minimum of 42 credits is required for the Family Financial Planning program. A minimum of 60 credits is required in the graduate Counseling programs. The Master of Education in School Counseling carries a minimum of 48 credits. (See the graduate catalog for further information.)

Certifications and Licensures

Certifications and licensures are dependent on the student’s eligibility to sit for certification and licensing examinations and passing those examinations. Several fields of study in the Department of Health and Human Development prepare students to sit for certification and licensing examinations. Many, but not all, certifications and licensures are offered as post-baccalaureate opportunities. See your advisor for additional information. The following certifications are related to Health and Human Development disciplines:

- **Accredited Family Financial Counselor**
  The Department of Health and Human Development offers a three-course series (HDCF 338 Personal and Family Finance I, HDCF 339 Personal and Family Finance II, and HDCF 342 Family Financial Counseling) that can aid students in becoming credentialed as an Accredited Financial Counselor (AFC). The AFC credential is offered nationally through the Institute for Personal Finance. The credential requires two tests, an internship and a year of work experience in helping consumers and families with financial matters. The three courses prepare students to take the two tests. The department then helps the student find placement for an internship in helping consumers and families with finances. The AFC credential allows students to credibly indicate their expertise in personal and family finance to potential employers.

- **Certified in Family and Consumer Sciences**
  Students completing the family and consumer sciences major and the restricted electives will be eligible to sit for the Certification in Family and Consumer Sciences (CFCS) exam set by the American Association of Family and Consumer Sciences. The CFCS Credential communicates to others within and outside of the profession that the individual certified in family and consumer sciences possesses a broad professional knowledge base in the field.

- **Certified Family Life Educator**
  Students completing the family and consumer sciences major and the restricted electives will be eligible to apply for the CFLE granted by the National Council on Family Relations. Interested community health students may also complete additional courses and apply for provisional certification. Certified Family Life Educators serve as consultants, directors, educators, and coordinators in settings such as social services, child care, health and welfare, recreation, youth programs, community action, drug/alcohol rehabilitation centers, senior citizen programs, parent education, family service agencies, extension, and retirement/convalescent care centers.

- **Certified Health Education Specialist**
  Completion of the community health major establishes eligibility to sit for the Certified Health Education Specialist examination (CHES). The CHES exam measures the possession, application, and interpretation of knowledge essential to the practice of community health/health education. The CHES certification is a national standard for health education practice and assists employers in identifying qualified health education practitioners.

- **Certified Personal Trainer/Certified Strength Coach**
  The National Strength and Conditioning Association provides opportunities to become a certified personal trainer or a certified strength coach.

- **Coaching Certification**
  Faculty in Health and Human Development partner with the Montana High School Association (MHSA) in the development and implementation of a coaching certification program. Although MHSA awards the certification, successful completion of the coaching minor offered in the department will prepare the future coach for the profession.
• **Family and Consumer Sciences Teacher**
  The family and consumer sciences teacher preparation program is designed for students who want to become teachers of family and consumer sciences in public or private schools. Upon completion of the degree, students are eligible for licensure from the State of Montana in teaching grades 5-12.

• **Health Enhancement (Health and Physical Education) K-12 Teacher**
  The health enhancement K-12 teacher preparation program is designed for students who want to become teachers of health enhancement (health and physical education) in public or private schools. Upon completion of the degree, students are eligible for licensure from the State of Montana in teaching grades K-12 with reciprocity in other states.

• **Health Fitness Instructor and Exercise Test Technologist**
  The American College of Sports Medicine, the premier organization for health/fitness professionals and clinicians, offers the Health/Fitness Instructor and Exercise Test Technologist certifications at sanctioned test locations throughout the Pacific Northwest. The certification exams include written and practical components that emphasize the application of knowledge and hands-on skills typically acquired in an undergraduate exercise science or kinesiology program.

• **Licensed Professional Counselor or Licensed Clinical Professional Counselor**
  Counseling programs in the graduate program in Health and Human Development lead to the opportunity to become licensed in Montana as a Licensed Professional Counselor (LPC) or Licensed Clinical Professional Counselor (LCPC). Following completion of a master’s degree, the student must complete a minimum of 1500 hours of supervised counseling practice prior to sitting for and passing the LPC examination.

• **Registered Dietitian**
  The food and nutrition dietetics option gives the students an opportunity to apply to a national post-baccalaureate supervised practice/dietetic internship. Upon its completion, the student may sit for the RD examination given by the Commission on Dietetic Registration, the credentialing agency for The American Dietetic Association. The RD status enables a person to become licensed in Montana as a Licensed Nutritionist by the Board of Medical Examiners.

**Academic Advisors**

The Health and Human Development academic advising office, staffed with academic advisors to serve the needs of students, is located in Hoesaeus PE Complex. Students are expected to meet with an advisor each semester to discuss their plan of study, select courses, and register for courses. In addition, students are encouraged to meet with an academic advisor to discuss issues and questions regarding professional programs, career opportunities, and academic concerns. Academic advisors can assist students to appropriate referrals when necessary.

To receive advising or to inquire about programs in the Department of Health and Human Development, contact the Health and Human Development Advising Center by phone at 406-994-4001 or by e-mail at hhdadvising@montana.edu.

**Course Requirements and Curricula for Majors**

The curriculum and specific course requirements for each major and minor within the Department of Health and Human Development are listed below.

**Curricula in Health and Human Development**

**COMMUNITY HEALTH MAJOR**

Graduates of the community health major are employed in entry-level positions conducting planning, administration, evaluation, research, and teaching in community health settings. The undergraduate program is concerned with improving health and well-being for all through the promotion of healthful lifestyles, healthy family functioning, community actions for health, and conditions that make it possible to live healthful lives. The program draws on public health, education, psychology, sociology, family science, and other social and behavioral sciences. Students are prepared to work in a variety of settings including family planning agencies, nonprofit agencies, state and federal health agencies, schools, and community health centers. This program stresses community involvement because community health emphasizes an interactive process in which target populations are active participants in their health, rather than passive recipients. Student involvement will take the form of class assignments, practicum, internships, and service. Students will be prepared to assess individual and community needs; plan, implement, and evaluate effective health programs; coordinate provision of services; act as a resource person; and communicate health needs, concerns and resources. Persons enrolling in this option should seriously consider earning a graduate degree in public health or some related area at some point in their career. Students must receive a grade of “C” or higher in all required courses as outlined in the major.

Completion of the community health major establishes eligibility to sit for the Certified Health Education Specialist (CHES) examination. The CHES exam measures the possession, application, and interpretation of knowledge essential to the practice of community health/health education. The CHES certification is a national standard for health education practice and assists employers in identifying qualified health education practitioners.

Interested students may also complete additional courses and apply for provisional certification for the Certified Family Life Educator (CFLE) program accredited by the National Council on Family Relations.

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
<tr>
<td>HDHL 210--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 230--Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 240--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS--Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 221--Health Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
<tr>
<td>HDHL 210--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 230--Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 240--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS--Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 221--Health Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDHL 210--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 230--Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 240--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS--Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 221--Health Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
<tr>
<td>HDHL 210--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 230--Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 240--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS--Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 221--Health Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
</tbody>
</table>

**Freshman Year Credits**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
<tr>
<td>HDHL 210--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 230--Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 240--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS--Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 221--Health Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
<tr>
<td>HDHL 210--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 230--Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 240--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS--Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 221--Health Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
</tbody>
</table>

**Sophomore Year Credits**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
<tr>
<td>HDHL 210--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 230--Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 240--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS--Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 221--Health Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
</tbody>
</table>

**University Core and Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
<tr>
<td>HDHL 210--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 230--Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 240--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS--Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 221--Health Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
</tbody>
</table>

**University Core and Electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
<tr>
<td>HDHL 210--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 230--Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 240--Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS--Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 221--Health Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221--Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
</tbody>
</table>
ENRICHMENT DISCIPLINES

Students must receive a grade of “C” or higher in all required courses as outlined in the major.

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDEC 160--Early Childhood through Adolescent Development</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 101US--First Year Seminar</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W--College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>Supporting Courses</td>
<td>9</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDEC 288--Signaling for Early Childhood Educators</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 253--Relations in Family System</td>
<td>3</td>
</tr>
<tr>
<td>EDEC 271--Paraprof Experience in Early Childhood</td>
<td>1</td>
</tr>
<tr>
<td>Supporting Courses</td>
<td>13</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDCF 519--Theories &amp; Skills Help Relation</td>
<td>3</td>
</tr>
<tr>
<td>EDEC 350--Environments and Management in Early Childhood Ed</td>
<td>3</td>
</tr>
<tr>
<td>EDEC 385--Integrated Curriculum in Early Childhood Ed</td>
<td>4</td>
</tr>
<tr>
<td>HDCF 556--Exceptional Children</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 557--Exceptional Children Lab</td>
<td>1</td>
</tr>
<tr>
<td>HDCF 371--Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>Supporting Courses</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDEC 430--Social/Emotional Development in Young Children</td>
<td>3</td>
</tr>
<tr>
<td>EDEC 459--Literacy in EC</td>
<td>3</td>
</tr>
<tr>
<td>EDEC 496--Practicum in EC</td>
<td>6</td>
</tr>
<tr>
<td>HDCF 455R--Admin of Human Svc Prog</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 458--Assess &amp; Intervention</td>
<td>4</td>
</tr>
<tr>
<td>EDEC 455--Health &amp; Movement in EC</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

Family and Consumer Sciences Major

The Family and Consumer Sciences (FCS) profession is dedicated to enhancing the relationships among individuals, families, communities, and the environments in which they function. The family and consumer sciences profession takes leadership in improving individual, family, and community well-being; impacting the development, delivery, and evaluation of consumer goods and services; influencing the creation of policy; and shaping societal change, thereby enhancing the human condition.

Students in FCS take a common core of foundation courses in content areas based upon American Association of Family and Consumer Sciences (AAFCS) standards. In addition, students take restricted supporting courses in the program.

Both teaching and non-teaching options are available.

Both teaching and non-teaching options take the following core classes:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDCF 138--Surv of Family Finance &amp; Cons Iss</td>
<td>3</td>
</tr>
<tr>
<td>EDEC 160--Early Childhood through Adolescent Development</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 239--Contemp Consumer Issues</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 263--Relationships &amp; Family Sys</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 388--Personal and Family Finance I</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 371--Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 455R--Family Law &amp; Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 437--Managing Work and Family</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 490--Parenting</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 447--Family Life Education</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 464--Gen-Race Class &amp; Fam Div</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS--Basic Human Nutrition</td>
<td>3</td>
</tr>
</tbody>
</table>

Take the following:

- HDCF 339--Pers & Family Finance II
- HDCF 342--FamFinancial Counseling
- or HDCF 519--Theories Help Relations

Non-Teaching Option

The Family and Consumer Sciences non-teaching option emphasizes the family as a dynamic social unit and examines diverse families in contemporary society. The program focuses on family behavior, strengths, and challenges using family-specific theoretical frameworks (family systems, family crises) and research methods. Social, cultural, historical, political, and economic trends that influence family functioning and well-being are addressed. Students study a wide range of family issues including development across the lifespan, changing family structures, and intergenerational relations. Additionally, human response to family issues, family policies and laws, family finance and economics, work and family issues, and human service delivery and decision-making are included.

The family and consumer sciences non-teaching option provides a strong background for students seeking careers in human services, family life education, family policy, and financial counseling. However, graduate training will be necessary for students wishing to enter the counseling/therapy fields. The curriculum prepares students to work in a wide range of organizations and settings, state or federal agencies, nonprofit settings, and for admission to graduate programs in family science, family resource management, human...
Teaching Option

Family and consumer sciences students learn to work through credit and not-for-credit education systems to empower individuals and families across the lifespan to manage the challenges of living and working in a diverse, global society. The unique focus is on families, work, and their interrelationships. The curriculum at MSU is in sync with the National Standards for Family and Consumer Sciences Teachers and the National Standards for Family and Consumer Sciences Students. Therefore, students choosing this option will be well qualified to seek employment in a variety of educational settings including secondary public and private schools, extension, and public and private agencies. Students completing the program successfully will qualify for a Montana teaching license in Family and Consumer Sciences grades 5-12. Students are encouraged to complete the Certified Family Life Educator and Accredited Financial Counselor designations as well as a teaching minor in a second field while attending MSU to further increase their professional opportunities.

Additionally, the family and consumer sciences major prepares undergraduates students to pursue graduate degrees in a variety of areas including family and consumer sciences, curriculum and instruction, school counseling, and adult education. Students must receive a grade of "C" or higher in all required courses as outlined in the major.

Note: The family and consumer sciences teaching option requires 128 credits.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDFC 158-Surv Fam Finance &amp; Cons Iss</td>
<td>3</td>
</tr>
<tr>
<td>EDEC 160-Early Childhood through Adolescence Development</td>
<td>3</td>
</tr>
<tr>
<td>LIBR 121-Library Research Skills</td>
<td>2</td>
</tr>
<tr>
<td>US 101US-First Year Seminar</td>
<td>1</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>16</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDFC 259-Contemp Consumer Iss</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 241-Meat Well-Being: Am Fam</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 261-Adult Dev and Aging</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 263-Relationships in Family Systems</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS-Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 263-Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>HMDH 249-Human Sexuality</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDCF 358-Pers &amp; Family Finance I</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 371-Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 440-Parenting</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 410-Human Response to Stress</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following: HDFC 339-Pers &amp; Family Finance II</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 342- Famil Counseling</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Senior Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 223-Ed Psy &amp; Adolescent Dev</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 425R-Managing Work &amp; Family</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 447-Family Law Education</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 455R-Family Law and Public Policy</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 490-Parenting</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 457-Managing Work &amp; Family</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 464-Gen, Race, Class &amp; Dev</td>
<td>3</td>
</tr>
<tr>
<td>Restricted Electives</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

### FOOD AND NUTRITION MAJOR

The Department of Health and Human Development offers a major in the study of food and nutrition. Students who choose the nutrition science option intend to pursue a health profession or research-related career, for example, medicine, dentistry, industry, academia, etc. The dietetics option is designed for students wanting to become a registered dietitian. Information about degree requirements can be obtained from the Health and Human Development advising office, Hosaeus PE Complex.

### Dietetics Option

The dietetics option at Montana State University-Bozeman has been granted initial accreditation as a Didactic Program in Dietetics by the Accreditation Council for Education and Dietetics (ACEND) of the Academy of Nutrition and Dietetics, a specialized accrediting body recognized by the Council on Higher Education Accreditation and the United States Department of Education, 120 Riverside Plaza, Suite 2000, Chicago, IL 60606-6995, (312) 899-0040, ext. 5400. A graduate will attain a verification statement upon completing the ACEND-approved dietetics program curriculum in addition to a minimum of 12 credits.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDSN 101 Intro to Design</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 158-Surv Fam Finance &amp; Cons Iss</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 150F-Ind Fam Dev Well-Being Life</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following: EDEC 160-Early Childhood through Adolescent Development</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 261-Adult Dev &amp; Aging</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 249-Drugs and Society</td>
<td>3</td>
</tr>
<tr>
<td>M 100-“C” or better in any 100level or above M course</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 202-In-School Experience</td>
<td>3</td>
</tr>
<tr>
<td>EDU 225-Ed Psy &amp; Adolescent Dev</td>
<td>3</td>
</tr>
<tr>
<td>EDU 211D-Multicultural Education</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 218-Fashion and Textiles</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 219-Apparel Construction</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 259-Contemp Consumer Issues</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 241-Meat Well-Being: Am Fam</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>
in each required program course at graduation. A graduate is then eligible to apply for a ACEND-accredited supervised practice/dietetic internship or other post-baccalaureate experience. Upon completion of the post-graduate dietetic internship, students are eligible to take the national registration exam for dietitians. Once the individual has passed the exam, the individual is then a “registered dietitian.” The dietetics option has a strong foundation in food and nutrition, food service management, and clinical nutrition. Registered dietitians may find employment in health care facilities; industrial, school, and university food services; community nutrition services; private practice; sales for food service or health products; and other related fields.

Nutrition Science Option
The nutrition science option is designed to prepare a student for admission to medical (allopathic or osteopathic), dental, or graduate school with an emphasis on nutrition and biochemistry. A student can receive a dietetic verification statement if additional dietetic course requirements are met. Although the nutrition science option provides a strong background for most professional schools, students must contact individual schools for specific post-baccalaureate entrance requirements.

Standards of Work
Students must receive a grade of “C” or higher in all required courses as outlined in the major.

DIETETICS OPTION

**Freshman Year**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 111-College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 115-College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>WRIT 101-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>COM 110US-Public Communication</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>ECNS 101IS-Economic Ways of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 138-Surv Family Finance &amp; Cons Iss</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 239-Contemporary Consumer Issues</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>M 121Q-College Algebra (or higher)</td>
<td>3</td>
</tr>
<tr>
<td>M 145Q-Math for Liberal Arts</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>HDCF 150IS-Ind Fam Well-Being Lifespan</td>
<td>3</td>
</tr>
<tr>
<td>PSX 100IS-Intro to Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>ANTY 101D-Anthropology &amp; Human Exp</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 101IS-Introduction to Sociology</td>
<td>3</td>
</tr>
<tr>
<td>University Core</td>
<td>4</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOH 201-Human Anatomy &amp; Physiology I</td>
<td>5</td>
</tr>
<tr>
<td>CHMY 211-Elements of Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>NUTR 221-CS-Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 326-Food Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 227-Food Fundamentals Lab.</td>
<td>2</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>ACTG 201-Prin of Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 338-Personal &amp; Family Finance I</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>BIOM 1035N-U-nseen Universe: Microbes</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 250-Microbiology for Hlth Sciences</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>WRIT 201-College Writing II</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221-Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 250-Microbiology for Hlth Sciences</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 318-Biometry</td>
<td>3</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 380-Biochemistry</td>
<td>5</td>
</tr>
<tr>
<td>BIOH 211-Human Anatomy &amp; Physiology II</td>
<td>4</td>
</tr>
<tr>
<td>HDCF 319-Theories &amp; Skills for Help Relations</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 371-Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 321-Nutrition in the Lifecycle</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 322-Food Service Systems Mgmt</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 395P-Practicum: Quantity Foods Prodl &amp; Mgmt</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 501-Nutrition and Society</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 401-Nutrition Asst &amp; Counseling</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUTR 421-Macronutrient Metabolism</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 422-Micronutrient Metabolism</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 425-Medical Nutritional Therapy I</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 426-Medical Nutritional Therapy II</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>SFBS 429-Small Bus Entre Food Hlth</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 469-Social Entrepreneurship</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>NUTR 494-Seminar</td>
<td>1</td>
</tr>
<tr>
<td>SFBS 443R-Culinary Marketing:Farm to Table3</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 451R-Sustainable Food Systems</td>
<td>5</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

See the Food and Nutrition major web site at www.montana.edu/hhd for a suggested list of electives and additional courses specifically needed to attain the ACEND-approved verification statement.

NUTRITION SCIENCE OPTION

**Freshman Year**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 195-Integrative Physiology</td>
<td>4</td>
</tr>
<tr>
<td>BIOB 256-Intro Biol: Cells to Organisms</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 111-College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 115-College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>WRIT 101-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>M 191Q-Survey of Calculus</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>COM 110US-Public Communication</td>
<td>3</td>
</tr>
<tr>
<td>US 101US-First Year Seminar</td>
<td>3</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 260-Cellular &amp; Molecular Biology</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 111-College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 312-Organic Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>NUTR 221-CS-Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 205-College Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 297-College Physics II</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>2</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 380-Biochemistry</td>
<td>5</td>
</tr>
<tr>
<td>BIOH 211-Human Anatomy &amp; Physiology II</td>
<td>4</td>
</tr>
<tr>
<td>BIOQ 320-Biomedical Genetics</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 319-Theories &amp; Skills for Help Relations</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 371-Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 321-Nutrition in the Lifecycle</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 321-Nutrition in the Lifecycle</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 351-Nutrition &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 360-Gen Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 425-Adv Cell &amp; Molecular Biology</td>
<td>4</td>
</tr>
<tr>
<td>NUTR 401-Nutrition Asst &amp; Counseling</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 421-Macronutrient Metabolism</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 422-Micronutrient Metabolism</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 425-Medical Nutritional Therapy I</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 426-Medical Nutritional Therapy II</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>12</td>
</tr>
</tbody>
</table>

HEALTH AND HUMAN PERFORMANCE MAJOR

The undergraduate major in Health and Human Performance (HHP) at Montana State University is a general pre-health professional curriculum that prepares students for health-related graduate programs (e.g., physical therapy, occupational therapy, medical school, etc.), exercise science graduate programs (e.g., exercise physiology, health promotion, biomechanics), as well as entry-level occupations within the health and wellness industry. HHP majors can choose to focus their course work within one of the following curriculum options: exercise science or kinesiology. Students within the exercise science option intend to pursue a health-related graduate degree to meet their career aspirations, whereas students within the kinesiology option will pursue careers within the health and wellness industry that do not require a graduate degree.

EXERCISE SCIENCE OPTION

The exercise science option within the Health and Human Performance (HHP) major focuses on both clinical and performance-based understandings of human movement. The exercise...
science option emphasizes a cross-disciplinary understanding of human movement through non-departmental courses in biology, anatomy and physiology, chemistry, physics, math, and statistics. These courses then serve as the foundation for mechanical (e.g., biomechanics), physiological, and nutritional perspectives within the departmental courses. The exercise science option specifically allows students to customize their junior and senior year course work as needed for later application to health-related graduate programs in physical therapy, occupational therapy, medical physician assistant, sports medicine, exercise science graduate programs (exercise physiology, health promotion, biomechanics), as well as medical school. Additional careers for exercise science students can include those within the health and fitness industry (e.g., those requiring ACSM Certified Health Fitness Specialist and/or Certified Clinical Exercise Specialist certifications), corporate wellness programs, exercise rehabilitation programs (cardiac rehabilitation, gait laboratories, sport medicine facilities, older adult programs, etc.), as well as careers in the sport and rehabilitative medicine equipment industries. Regardless of a student's career goals, each student's course work will culminate in one of the following "capstone experience" courses: HDPE 465, Exercise Testing and Prescription; HDPE 490, Undergraduate Research; or a pre-approved internship (HDPE 498). Students must receive a grade of "C" or higher in all required courses as outlined in the major.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOH 211-Human Anatomy &amp; Physiology II</td>
<td>4</td>
</tr>
<tr>
<td>HDPE 320-Anatomical Kinesiology</td>
<td>4</td>
</tr>
<tr>
<td>HDPE 322-Exercise Physiology</td>
<td>4</td>
</tr>
<tr>
<td>HDPE 323R-Biomechanics</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Approved Electives</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>sophomore Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOH 211-Human Anatomy &amp; Physiology II</td>
<td>4</td>
</tr>
<tr>
<td>HDPE 320-Anatomical Kinesiology</td>
<td>4</td>
</tr>
<tr>
<td>HDPE 322-Exercise Physiology</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Approved Electives</td>
<td>30</td>
</tr>
</tbody>
</table>

**KINESIOLOGY OPTION**

The kinesiology option within the Health and Human Performance (HHP) major prepares graduates for careers requiring leadership in organizing, directing, and managing fitness and wellness programs in corporate and commercial settings. The overall goal of the kinesiology option is to develop basic knowledge, comprehension, and appreciation of a) historical and cultural perspectives of human movement, b) social and psychological influences of human movement, and c) physiological and biomechanical correlates of human performance. From this broad knowledge base, the program's inherent flexibility allows students to pursue a variety of areas related to physical activity and sport. This option also prepares students for professional certifications in fitness and conditioning through professional organizations such as the American College of Sports Medicine (ACSM) and the National Strength and Conditioning Association (NSCA). Finally, each student's course work will culminate in one of the following "capstone experience" courses: HDPE 465, Exercise Testing and Prescription; HDPE 490, Undergraduate Research; or a pre-approved internship (HDPE 498). Students must receive a grade of "C" or higher in all required courses as outlined in the major.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOH 211-Human Anatomy &amp; Physiology II</td>
<td>4</td>
</tr>
<tr>
<td>HDPE 320-Anatomical Kinesiology</td>
<td>4</td>
</tr>
<tr>
<td>HDPE 322-Exercise Physiology</td>
<td>4</td>
</tr>
<tr>
<td>HDPE 323R-Biomechanics</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Approved Electives</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUTR 221-Intro to Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 267-Exercise Physiology</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 411-Nutr for Sport &amp; Exercise</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>12</td>
</tr>
</tbody>
</table>

**HEALTH ENHANCEMENT; HEALTH AND PHYSICAL EDUCATION TEACHING K-12 BROADFIELD MAJOR**

The Health Enhancement Teacher Preparation program is designed for students who want to become teachers of Health Enhancement (Health and Physical Education) in public schools. Upon completion of the degree, students are eligible for certification in teaching K-12 Health Enhancement, Physical Education, and/or Health Education in Montana and other states. Health Enhancement is a comprehensive approach to combining the traditional areas of Health Education and Physical Education. It is a contemporary curriculum where healthy lifestyles and concepts are achieved through skillful movement with an emphasis on physical fitness, healthy lifestyle management skills, and understanding of the total self (physical, intellectual, emotional, and social). In addition to the traditional approach to teaching fundamental movement, skills, games, and dance, this curriculum emphasizes the overall health of the individual as a value in life and enhances critical thinking, decision-making and problem-solving skills of future teachers and their students. Courses within this curriculum represent a combination of content knowledge (health enhancement,
health education, and physical education) along with a strong background in pedagogical content knowledge (teaching methods and curriculum). Students majoring in Health Enhancement develop a professional development portfolio based on national beginning teacher standards. The final semester consists of student teaching in two public school placements.

Criteria for selection and retention:

Admission to the Teacher Education Program. Any student who wishes to enter the Teacher Education Program must complete an "Application for the Teacher Education Program." These forms are available at www.montana.edu/ehhd/fpcert/index.html. The forms must be signed by the advisor and the forms turned into the Education Advising Center, 132 Reid Hall. Students should apply to the Teacher Education Program by the end of their sophomore year.

The requirements for admission are 1) cumulative grade point average of at least 2.5; 2) a grade of “C” or higher in all required courses; 3) approval of the advisor; and 4) no record of immoral conduct related to the teaching profession nor been judged guilty of a criminal offense as outlined by Section 20-4-110 of the Montana Code Annotated.

Application and approval for student teaching. Certain requirements must be met by all students desiring to student teach. These are 1) maintenance of the same standards required for admission into the program including satisfactory clearance on a federal criminal background check; 2) completion of all required courses; 3) certification of first aid and CPR; and 4) approval of advisor.

Student teaching is limited to seniors. Application must be made to the Director of Field Placement and Licensee no later than the following times:

- Freshman Year Credits
  - COM 110US-Intro to Public Communication........3
  - HDCE 150D-Ind Fam Well-Being Lifespan........3
  - HDPE 102-Paraprofessional Experience...........3
  - HDPE 222-Found of Ex Science....................3
  - HDPE 251-Teaching Fitness/Art....................3
  - HDPE 267-Introduction to Coaching.................3
  - LBR 121-Alec Library Research Skills.............3
  - M 145Q-Math for Liberal Arts.......................3
  - WRIT 101W-College Writing........................9
  - University Core and Electives....................31

- Sophomore Year Credits
  - EDU 233-Ed Psy & Adolescent Dev Devel...........5
  - EDU 211D-Multicultural Education................3
  - NUTR 221CS-Basic Human Nutrition...............3
  - HDHL 230-Drugs and Society.......................3
  - HDPE 240-Human Sexuality........................3
  - HDPE 221-Health Anat & Phys.......................3
  - HDPE 224-Teaching Movement Content..............3
  - HDPE 304-Tech Apps in Health Enhancement.........3
  - University Core and Electives....................31

- Junior Year Credits
  - EDU 382-Assessment, Curric, Instruction..........3
  - EDU 397-Methods: K-4 Health Enhancement.........3
  - EDU 497-Methods: 5-12 Health Enhancement.........3
  - HDFC 371-Research Methods........................3
  - HDPE 314-Fifth Enhance for Atypical Populations 3
  - HDPE 520-Anatomical Kinesiology................3
  - University Core and Electives....................31

- Senior Year Credits
  - EDU 419-Student Teaching; K8.....................6
  - HDPE 455-Student Teaching; K-12..................6
  - EDU 408-Professional Issues: 5-12...............2
  - HDHL 455-The Ethic of Care.......................3
  - HDPE 422-Exercise Physiology.....................4
  - HDPE 430-Instruct Design & Admin of HE Curr ...3
  - HDPE 445R-Applied Sport Psychology...............3
  - University Core and Electives....................31

Electives
  (select 9 credits from the following courses):
  - NUTR 411-Nutr for Sports & Exer..................3
  - HDPE 316-Football Coaching Theory...............1
  - HDPE 317-Basketball Coaching Theory...............1
  - HDPE 318-Soccer Coach Theory.....................1
  - HDPE 319-Volleyball Coaching Theory..............1
  - HDPE 362-Track & Field Theory....................2
  - HDPE 367-Coaching Application....................3
  - HDPE 456-Principles of Strength and Conditioning..........................3
  - HDPE 467-Advanced Concepts in Coaching........3
  - DANC 150-Social Dance.............................1
  - Free electives - Select 3 credits from any University Course..................3

A minimum of 128 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

COACHING MINOR

This coaching minor is one of the few in the northern Rocky Mountain region and is specifically designed to prepare those interested in coaching any sport at any entry level. It was based upon the National Standards for Sport Coaches that was developed by professional coach educators from the National Association of Sport and Physical Education (NASPE) and other sport organizations and universities across the USA.

1. HDPE 267, Introduction to Coaching is the ‘keystone’ course for this major. All students should start here.
2. In most cases, there will be NO credits given for PRIOR coaching experience that has not resulted in a written evaluation from an athletic director, director of coaching, head coach or other sport administrator.
3. The sports-specific courses (theories of coaching football, basketball, soccer, track and field, volleyball, etc.) have HDPE 267 as their prerequisite. No student should attempt taking any of these classes without successful completion of HDPE 267.

Students must receive a “C” or better (with the exception of HDPE 367, which is P/F) for the following courses. Students receiving an “F” in HDPE 367 must repeat that course with the same supervisor.

Required Classes

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPE 267-Introduction to Coaching</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 221CS-Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 455-The Ethic of Care</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 221-Health Anatomy &amp; Physiology</td>
<td>3</td>
</tr>
<tr>
<td><em>HDPE 367-Coaching Application</em></td>
<td>3</td>
</tr>
<tr>
<td>HDPE 445R-Applied Sport Psychology</td>
<td>3</td>
</tr>
</tbody>
</table>
| HDPE 456-Principles of Strength and Conditioning | 3

Take one of the following:

- HDPE 222-Foundations of Exercise Science | 3 |
- HDPE 322-Exercise Physiology | 4 |

Students must receive a “C” or better for the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUTR 411-Nutr for Sports &amp; Exer</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 410-Human Response to Stress</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 456-Principles of Strength &amp; Cond</td>
<td>3</td>
</tr>
</tbody>
</table>

27/28
SUSTAINABLE FOOD AND BIOENERGY SYSTEMS

This program is a unique interdisciplinary curriculum designed for students interested in the interconnected processes of crop production, processing, distribution, and utilization of food and bioenergy. The degree focuses on ecologically sound, socially just and economically viable farming methods, food and health, and related food and bioenergy system topics. Students work closely with faculty to gain hands-on experience enhancing practical skills and knowledge, and in specific, self-selected focus areas through internships. The degree plan is intended to encompass a wide range of food- and bioenergy-related areas in order to prepare students for career opportunities in agricultural business, public health and community food security, natural resource conservation, bioenergy production, marketing, distribution, and local food systems.

Sustainable Food Systems Option

The Sustainable Food Systems Option draws from both the physical and social sciences in the areas of food and nutrition, family and consumer sciences, plant sciences, environmental sciences, ecology, sociology, and political science. Emphasis in this option is on health and consumer issues related to food production and food systems. Students gain hands-on experience in culinary fundamentals and management, organic gardening, and independent research projects. Internships are designed to provide experience with food processing, food cooperative management, alternative food distribution systems, and small business operations. Having a better understanding of the interconnections among food production, food policy, food security and health, helps prepare graduates capable of addressing interdisciplinary food system problems such as obesity, food insecurity and poverty, food safety, and loss of indigenous foods, among others.

Career Opportunities

Graduates from this option are prepared for careers in community nutrition, community food security, public health, Extension education, food and nutrition policy and education, food enterprise, culinary arts and management, community supported agriculture, food processing, food marketing, retailing and distribution.

Agroecology Option

Agroecology explores how crops and pest organisms interact with their environment, and the application of technology to efficiently and sustainably produce crops. Agroecology focuses on application of principles of population and community ecology, as well as environmental science, to cropland ecosystems. The curriculum is based on the philosophy that to be able to successfully predict management outcomes and thus make informed recommendations, one must understand fundamental principles of evolution, ecology, soil science, agronomy, and pest management.

The curriculum originates from a base in biological science which includes a broad knowledge of organisms (including plants, animals and microorganisms) and the physical and chemical characteristics of environments. In the Agroecology curriculum, students will develop a knowledge of the diversity of organisms and how they interact in natural and managed ecosystems. Furthermore, the curriculum will build on this knowledge in courses that demonstrate the application of ecology and environmental science principles. Students will also learn how new technologies like remote sensing and geographic information systems are modernizing agriculture. In later stages of the curriculum, students may select from an array of upper division courses in natural ecosystems, cropping systems, pest management, applied ecology, and policy and planning that enable them to specialize in food or bioenergy-related areas best suited to their own career vision.

Career Opportunities

Graduates from this option find careers in environmental industries and consulting firms that solve problems associated with agroecosystems or agricultural practices; government jobs in environmental management and policy making; agricultural industry positions associated with precision agriculture, pest management, general agronomy, and information services. Students will be prepared for graduate training that leads to independent research in basic and applied ecology, environmental biology, cropping systems, precision agriculture, ecologically-based pest management, or weed science.

Sustainable Crop Production Option

Where does our food come from? Are there ways to sustainability maintain production levels and yet protect our natural resources? Is it possible to improve the quality and nutrition of our food supply? Are local food systems a viable alternative to corporate agricultural production? Can crops grown for bioenergy production reduce our use of fossil fuels and lessen carbon dioxide emissions? The answers to these questions and many more are discovered by students in the Sustainable Crop Production Option. The curriculum is designed to acquaint students with a broad range of principles and issues in sustainable crop production, including soil fertility, plant physiology, greenhouse production, pest management, and small business management. Both large- and small-scale food and bioenergy production systems are examined.

Career Opportunities

Graduates from this option are prepared for careers in agricultural production, community nutrition, community food security, public health, Extension education, food and nutrition policy and education, food enterprise, culinary arts and management, community supported agriculture, food processing, food marketing, retailing and distribution.

Sustainable Livestock Production Option

Sustainable Livestock Production focuses on the biological understanding of animal agriculture and its continued presence in sustainable grazing systems as well as its potential role in sustain-
able farming systems. Students will be introduced to the principles, practices and issues impacting the production, processing and preservation of safe, wholesome, nutritious, and palatable meat along with the regulatory requirements for selling animal products. Sustainable Livestock Production focuses on the science of animal production, but expands student learning to a larger systems understanding to the role of domestic livestock in sustainable systems. In addition, students will be exposed to the role of strategic grazing in landscape management as well as using livestock to manage potential waste streams from other industries.

**Career Opportunities**

Graduates from this option are prepared for careers in both the production and allied industries associated with animal agriculture and will also prepare the student for opportunities in extension and graduate work.

**Curricula in Sustainable Food and Bioenergy Systems**

**HEALTH AND HUMAN DEVELOPMENT**

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 146-Intr to Sustain Food &amp; Bioenergy Systems</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 170IN-Principles of Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>ECNS 101ES-Econ Way Thinking</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 110CS-Introduction to Plant Biology</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 121IN-Intr to General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>M 121-College Algebra</td>
<td>3</td>
</tr>
<tr>
<td>M 145Q-Mathematics for Liberal Arts</td>
<td>3</td>
</tr>
<tr>
<td>SOCT 101IN-Intr to Sociology</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 296-Towne's Harvest Pracicum</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 298-Internship</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>29</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDFC 239-Contemp Cons Issues</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 226-Food Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 227-Food Fundamentals Lab.</td>
<td>2</td>
</tr>
<tr>
<td>ENSC 110-Land Resource &amp; Environmental Sciences</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 101IN-Unseen Universe: Microbes</td>
<td>4</td>
</tr>
<tr>
<td>AGSC 341-Field Crop Production</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>BIOB 318-Biometry</td>
<td>3</td>
</tr>
<tr>
<td>STAT 2106Q-Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>HORT 245-Plant Propagation</td>
<td>3</td>
</tr>
<tr>
<td>NASX 232D-Montana Indians: Cult,Hist,Current Issues</td>
<td>3</td>
</tr>
<tr>
<td>PSCT 2930D-Intr Info Relations</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>30</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECHM 205-Energy &amp; Sustainability</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 371-Res Methods</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 322-Food Service Systems Mgmt</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 395-Practicum: Quantity Foods Prod &amp; Mgmt.</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 351-Nutrition &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 243IN-Soils</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 428-Sustainable Cropping Systems</td>
<td>3</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td></td>
</tr>
<tr>
<td>AGBE 315-Ag in Global Context</td>
<td>3</td>
</tr>
<tr>
<td>AGED 353-Coop Bus Princ &amp; Prac</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 222-Livestock in Sustainable Syst.</td>
<td>3</td>
</tr>
<tr>
<td>HORT 343-Com Prac Plant Production</td>
<td>3</td>
</tr>
<tr>
<td>HORT 345-Organic Market Gardening</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>30</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 429-Small Bus Entre Food Hlth</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 469-Com Soc Entrepreneurian</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 321-Nutrition in the Lifecycle</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>SFBS 445R-Culinary Marketing</td>
<td>3</td>
</tr>
<tr>
<td>Farm to Table</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 451R-Sustainable Food Systems</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 498-Internship</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 499-Senior Thesis/Capstone</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>NASX 415-Native Food Systems</td>
<td>3</td>
</tr>
<tr>
<td>PSCT 456-Politics of Food &amp; Hunger</td>
<td>3</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td></td>
</tr>
<tr>
<td>AGBE 337-Agricultural Law</td>
<td>3</td>
</tr>
<tr>
<td>AGED 482-Nonformal Teaching</td>
<td>3</td>
</tr>
<tr>
<td>Methods in Ag</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 463-Health, Ag and Poverty</td>
<td>3</td>
</tr>
<tr>
<td>HORT 337-Veg Production</td>
<td>3</td>
</tr>
<tr>
<td>NRSM 421-Holistic Thought</td>
<td>3</td>
</tr>
<tr>
<td>PSC 406-The Political Economy of Energy</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>30</td>
</tr>
</tbody>
</table>

**AGROECOLOGY OPTION**

**Land Resources and Environmental Sciences**

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 146-Intr to SFBS Seminar</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOB 170IN-Principles of Biological Diversity</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 121-College Algebra</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 145Q-Mathematics for Liberal Arts</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SOCT 101IN-Intr to Sociology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SFBS 296-Towne's Harvest Pracicum</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SFBS 298-Internship</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 101ES-Econ Way Thinking</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NUTR 221ES-Basic Human Nutrition</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ENSC 110-Land Resource &amp; Environmental Sciences</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 121-College Algebra</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 145Q-Mathematics for Liberal Arts</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NASX 232D-Montana Indians: Cult, Hist, Current Issues</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PSCT 250D-Intro to International Rel</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Take two of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGBE 210IS-Econ Ag Business</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ANSC 222-Livestock in Sustainable Syst.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOM 369-Gen Microbiology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOO 302IN-Intro to Enomology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ECNS 204HS-Microeconomics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GPHY 111CS-Intr to Phys Geography</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

**SUSTAINABLE CROP PRODUCTION OPTION**

**Plant Sciences and Plant Pathology**

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 146-Intr to Sust Food/ Bioenergy System</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOB 170IN-Principles Biological Diversity</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ECNS 101ES-Econ Way Thinking</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOB 110CS-Introduction to Plant Biology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENSC 110-Land Resource &amp; Environmental Sciences</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 121-College Algebra</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 145Q-Mathematics for Liberal Arts</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFBS 429-Small Bus Entre Food Hlth</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 469-Com Soc Entrepreneurian</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>SFBS 445R-Culinary Marketing</td>
<td>3</td>
</tr>
<tr>
<td>Farm to Table</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 451R-Sustainable Food Systems</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 498-Internship</td>
<td>3</td>
</tr>
<tr>
<td>SFBS 499-Capstone</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>30</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>CHMY 121IN</td>
<td>Intro to General Chemistry I</td>
</tr>
<tr>
<td>NRSM 101</td>
<td>Natural Resource Conservation</td>
</tr>
<tr>
<td>ANSC 100</td>
<td>Intro to Animal Science</td>
</tr>
<tr>
<td>SUSTAINABLE LIVESTOCK PRODUCTION OPTION</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 318</td>
<td>Biometry</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q</td>
<td>Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGBE 210IS</td>
<td>Econ Ag Business</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 222</td>
<td>Livestock in Sustainable Syst</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 245IN</td>
<td>Soils</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 266</td>
<td>Funct Anatomy Domestic Animal</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 266</td>
<td>Funct Anatomy Domestic Animal, Lab</td>
<td>1</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANSC 205</td>
<td>Intro to Meat Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 233</td>
<td>Livestock Management-Sheep</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 254</td>
<td>Livestock Mgmt-Beef</td>
<td>3</td>
</tr>
<tr>
<td>NRSM 255</td>
<td>Range/Pasture Monitoring</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECHM 205-CS</td>
<td>Energy &amp; Sustainability</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANSC 316</td>
<td>Meat Science</td>
<td>3</td>
</tr>
<tr>
<td>ECHM 205CS</td>
<td>Energy &amp; Sustainability</td>
<td>3</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGBE 320</td>
<td>Animal Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 321</td>
<td>Physiology of Reproduction</td>
<td>4</td>
</tr>
<tr>
<td>ANSC 322</td>
<td>Principles of Animal Breeding/Genetics</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 337</td>
<td>Diseases of Domestic Livestock</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECNS 292</td>
<td>Principles of Macromolecules</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 294</td>
<td>Microtechnics</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGBE 321</td>
<td>Econ of Ag Marketing</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 337</td>
<td>Ag Law</td>
<td>3</td>
</tr>
<tr>
<td>AGBE 354</td>
<td>Ag Finance &amp; Credit Analysis</td>
<td>3</td>
</tr>
<tr>
<td>AGED 355</td>
<td>Coop Bus Prin &amp; Pract</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 325</td>
<td>Marketing</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NRSM 555</td>
<td>Grazing Ecology &amp; Mgmt</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 428</td>
<td>Sustainable Cropping Systems</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 541</td>
<td>Field Crop Production</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 542</td>
<td>Forages</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMKT 242D</td>
<td>Intro to Global Markets</td>
<td>3</td>
</tr>
<tr>
<td>NASR 232D</td>
<td>Montana Indians: Cult, Hist, Curr Issues</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANSC 432</td>
<td>Sheep Management</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 435R</td>
<td>Beef Cattle Management</td>
<td>2</td>
</tr>
</tbody>
</table>

| PROGRAMS OF INSTRUCTION – ENGINEERING |

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMGT 469</td>
<td>Com Soc Entrepreneurialism</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 45R</td>
<td>Sustainable Food Systems</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 45R</td>
<td>Culinary Marketing</td>
<td>3</td>
</tr>
<tr>
<td>Farm to Table</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Take five of the following:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NASR 415</td>
<td>Native Food Systems</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 436</td>
<td>Politics/Food/Hunger</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 466</td>
<td>Political Econ of Energy</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

| PROGRAMS OF INSTRUCTION – ENGINEERING |

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 123IN</td>
<td>Intro to Organic &amp; Biochem I</td>
<td>4</td>
</tr>
<tr>
<td>NUTR 221CS</td>
<td>Basic Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>NRSM 351</td>
<td>Nutrition and Society</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 401</td>
<td>Integrated Pest Management</td>
<td>4</td>
</tr>
<tr>
<td>AGSC 410</td>
<td>Veterinary Ento</td>
<td>2</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ANSC 410</td>
<td>Veterinary Ento</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 419</td>
<td>Nutrient Cycling</td>
<td>3</td>
</tr>
<tr>
<td>AGSC 410</td>
<td>Integrated Pest Management</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ANSC 432</td>
<td>Sheep Management</td>
<td>3</td>
</tr>
<tr>
<td>ANSC 435R</td>
<td>Beef Cattle Management</td>
<td>2</td>
</tr>
</tbody>
</table>

| COLLEGE OF ENGINEERING |

Dr. Robert J. Marley, Dean, and Director of the Engineering Experiment Station

Dr. Anne K. Camper, Associate Dean for Research and Graduate Studies

Heidi M. Sherick, Assistant Dean for Undergraduate Programs and Diversity

The College of Engineering provides administrative structure and support to the following academic departments and baccalaureate degree programs:

- Department of Chemical & Biological Engineering
  - BS Bioengineering
  - BS Chemical Engineering

- Department of Civil Engineering
  - BS Civil Engineering
  - Bio-Resources Engineering Option
  - Civil Engineering Option
  - BS Construction Engineering Technology

- Department of Computer Science
  - BS Computer Science

- Department of Electrical & Computer Engineering
  - BS Computer Engineering
  - BS Electrical Engineering

- Department of Mechanical & Industrial Engineering
  - BS Industrial Engineering
  - BS Mechanical Engineering
  - BS Mechanical Engineering Technology
The College of Engineering offers six minors:
- Aerospace
- Computer Science
- Computer Engineering
- Electrical Engineering
- Mechatronics
- Military Studies

The College of Engineering provides administrative support for the Reserve Officers’ Training Corps (ROTC) programs in the Air Force and Army. A complete description of each individual degree program is provided later in this section under the heading of the appropriate department. The following is a highlight of the mission, goals, and objectives of the College of Engineering and applies to all of its programs.

College Mission
The College of Engineering will serve the State of Montana and the nation by:
- Fostering lifelong learning
- Integrating learning and discovery
- Developing and sharing technical expertise
- Empowering students to be tomorrow’s leaders

College Vision
The College of Engineering at Montana State University will be an outstanding collaborative community that achieves excellence in learning, innovation, discovery, and knowledge transfer. To realize this vision, the college will:
- Leverage shared interests and talents among faculty and students in order to create knowledge across disciplinary lines.
- Effectively and efficiently balance breadth with depth in undergraduate education in order to prepare students for the global workforce.
- Be a leader in innovation and discovery in our identified focus areas.
- Successfully integrate research and innovation into the learning experience of both undergraduate and graduate students.
- Be recognized for the level of knowledge transfer to industry, governments, and citizens in the state of Montana.

College Core Values
Members of the MSU College of Engineering community approach all of their work with the following deeply held core values:
- Life-long learning. The college is a community that believes in and fosters life-long learning in all of its members—undergraduate students, graduate students, faculty, and staff. Life-long learning also extends beyond the college community to state and national constituencies.
- Knowledge Discovery. At the heart of the college community’s activities are knowledge discovery and dissemination and the creativity that accompanies these activities. We believe that knowledge discovery informs and enriches the life-long learning of the entire college community.
- Collaboration. We believe that collaboration and collegiality both inside and outside of our college community enrich all college activities.
- Inclusiveness. The college is a community that welcomes and encourages diverse points of view and backgrounds, believing that this inclusiveness enriches our creative learning environment.
- Professionalism. The College of Engineering community approaches all activities with a high degree of professionalism, working with integrity, honesty, and commitment to excellence.

College Goals
The goals of the College of Engineering are as follows:
- Prepare the MSU COE community to engage effectively with the global community.
- Build on growing college synergy and increase cross-disciplinary activities at every level of the COE community, including not only faculty research and creative activity but also the student experience.
- Establish the college as a leader in the state and national technological community.

Engineering Program
Educational Objectives, Assessment, and FE Exam Requirement
ABET, Inc., the recognized accreditor for college and university programs in applied science, computing, engineering, and technology, has established standards and criteria for the accreditation of undergraduate engineering and engineering technology programs. Individual programs have program educational objectives that are consistent with ABET and with the needs of the program’s constituents.

Assessment of program objectives is a dynamic and ongoing process. One assessment strategy is to examine the results of the Fundamentals of Engineering (FE) examination. The FE exam is a nationally normalized test that is required of graduating engineering seniors at MSU. Students are required to enroll in EGEN 488 (Fund of Engineering Exam), take the FE Exam, and make an honest and serious effort to pass the exam. Review sessions are available leading up to the exam.

For a complete and up-to-date listing of all program specific objectives as well as other educational outcomes assessment strategies, please refer to the College of Engineering web site at http://www.coe.montana.edu.

Student Performance and Retention
Students admitted to MSU will automatically be eligible for admission to College of Engineering (COE) programs. The College of Engineering is committed to retaining each admitted student within the COE and MSU, and to helping them achieve their fullest academic potential.

Students are required by Board of Regents policy to achieve a “C-” or better grade in each class used to satisfy the COE Bachelor of Science degree requirements. If repeating a course is necessary in order to meet this requirement, students are expected to repeat the course successfully (“C-” or better) prior to taking a follow-on course for which the repeated course is a prerequisite.

Accreditation
The following engineering programs are specifically accredited by the Engineering Accreditation Commission of Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone (410) 347-7700:
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Industrial Engineering
- Mechanical Engineering
Because the Bioengineering degree is new it has not yet gone through an accreditation review process. The program will seek accreditation in the near future.

The following engineering technology programs are accredited by the Technology Accreditation Commission of Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone (410) 347-7700:

- Construction Engineering Technology
- Mechanical Engineering Technology

The Computer Science program is accredited by the Computing Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone (410) 347-7700.

College of Engineering Program Fee

Engineering education is more expensive to deliver than education in most other disciplines, both at MSU and nationally. MSU strives to develop and maintain modern laboratories that benefit student learning. Because of increased equipment and maintenance costs, students enrolled within the College of Engineering (COE) at Montana State University in Bozeman are charged a program-wide fee with the following primary goals:

1. Help ensure that College programs maintain quality instructional laboratories, technical infrastructure within the College, and the ability to conduct staff-intensive program assessment (required for professional accreditation).
2. Help meet the higher cost of engineering education by augmenting existing state funds.
3. Help to support and increase student access to advanced technology within each of the COE programs.
4. Greatly increase the College’s ability to leverage private support for our programs, such as through matching grants.

Other engineering course fees (with the exception of CET and Fundamentals of Engineering exam fees) have been eliminated and the expenses formerly covered by these individual course fees will now be recovered from the program fee. The following fee structure is in place:

- $81 per semester for Freshmen (flat rate).
- $116 per semester for Sophomores through graduate level (flat rate).
- $46 flat rate for summer session collected once (one or more sessions), any level of student.

For more information about the Engineering Program Fee please refer to the College of Engineering web site http://www.coe.montana.edu.

Total Credit Requirements

Montana State University requires a minimum of 120 semester credits for graduation. Of these, 42 credits must be in upper division courses (numbered 300 and above). All degree programs within the College of Engineering meet or exceed these standards, and specific requirements for each are tabulated in the sections describing these programs.

General Education Core

More than ever, engineers, technologists, and computer scientists must possess communication skills and an awareness of how design and policy decisions affect society. These topics plus other general education offerings are provided through a coherent program of general education required by all College of Engineering degree programs. University core requirements for communication, mathematics, and sciences are met or exceeded by all College of Engineering degree programs, and the College of Engineering encourages students’ participation in the broader areas of humanities, social sciences, arts, and diversity. These areas are designed to complement the technical content of the degree program.

College of Engineering students who are exempt from the Core 2.0 College Writing requirement because of their ACT or SAT scores are required to take a college-level writing class to fulfill the writing requirement. College-level writing classes include WRIT 201, WRIT 221, UH 201US, UH 202IH, or a departmentally approved substitute.

Electives

The engineering, technology, and computer science curricula as tabulated include “core curricula and elective” credits. Courses are selected by the student and advisor to fulfill block requirements in the core curriculum areas as well as professional electives. The student may also petition her or his department to include up to six advanced military science credits in her or his professional elective program.

Design Projects with Student Teams

The College of Engineering provides opportunities for students to engage in design projects, including working in multidisciplinary design teams.

Most programs require students to take EGEN 310, Multidisc Engineering Design, which is a multi-disciplinary design course. This course gives students the background and skills that they need to be successful in their senior capstone design course and also helps students understand the complexities and benefits of working with students from other engineering disciplines, as well as computer science.

In the senior capstone course, students generally work with other students from their own discipline to solve an engineering design problem. A typical design project involves a student team synthesizing a solution to meet the needs of a customer, which could be an engineering company, a faculty member, or a governmental organization.

The student design team presents results in written and oral formats, and in many cases, the result includes a working prototype. All engineering and computer science students engaged in these design projects work in student design teams based on the needs to accomplish the goals of the project.

Capstone design projects contribute to the educational objectives of the academic programs by engaging seniors in challenging, team-oriented, real-world design efforts. The teams include the students and professionals from the sponsors as well as faculty supervisors for each project. At the conclusion of their design experience, the students will have accomplished the following:

1. Designed and developed information, or built a prototype as necessary, for a system, component, or process to meet design objectives.
2. Used creativity in meeting the design objectives.
3. Independently learned new information and applied this information to meet design objectives.
4. Worked effectively as a design team member.
5. Prepared and presented an effective written and/or oral technical report to the sponsor.
6. Accomplished a logical and practical sequence of safe and workable operations while meeting the design objectives.
7. Provided a global, societal, and economic context to the design as appropriate for the project.

Cooperative Education/Internship

The College of Engineering encourages students to gain professional experience related to their discipline that can complement and enhance their academic studies. To help gain professional experience, departments within the College operate a variety of cooperative education and internship programs. Most College of Engineering departments partner with regional and national companies to provide a structured program for qualified students. Interested students should contact Career Services and their respective department offices for more information about these programs.

Engineering Minority Program (EMPower)

The College of Engineering at MSU is committed to equal access to educational opportunities for all students. This commitment has led to nationally recognized efforts to help provide such opportunities. The Engineering Minority Program (known as EMPower) provides enrichment programs for pre-college students and focuses on customized retention plans and support of social and academic networks including scholarships for underrepresented minorities.

The Designing Our Community (DOC) Program, which is part of EMPower, seeks to enhance outreach, recruitment, and retention to increase the number of Native Americans who graduate from MSU with engineering or computer science degrees. The College of Engineering has targeted the enhancement of Native American education as a top priority over the next 5 years. Our vision is to become firmly established as the premier institution of choice for Native American students in engineering, engineering technology, and computer science in the northern Rockies and the northern Great Plains regions and to be a successful partner with Native American communities in developing the future workforce.

Chemical and Biological Engineering
Department of Chemical & Biological Engineering
http://www.chbe.montana.edu/

The Department of Chemical and Biological Engineering (CHBE) prepares students with the knowledge and skills to contribute to society and their profession. The basis of both chemical and biological engineering is the useful transformation of materials from one form to another. This transformation may be brought about by chemical or biological processes. Both chemical and biological engineers often function as process engineers. A typical process involves chemical or biological reactions followed by separation of desired products. But there are distinct differences in the design and operation of chemical and biological systems, and the chemical engineering and bioengineering degrees allow students to focus on either area of specialization. Both fields are continuously developing as today’s research efforts create exciting new opportunities. Chemical engineers practice in a variety of fields: chemical manufacturing and petroleum refining, waste minimization and environmental engineering, materials and microelectronics, pharmaceuticals, bioengineering and biomedicine, and many others. Biological engineers work in many of the same areas: environmental engineering, materials, pharmaceuticals, Bioengineering and biomedicine and the list will continue to expand as the field develops.

The outcome of the undergraduate program in chemical engineering is an accredited B.S. Ch.E. degree. We anticipate seeking accreditation for the bioengineering degree in the near future.

Our program objectives can be stated as follows:
Our graduates:
• will be confident in their ability to apply chemical or bioengineering fundamentals
• will be proactive problem solvers
• will pursue lifelong learning
• will be effective communicators
• will be effective team members
• will be highly ethical engineering professionals

Specific educational objectives for all engineering students are stated in the College of Engineering portion of this document.

The Department provides graduate programs that lead to masters degrees in chemical engineering and environmental, as well as the PhD in Engineering, with chemical engineering and environmental engineering options. The graduate program complements students' undergraduate experience by providing opportunities for advanced study, undergraduate research, and cooperative education experience. The Department serves the State of Montana and the nation through education, research, and service, while encouraging diversity in the student population, to meet the mission of Montana State University and the College of Engineering.

The preparation of men and women competent to develop, design, and operate new chemical or biological systems, or to perform the research and development to improve existing products and processes, is a comprehensive process. Thus the curricula in chemical engineering and bioengineering are founded on the study of engineering principles of basic science, particularly chemistry, physics, biology, and mathematics. Safety and concern for the environment and society must be overriding concerns to chemical and bioengineering practitioners, and developing this awareness is another aspect of the Department's educational goals. Both chemical and biological engineers typically work as teams of professionals, sharing expertise and knowledge for greater achievement, so teamwork and communication are emphasized. The following curricula have been developed to provide these skills through faculty members who have extensive knowledge and experience in the field.
Curricula in the Department of Chemical and Biological Engineering

BIOENGINEERING

The curriculum is 128 credits comprised of a Basic Program plus Electives which students select to meet both University Core requirements and requirements of the Bioengineering degree.

Student Performance and Retention Requirements: Students starting their academic program in the fall of 2005 or later are required by Board of Regents policy to achieve a C- or better grade in each class used to satisfy the Bachelor of Science degree requirements. Moreover, students must achieve a C- or better grade in M 171, 172, 273, 274, CHMY 141, 143, 211, EGEN 102, ECHM 215, EBIO 226, University Seminar, and College Writing prior to taking follow-on courses.

Basic Program

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>1st Semester</th>
<th>2nd Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIO 100-Intro to Biological Engineering</td>
<td>F</td>
<td>S</td>
</tr>
<tr>
<td>EGEN 102-Intro to Engineering</td>
<td>F</td>
<td>S</td>
</tr>
<tr>
<td>Computer Applications</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 171Q-Calculus I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 172Q-Calculus II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Us or W Core course</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Univ Core Electives (IA, IH, IS or D)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>1st Semester</th>
<th>2nd Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 211-Elements of Organic Chemistry</td>
<td>F</td>
<td>S</td>
</tr>
<tr>
<td>ECHM 215-Elem Prin of Chemical Engr I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EBIO 216-Elementary Prin of Bioengineering</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ECHM 321-Chemical Engr Fluid Mechanic Operations</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 273Q-Multivariable Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 274-Intro to Differential Equations</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PBHS 220-Gen &amp; Mod Phys I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BROM 309-General Microbiology</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>1st Semester</th>
<th>2nd Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 380-General Biochemistry</td>
<td>F</td>
<td>S</td>
</tr>
<tr>
<td>BIBM 775-Genetics</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>EMAT 251-Materials Structures and Properties</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EBIO 324-Bioengineering Transport</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EBIO 438-Bioprocess Engineering</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EBIO 439-Downstream Processing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EGEN 310R-Multidisc Engineering Design</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EGEN 350-Applied Engr Data Analysis</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>PHYS 222-Gen &amp; Mod Phys II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Univ Core Electives (IA, IH, IS or D)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>1st Semester</th>
<th>2nd Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECHM 215-Elem Prin of Chemical Engr I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHMY 211-Elements of Organic Chemistry</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>M 273Q-Multivariable Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 274-Intro to Differential Equations</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PBHS 222-Gen &amp; Mod Phys II</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

A minimum of 128 credits is required for graduation; 42 of which must be in courses numbered 300 and above.

Focus Areas in Bioengineering

Focus Areas are lists of suggested technical electives for students who wish to study in an area of specialization. The Focus Areas in bioengineering include:

- Biomedical Engineering
- Environmental Engineering
- Bioprocess Engineering
- Food Engineering

CHEMICAL ENGINEERING

The curriculum is 128 credits comprised of a Basic Program plus Electives which students select to meet both University Core requirements and requirements of the Chemical Engineering degree.

Student Performance and Retention Requirements: Students starting their academic program in the fall of 2005 or later are required by Board of Regents policy to achieve a C- or better grade in each class used to satisfy the Bachelor of Science degree requirements. Moreover, students must achieve a C- or better grade in M 171, 172, 273, 274, CHMY 141, 143, 211, EGEN 102, ECHM 215, EBIO 216, University Seminar, and College Writing prior to taking follow-on courses.

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>1st Semester</th>
<th>2nd Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECHM 100-Intro to Chemical Engineering</td>
<td>F</td>
<td>S</td>
</tr>
<tr>
<td>EGEN 102-Intro to Engineering Computer Applications</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 171Q-Calculus I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 172Q-Calculus II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Us or W Core course</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Univ Core Electives (IA, IH, IS or D)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>1st Semester</th>
<th>2nd Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMAT 251-Materials Structures and Properties</td>
<td>F</td>
<td>S</td>
</tr>
<tr>
<td>ECHM 215-Elem Prin of Chemical Engr I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHMY 211-Elements of Organic Chemistry</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>1st Semester</th>
<th>2nd Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECHM 215-Elem Prin of Chemical Engr I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHMY 211-Elements of Organic Chemistry</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>M 273Q-Multivariable Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 274-Intro to Differential Equations</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PBHS 222-Gen &amp; Mod Phys II</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

A minimum of 128 credits is required for graduation; 42 of which must be in courses numbered 300 and above.

Focus Areas in Chemical Engineering

Focus Areas are lists of suggested technical electives for students who wish to study in an area of specialization. The Focus Areas in Chemical Engineering include:

- Process & Product Engineering
- Biochemical Engineering
- Environmental Engineering
- Materials Engineering
- Dual Degree Program in Bioengineering

In partnership with Istanbul Technical University (ITU), the department offers a dual degree program in Bioengineering intended for Turkish students enrolled at ITU. Students in the program complete unique coursework in Bioengineering at both campuses-coursework that neither campus alone can offer. Students are resident at ITU during years 1 and 3 and at MSU during years 2 and 4, and graduates receive degrees from both institutions. Detailed curricular requirements are available from the department.
Civil Engineering

Department of Civil Engineering
http://www.coe.montana.edu/ce/

Montana State University’s Department of Civil Engineering anticipates that the engineering and construction community will evolve quickly with several very fundamental precepts for success. Among these is the premise that the engineers and constructors of the future will continue to rely on fundamental engineering science and contemporary computational tools to guide their choices. We therefore choose to focus on fundamental engineering basics and the application of modern engineering tools. Our civil and environmental engineering programs will be acknowledged for their strong emphasis and rigor in engineering science, design, and applications. Our construction programs will be acknowledged for their emphasis on engineering and management skills and the application of those skills to the construction industry. The emphasis of these programs will continue to be preparation of students for professional practice in the engineering and construction industries.

Incorporating our vision into the traditional mission of a land grant institution leads to a strong emphasis on undergraduate education. However, in making this a substantial portion of our mission, we must also look beyond the undergraduate classroom. To ensure a quality faculty, and up-to-date curricula, we must ensure a vibrant broad-based graduate program at the master’s level and a smaller subset of specialty areas at the doctoral level. A strong master’s program also positions the department favorably for the possibility of future changes in professional degree requirements and is consistent with our vision for education at MSU. The graduate program is essential to attract good faculty and provide for their professional development, and to provide opportunities for students interested in study beyond the baccalaureate degree.

Mission

- Foremost, we will provide undergraduate education founded on a rigorous treatment of engineering fundamentals coupled with modern engineering tools. We see competency in mathematics, physical science, and engineering mechanics, as crucial to our mission.
- Provide graduate education opportunities in a majority of traditional civil engineering areas.
- The department will maintain sufficient breadth to provide post-baccalaureate education focused on professional practice.
- The department will provide graduate opportunities in a subset of focus areas coupled to vibrant research programs with sound external funding.

Civil Engineering

Civil Engineers design and construct facilities which improve the welfare and raise the living standards of people. These installations are usually permanent and expensive; each one is unique, offering challenging opportunities for ingenuity and creative design. A registered civil engineer is a professional with legal responsibilities and authority. Civil Engineering graduates enjoy splendid opportunities for employment in Montana, the Pacific Northwest, and the rest of the nation.

The following sub-areas comprise the field of civil engineering: environmental engineering for water and wastewater treatment, solid and toxic waste handling, and air and water pollution problems; geotechnical engineering for making use of soil, rock, and ice as foundation materials; structural engineering for buildings, bridges, dams, piers, towers, and other erected structures; transportation engineering for highways, railroads, airports, and pipelines; water resources engineering for water supply, irrigation, flood control, aquatic habitat improvement, groundwater management, and hydroelectric power generation; construction of engineered facilities; and engineering measurements, which include surveying, photogrammetry, and mapping.

The Civil Engineering Bachelor of Science Program is a traditionally structured program that provides graduates with a strong background in math, basic sciences and engineering mechanics, and prepares graduates to become registered professional engineers capable of practicing civil engineering in the areas of environmental, geotechnical, structural, transportation and water resources engineering. The background of graduates that select the Bio-Resources option is focused on soil, water resources and environmental concerns. The educational objectives of the Civil Engineering Bachelor of Science Program describe what graduates can expect to accomplish during the first years after graduation.

All graduates can expect to be able to:
- enter the profession of Civil Engineering and advance in the profession to become registered professional engineers and leaders in the field of Civil Engineering.
- work on multi-disciplinary teams and effectively communicate with Civil Engineers of various sub-disciplines, architects, contractors, the public and public agents, scientists and others to design and construct Civil Engineering projects.
- begin to develop expertise in one of the sub-disciplines of Civil Engineering and engage in the lifelong learning necessary to advance in the Civil Engineering profession;
- contribute to society and the Civil Engineering profession through involvement in professional related and/or other service activity, and
- conduct their affairs in a highly ethical manner holding paramount the safety, health and welfare of the public and striving to comply with the principles of sustainable development.

Some graduates can expect to be able to:
- enter the surveying profession and become licensed to practice surveying;
- begin careers in the construction industry;
- or earn advanced degrees in Civil Engineering or other fields.

Courses in the first two years of the program develop a student’s mathematical skills and understanding of the physical principles that underlie the practice of civil engineering. Engineering science courses in the second, third, and fourth years develop the student’s ability to apply mathematics and basic scientific principles to the solution of practical engineering problems. The third year student develops a broad perspective of the field and establishes the foundation for professional practice and
Students are encouraged to take the course, is used to administer the exam. The Fundamentals of Engineering Exam), a zero-credit registration. EGEN 488(Fundamentals of Engineering), and Retention Requirements prior to advancement in their degree program. This means that students cannot enroll in advanced courses until a suite of key entry-level courses is completed at a minimum performance level. The following mechanisms will be used in the Student Performance and Retention Initiative efforts:

1. Students will be required to successfully complete a suite of key courses (marked with an *) prior to taking any course from a select list of advanced courses (marked with a †), and must attain at least a C- in each of the key courses. In addition, each key course can be repeated at most once.

2. Once the suite of key courses is satisfactorily completed, students are allowed to advance in their degree program. Intentional attempts by a student to circumvent the Student Performance and Retention Requirements will be considered academic misconduct.

3. Students who have difficulty meeting these requirements will work with their advisor to discuss changes that may enhance their academic performance.

Curricula in the Department of Civil Engineering

CIVIL ENGINEERING

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 141-College Chemistry I *</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 145-College Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 171Q-Calculus I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 172Q-Calculus II *</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EGEN 115-Engineering Graphics</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EGEN 116-Engineering Graphics Lab</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PHSX 220-Physics I †</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>(Includes University Seminar and College Writing*)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMGT 205—Management Communication Fundamentals</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WRIT 201—College Writing II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WRIT 221—Intermediate Tech Writing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>UH 202IH—Text &amp; Critics: Imagination</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOB 160—Principles of Biology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ERTH 101IN—Intro to Physical Geology</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>GPHY 284—Intro to GIS Science &amp; Cartography</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ENSC 245—Soils</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BICT 102IN Unseen Universe: Microbes</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CE 201—Surveying</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ECIV 202—Appl Analysis/Tech Communication</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>EGEN 201-Engineering Mechanics: Statistics *</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EGEN 202-Engineering Mechanics: Dynamics †</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EGEN 205—Mechanics of Materials †</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGEN 350—Applied Engr Data Analysis †</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>STAT 332—Statistics for Scientists &amp; Engineers †</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 172Q—Multivariable Calculus *</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 274—Intro to Differential Equations</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PHSX 222-Physics II</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Graduating students are required to take the Fundamentals of Engineering exam as the first step toward professional registration. EGEN 488(Fundamentals of Engineering Exam), a zero-credit course, is used to administer the exam. Students are encouraged to take the discipline-specific version. This examination is administered by the National Council of Examiners for Engineering and Surveying (NCEES). Students planning to take the comprehensive examination on surveying fundamentals as the initial step in becoming licensed as a registered land surveyor should review the education requirements for admission to this examination. Students electing to fulfill the educational requirements for registration both as a land surveyor and engineer must complete the requirements for a B.S. in Engineering/Land Surveying Minor.

Graduate work leading to the Master of Science and Doctor of Philosophy degrees is recommended for qualified students desiring advanced professional attainment or careers in academic fields. The Civil Engineering Department offers a Master of Science degree targeted at qualified students interested in an advanced professional degree, for which the civil engineering work place is currently seeing an increased demand. The program consists of a concurrent schedule of undergraduate and graduate classes starting the senior year, allowing a Bachelor of Science degree and a Master of Science degree to be obtained in a total of ten semesters of study.

Student Performance and Retention Requirements

Freshmen or transfer students entering the Civil Engineering Department must satisfy our Student Performance and Retention Requirements prior to advancement in their degree program. This means that students cannot enroll in advanced courses until a suite of key entry-level courses is completed at a minimum performance level. The following mechanisms will be used in the Student Performance and Retention Initiative efforts:

1. Students will be required to successfully complete a suite of key courses (marked with an *) prior to taking any course from a select list of advanced courses (marked with a †), and must attain at least a C- in each of the key courses. In addition, each key course can be repeated at most one time.

2. Once the suite of key courses is satisfactorily completed, students are allowed to advance in their degree program. Intentional attempts by a student to circumvent the Student Performance and Retention Requirements will be considered academic misconduct.

3. Students who have difficulty meeting these requirements will work with their advisor to discuss changes that may enhance their academic performance.
### Programs of Instruction - Engineering

<table>
<thead>
<tr>
<th>Semester</th>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior Year F S</td>
<td>ECV 308-Construction Practice†</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ECV 312-Structures I †</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ECV 315-Structures II †</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ECV 320-Geotechnical Engineering †</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ECV 331-Engineering Hydrology †</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>ECV 332-Engineering Hydrodynamics †</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>EENV 340-Principles of Environmental Engineering †</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ECV 350-Transportation Engineering †</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EGEN 335-Fluid Mechanics †</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EGEN 335-Engineering Thermodynamics †</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EGEN 325-Engineering Economics Analysis†</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EGEN 310R-Multidisciplinary Design</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EMAT 251-Materials Structures and Properties</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EEEF 250-Circuits, Devices, and Motors</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>EMEC 320-Thermodynamics I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EGEN 324-App lied Thermodynamics</td>
<td>3</td>
</tr>
</tbody>
</table>

| Senior Year F S | ECV 401-Civil Engineering Practice and Ethics † | 1 |
| | ECV 409R-Civil Engineering Design † | 2 |
| | ECV 499R-GE Engineering Design † | 2 |
| | EGEN 488-Fundamentals of Engineering Exam † | 0 |
| | Analytical Elective (Contact CE Dept for an approved list of courses) | 3 |
| | University Core and Electives | 9-12 |
| | | 15-14 |

* Key courses
† Advanced courses

### University Core Electives for Civil Engineering majors must include one of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 101S-Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 242D-Intro to International Business</td>
<td>3</td>
</tr>
<tr>
<td>PSCJ 210S-Introduction to American Government</td>
<td>3</td>
</tr>
<tr>
<td>PSCJ 214S-Principles of Political Science</td>
<td>3</td>
</tr>
<tr>
<td>PSCJ 290D-Intro to International Relations</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives must include: 12 credits of approved professional electives at the 300 level or above. A minimum of 2 courses in CE and not more than 5 courses in any one civil engineering sub-area are required. A maximum of 4 credits total from Individual Problems, Internships (max. 2 cr.), and Undergraduate Research may be counted toward professional electives. The professional electives program must contain a minimum of 2 design intensive courses. Students must successfully complete all key courses prior to taking any professional electives. A maximum of 5 credits/hours may be included from a completed MSU minor, a prior or concurrent BS/BA degree in another major, or courses in a completed MSU Honors Program. A student may petition to include other senior or graduate level courses consistent with the degree program but not listed here (requires Academic Advisor and Department Head approval).

A minimum of 128 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

### Professional Elective Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 361-Geological Principles Surveying</td>
<td>3</td>
</tr>
<tr>
<td>CE 362-Drainage Land Survey System</td>
<td>3</td>
</tr>
<tr>
<td>CE 363-Geodetic Survey Computations</td>
<td>3</td>
</tr>
<tr>
<td>CE 405-Photogrammetry</td>
<td>3</td>
</tr>
<tr>
<td>CE 464-Geometric Design in Surveying</td>
<td>3</td>
</tr>
<tr>
<td>CE 467-Const Estimating &amp; Bidding Practice</td>
<td>3</td>
</tr>
<tr>
<td>CE 491-Environmental Planning and Scheduling</td>
<td>3</td>
</tr>
<tr>
<td>CE 414-Steel Design</td>
<td>3</td>
</tr>
<tr>
<td>CE 415-Design of Masonry Structures</td>
<td>3</td>
</tr>
<tr>
<td>CE 416-Design of Wood and Timber Structures</td>
<td>3</td>
</tr>
<tr>
<td>CE 484-Reinforced Concrete Design</td>
<td>3</td>
</tr>
<tr>
<td>CE 490-Geodesign &amp; Foundation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CE 425-Geotechnical Structures</td>
<td>3</td>
</tr>
<tr>
<td>CE 431-Open Channel Hydraulics</td>
<td>3</td>
</tr>
<tr>
<td>CE 435-Closed conduit Hydraulics</td>
<td>3</td>
</tr>
<tr>
<td>CE 450-Geotechnical Systems Planning</td>
<td>3</td>
</tr>
<tr>
<td>CE 451-Highway Pavements</td>
<td>3</td>
</tr>
<tr>
<td>CE 452-Traffic Engineering and ITS</td>
<td>3</td>
</tr>
<tr>
<td>CE 454-Transportation Planning</td>
<td>3</td>
</tr>
<tr>
<td>CE 456-Highway Geographic Design</td>
<td>3</td>
</tr>
<tr>
<td>CE 492-Individual Projects</td>
<td>1-3</td>
</tr>
<tr>
<td>CE 498-Internship</td>
<td>2</td>
</tr>
<tr>
<td>CE 490R-Undergraduate Research</td>
<td>1-4</td>
</tr>
<tr>
<td>EENV 325-Applied Engineering Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>EENV 434-Geosurveyor Supply &amp; Remediation</td>
<td>3</td>
</tr>
<tr>
<td>EENV 440-Water Chemistry for Environmental Engineers</td>
<td>3</td>
</tr>
<tr>
<td>EENV 441-Natural Treatment Systems</td>
<td>3</td>
</tr>
<tr>
<td>EENV 443-Air Pollution Control</td>
<td>3</td>
</tr>
<tr>
<td>EENV 445-Hazardous Waste Treatment</td>
<td>3</td>
</tr>
<tr>
<td>EENV 447-Hazardous Waste Management</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 415-Environmental Engineering Dynamics</td>
<td>3</td>
</tr>
</tbody>
</table>

### BIO-RESOURCES ENGINEERING OPTION

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECV 202--Industrial Technology</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 141--Chemistry I*</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 143--Chemistry II*</td>
<td>4</td>
</tr>
<tr>
<td>M 171Q-Calculation I*</td>
<td>4</td>
</tr>
<tr>
<td>M 172Q-Calculation II*</td>
<td>4</td>
</tr>
<tr>
<td>EGEN 115--Engineering Graphics*</td>
<td>1</td>
</tr>
<tr>
<td>EGEN 116--Engineering Graphics Lab</td>
<td>1</td>
</tr>
<tr>
<td>PHSX 220--Physics I*</td>
<td>3</td>
</tr>
<tr>
<td>University Core</td>
<td>6</td>
</tr>
<tr>
<td>(Includes University Seminar and College Writing*†)</td>
<td>3</td>
</tr>
</tbody>
</table>

* Key courses
† Advanced courses

### University Core Electives for Civil Engineering/
Bio-Resources Option majors must include one of the following courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 101S-Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 242D-Intro to International Business</td>
<td>3</td>
</tr>
<tr>
<td>PSCJ 210S-Introduction to American Government</td>
<td>3</td>
</tr>
<tr>
<td>PSCJ 214S-Principles of Political Science</td>
<td>3</td>
</tr>
<tr>
<td>PSCJ 290D-Intro to International Relations</td>
<td>3</td>
</tr>
</tbody>
</table>

### Take one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGEN 350--Applied Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STAT 352--Statistics for Scientists</td>
<td>3</td>
</tr>
<tr>
<td>M 272Q-Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>M 274--Intro to Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

**Note:** MSU majors must have 30 credits in courses numbered 300 or above.

---

**Junior Year F S**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>BIOB 170--Organismal Biology</td>
<td>4</td>
</tr>
<tr>
<td>ENSC 272--Water Resources</td>
<td>3</td>
</tr>
<tr>
<td>ENSC 274--Soils</td>
<td>3</td>
</tr>
<tr>
<td>NRSM 240--Natural Resources Ecology</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 284--Intro to GIS Science and Cartography</td>
<td>3</td>
</tr>
<tr>
<td>PHSS 222--Physics I</td>
<td>4</td>
</tr>
<tr>
<td>BIOM 360--General Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>ECV 308--Construction Practice</td>
<td>3</td>
</tr>
<tr>
<td>ECV 312--Structures I</td>
<td>3</td>
</tr>
<tr>
<td>ECV 320--Geotechnical Engineering Design</td>
<td>3</td>
</tr>
<tr>
<td>ECV 332--Engineering Hydrodynamics</td>
<td>2</td>
</tr>
<tr>
<td>EENV 341--Natural Treatment Systems</td>
<td>3</td>
</tr>
<tr>
<td>EENV 441--Air Pollution Control</td>
<td>3</td>
</tr>
<tr>
<td>EENV 443--Hazardous Waste Treatment</td>
<td>3</td>
</tr>
<tr>
<td>EENV 447--Hazardous Waste Management</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 415--Environmental Engineering Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 435--Fluid Dynamics</td>
<td>3</td>
</tr>
</tbody>
</table>

**Senior Year F S**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECV 490R--Undergraduate Research</td>
<td>1-4</td>
</tr>
<tr>
<td>EENV 325--Applied Engineering Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 335--Civil Engineering Design</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 411--Natural Treatment Systems</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 443--Air Pollution Control</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 445--Hazardous Waste Treatment</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 447--Hazardous Waste Management</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 415--Environmental Engineering Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 435--Fluid Dynamics</td>
<td>3</td>
</tr>
</tbody>
</table>

**University Core and Electives**

<table>
<thead>
<tr>
<th>Credits</th>
<th>17-19 17</th>
</tr>
</thead>
</table>

---

**Senior Year F S**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGEN 350--Applied Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STAT 352--Statistics for Scientists</td>
<td>3</td>
</tr>
<tr>
<td>M 272Q-Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>M 274--Intro to Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

**University Core Electives for Civil Engineering/
Bio-Resources Option majors must include one of the following courses:**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 101S-Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>BMKT 242D-Intro to International Business</td>
<td>3</td>
</tr>
<tr>
<td>PSCJ 210S-Introduction to American Government</td>
<td>3</td>
</tr>
<tr>
<td>PSCJ 214S-Principles of Political Science</td>
<td>3</td>
</tr>
<tr>
<td>PSCJ 290D-Intro to International Relations</td>
<td>3</td>
</tr>
</tbody>
</table>

**Additional requirements:** Professional electives must include 12 credits total with 1 course from the Water Resources Engineering Group and 1 course from the Environmental Engineering Group. A maximum of 4 credits total from Individual Problems, Internships (max. 2 cr.), and Undergraduate Research may be counted toward professional electives. The professional elective program must contain a minimum of 2 design intensive courses. Students must successfully complete all key courses prior to taking any professional electives. A maximum of 3 credit hours may be included from a completed MSU minor, a prior or concurrent BS/BA degree in another major, or courses in a completed...
MSU Honors Program. A student may petition to include other senior or graduate level courses consistent with the degree program but not listed here (requires Academic Advisor and Department Head approval).

A minimum of 128 credits is required for graduation; 42 of these credits must be in courses numbered 590 and above.

**Professional Elective Courses:**  
*Credits*

**Water Resources Engineering Group**  
ECIV 431–Open Channel Hydraulics ..........................3  
ECIV 433–Groundwater Supply and Remediation ..........3  
ECIV 435–Closed conduit Hydraulics .........................3

**Environmental Engineering Group**  
EENV 447–Hazardous Waste Management .............3  
EENV 445–Hazardous Waste Treatment ..................3

**Supporting Topics Group**  
BI0E 370–General Ecology ......................................3  
CE 465–Photogrammetry ........................................2  
ECIV 315–Structure II ............................................3  
ECIV 350–Transportation Engineering ......................3  
ECIV 420–Earth & Foundation Engineering .............3  
ECIV 425–Geotechnical Structures .........................3  
ECIV 499–Internship ..............................................3  
EENV 498–Undergraduate Research .........................3  
EVEN 408–Engineering Internship (EWB) ...............3  
ENSC 345–Soil and Environmental Chemistry ..........3  
ENSC 444–Watershed Hydrology .............................3  
ENSC 453–Soil & Environmental Physics .................3  
ENSC 460–Soil Remediation ....................................3  
ENSC 461–Restoration Ecology ..............................3  
GPHY 384–Adv GIS and Spatial Analysis ...................3

**Construction Engineering Technology**

The Construction Engineering Technology Bachelor of Science Program is a technically rigorous, production oriented, and construction specialty neutral program that prepares graduates to enter and advance to leadership positions in the construction industry. The educational objectives of the Construction Engineering Technology Bachelor of Science Program describe what graduates can expect to accomplish during the first years after graduation.

All graduates can expect to be able to:

- enter the construction industry and advance toward leadership positions in the construction industry,
- work on multi-disciplinary teams and effectively communicate with constructors, architects, engineers, the public and public agents, scientists and others to complete construction projects.
- engage in the life-long learning necessary to advance professionally in the construction field;
- contribute to society and the construction industry through involvement in professional related and/or other service activity, and
- conduct their affairs in a highly ethical manner holding paramount the safety, health and welfare of the public and striving to comply with the principles of sustainable development.

Some graduates can expect to be able to:

- enter the surveying profession and become licensed to practice surveying;
- earn a Construction Management-related masters degree from MSU or other graduate degrees.

The curriculum provides a well rounded, four-year, specialized university education culminating in a Bachelor of Science degree in Construction Engineering Technology (CET). Knowledge of mathematics and physical sciences along with applied courses in business management, law, and human relations form a background to move design, research or planning ideas to construction applications. The graduate has the training and skills provided by direct hands-on experience and has the additional knowledge and capabilities provided by theory and technological fundamentals. The curriculum prepares the student to be largely responsible for the construction of all types of structures, utilities, transportation facilities, and water and wastewater systems.

Emphasis is on current construction applications, surveying, maximizing production, estimating, scheduling, quality control, safety, testing, and field analysis.

Graduates use their skills and abilities to construct transportation systems, utilities, buildings, dams, public health and environmental systems, irrigation, municipal and public works, and also in surveying, mapping, and support of engineering design. Building, industrial, and heavy highway construction are emphasized with particular attention directed toward preparation for employment in management and supervisory positions in both field and office operations.

This curriculum provides the education necessary to work with engineers, architects, contractors, technicians, and owners. The student in this curriculum can be employed as a field supervisor, estimator, scheduler, or superintendent; he or she may progress to the highest levels of management in the construction arena such as project and operations managers. Because effective communication is essential in carrying out management responsibilities, students in this curriculum will be required to demonstrate good oral and written communication skills in their undergraduate studies. Other possible positions are employment with consulting engineers and architects in support activities involving plans and planning, acquisition of design data, surveying, construction inspection for quantity and quality control, sales engineering, plant expansion, and maintenance management activities.

Students planning to take the comprehensive examination on surveying fundamentals as the initial step to becoming licensed as a registered land surveyor should review the educational requirements for admission to this examination. Students who desire both the CET degree and land surveyor registration must carefully arrange their elective courses if they plan to graduate in the normal four years.

Students are required to take the Constructor Qualification Examination Level I (CQE) administered by the American Institute of Constructors (AIC) which must be taken the last semester of graduation. Seniors are eligible to take the national comprehensive examination on engineering fundamentals administered by the Montana Board of Professional Engineers and Land Surveyors, commonly called the Fundamentals of Engineering (FE) examination. Students who plan to take the FE examination are encouraged to take additional selected courses in calculus, dynamics, and thermodynamics.
CONSTRUCTION ENGINEERING TECHNOLOGY

Freshman Year
- CHMY 121N: Intro to Gen Chemistry* 4
- ECNS 101E: Economic Way of Thinking 3
- ECNS 202: Principles of Macroeconomics 3
- M 151Q: Precalculus 4
- M 150Q: Calculus for Technology I* 3
- EGEN 115: Engineering Graphics* 1
- EGEN 116: Engineering Graphics Lab 1
- PHSX 205: College Physics I* 4
- University Core 3
- (Includes University Seminar and College Writing*)

Sophomore Year
- ARCH 241: Building Construction 3
- Take one of the following:
  - BMGT 205: Management 3
  - Communication Fundamentals 3
  - BMGT 205: Management 3
- EGEN 116: Engineering Graphics Lab 1
- University Core 3
- Take one of the following:
  - STAT 216Q: Introduction to Statistics 3
  - EGEN 310R: Multidisciplinary Engineering 3
  - ETCC 302: Soils & Foundations† 4
- University Core 3

Junior Year
- EGEN 311: Applied Mechanics of Fluids 3
- EGEN 312: Engineering Economics 3
- University Core 3
- Take one of the following:
  - ACTG 220: Principles of Mang Accr† 3
  - ACTG 201: Principles of Accounting I 3
- EIND 313: Work Design & Analysis 3
- BFIN 322-Business Finance 3
- BFIN 420: Investments 3
- BMGT 322-Operations Management 3
- BMGT 329-Human Resources Mgmt 3
- BMGT 464-International Management 3

Senior Year
- BGEN 316: Intro to Law 3
- EGEN 456: Civil Engineering 3
- EGEN 457: Capstone: Construction 3
- ETCC 498-Internship 1
- EIND 434: Project & Engineering Management 3
- University Core and Electives 3

Electives must include 7 credits of technical-professional courses of which one must be in CE or CET. A maximum of 4 credits total from Individual Problems, Internships (if taking 2 internships, must be from two separate employers), and Undergraduate Research may be counted toward professional electives. Students must successfully complete all key courses prior to taking any professional electives. A maximum of 3 credit hours may be included from a completed MSU minor, a prior or concurrent BS/BA degree in another major, or courses in a completed MSU Honors Program. A student may petition to include other senior or graduate level courses consistent with the degree program but not listed here (requires Academic Advisor and Department Head approval).

A minimum of 128 credits is required for graduation; 42 of these credits must be in courses numbered 500 and above.

Technical-Professional Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 331: Environmental Ctrl I</td>
<td>4</td>
</tr>
<tr>
<td>ARCH 332: Environmental Ctrl II</td>
<td>4</td>
</tr>
<tr>
<td>BMGT 322: Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 355: Management &amp; Organization</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 329: Human Resources Mgmt</td>
<td>3</td>
</tr>
<tr>
<td>BMGT 464: International Management</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following (3 credits):
- CET 202: Construction Surveying and Earthwork ...
- ECIV 307: Construction Practice...
- ECIV 456: Highway Geometric Design...
- GPHY 284: Intro to GIS Science and Cartography...
- GPHY 354: Advanced Geographic Information Science...
- GPHY 484: Applied GIS and Spatial Analysis...
- GPHY 357: Fundamentals/Applications in Mapping...
- GPHY 426: Remote Sensing...

*Courses have prerequisites that must be satisfied prior to enrollment in surveying minor courses. Contact the Civil Engineering Department for more information.

Land Surveying Non-Degree Certificate

A Bachelor of Science (B.S.) degree is required to be eligible for this certificate.

Twenty-nine (29) total semester credits are required for completion of the certificate. This includes twenty (20) credits of required courses and nine (9) credits of approved elective courses.

Completion of the Land Surveying Non-Degree Certificate provides eligibility to qualify to take the Fundamentals of Surveying (FS) Exam offered by the State Board of Professional Engineers and Professional Land Surveyors and administered by NCEES (National Council of Examiners for Engineering and Surveying).

Students interested in pursuing the Land Surveying Non-Degree Certificate will be asked to declare their interest prior to the start of any 300-level surveying course. The declaration can be made by emailing reneeh@ce.montana.edu. At the beginning of the last semester of course work, students will complete an application to receive certification of completion of the Land Surveying Non-Degree Certificate. The Land Surveying Non-Degree Certificate will be noted on the students’ academic transcript and may also be listed on their resume.

Requirements for the Land Surveying Non-Degree Certificate are the same as the requirements for the Land Surveying Minor listed above.
A computer science degree is highly marketable. Between 2010 and 2020, one study projects that there will be a shortfall of 32 million technically specialized professionals in the U.S., Europe, Japan, China, and India.

Our curriculum is designed with considerable flexibility, due to the numerous types of computer science jobs that exist. The bachelor’s degree provides every student with a strong fundamental understanding of the field. Students may then select from exciting computer science electives such as artificial intelligence, computational biology, computer networks, databases, embedded systems, multimedia, operating systems, software engineering, web design, and special topics courses. Students who complete a bachelor’s degree will find themselves both highly marketable and well-prepared for graduate school.

The department also offers graduate programs leading to the M.S. and Ph.D. degrees in Computer Science. The bachelor’s degree is accredited by the Computing Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: 410-347-7700.

**Professional Option**

The professional option allows a student to delve more deeply into both computer science and related technical areas. The compilers course, CSCI 468, serves as the capstone for this option.

**Interdisciplinary Option**

Many opportunities and challenges lie at the intersection of technology and other fields. The interdisciplinary option allows a student to pursue a minor of choice such as Entrepreneurship or Japanese Studies. During a student’s senior year, the minor area must be connected back to computer science through a senior project. CSCI 482 and CSCI 483 serve as the capstone for this option.
Engineering are both accredited accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: (410) 347-7700.

The breadth and quality of each degree program are driven by the goals of the Electrical and Computer Engineering Department.

The mission of the department is to provide an excellent environment for the scholarly pursuits of education, discovery, and dissemination in electrical and computer engineering in support of Montana State University and the state of Montana. We strive to excel in teaching at both the undergraduate and graduate levels. We seek to attract and retain well-qualified undergraduate students and provide them with educational, research, and scholarship opportunities. We strive to train the next generation of academics and researchers by providing opportunities in world class research and experience in teaching. And, we seek to develop a competitive research program of regional, national, and international importance.

The goals of the Department are to:

- Serve the State of Montana and the nation through education, research, and service to meet the mission of Montana State University and the College of Engineering.
- Provide ABET accredited undergraduate programs in Electrical Engineering and Computer Engineering.
- Be recognized by academic and industrial colleagues as delivering excellent undergraduate programs which provide students with a strong foundation in the contemporary and traditional areas of Electrical and Computer Engineering.
- Encourage faculty members to maintain professional expertise through continued professional development so they can sustain excellence in teaching and advising and be competitive in research.
- Provide excellent learning opportunities in lectures and modern laboratory facilities.
- Provide graduate research opportunities which, coupled with undergraduate excellence, prepare students through advanced studies in current and emerging fields of state, national, and international importance.
- Develop a competitive research program and disseminate new knowledge while mentoring graduate students completing requirements for advanced degrees.

Educational objectives for the BSEE and BSCpE degree programs are broad statements that describe what graduates are expected to attain within a few years after graduation.

In their first few years on the job, graduates of the Programs:
- Pursue a professional career based on an education in the fundamentals of Electrical and Computer Engineering.
- Engage in post-graduate education programs.
- Provide a positive impact to the engineering community and to the community at large.

**Internship Opportunities**

Internships are encouraged for students seeking engineering experience during summer employment. A wide variety of engineering companies recruit undergraduate interns from MSU. A total of three credits of internship can be applied towards graduation as a professional elective at the rate of one credit per full-time summer engineering employment. An intern experience allows students to gain engineering industrial experience that complements their formal academic education. Students in the Electrical Engineering and the Computer Engineering degree programs are encouraged to investigate the possibilities of an internship experience according to opportunities announced each year. The MSU office of Career, Internship & Student Employment Services helps students identify internship opportunities.

**Research Opportunities**

Students in the Electrical Engineering and the Computer Engineering degree programs are also encouraged to investigate opportunities to work under the supervision of an ECE faculty member in a research lab either during the summer or during the academic year. All members of the ECE faculty have active research programs which regularly involve undergraduate students. Hands-on research experience complements the student’s formal academic education while providing familiarity with career opportunities in the research field. Students in the ECE department have opportunities for paid research positions in addition to receiving credit for conducting research by registering for EELE 492 - Independent Study or EELE 490R – Undergraduate Research.

**Graduate Program**

Graduate school can provide an opportunity to gain education and experience in specialty areas that go beyond the scope or depth of the undergraduate curriculum, and offers advanced work in such areas as design, development work, research, and university-level teaching. The Electrical and Computer Engineering Department offers graduate programs leading to the research-based M.S. in Electrical Engineering, the coursework-only M.Eng., and Ph.D. in Engineering with an EE option. Exciting leading to research provides excellent learning opportunities, including participation in interdisciplinary teams. A number of research and teaching assistantships are available for qualified graduate students. Information regarding the ECE graduate program can be found at http://ece.montana.edu/research/eegrad1.htm.

For more information about the department and its programs, see the Electrical and Computer Engineering Department home page at http://ece.montana.edu

### Computer Engineering

The Electrical and Computer Engineering Department offers an accredited program for the **Bachelor of Science Degree in Computer Engineering (BSCpE)**. The Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: (410) 347-7700.

In the fast-paced field of computers, the computer engineering graduate will be prepared for careers in exciting innovative technologies including embedded systems, programmable logic, hardware/software co-design, and digital signal processing. With increased processor capacity and processing speeds, re-programmable logic devices offer far-reaching opportunities for the
An ability to apply knowledge of mathematics, science, and engineering.

An ability to design and conduct experiments, as well as to analyze and interpret data.

An ability to design a system, component, or process to meet desired needs.

An ability to function on multi-disciplinary teams.

An ability to identify, formulate, and solve engineering problems.

An understanding of professional and ethical responsibility.

Computer Engineering Minor (Non-Teaching)

The Department of Electrical and Computer Engineering offers a non-teaching minor in Computer Engineering that provides a focus in computer programming, digital logic design, and microprocessor hardware/software. The minor requires a minimum of 90 credits: 23 credits in seven specified CS and EE courses and at least 7 credits (2 or 3 courses) of electives selected from among a specified list of upper-division EE courses. This minor is a useful complement to majors in science or engineering for those seeking a cross-disciplinary academic program.

Student Performance and Retention Requirements

Students commencing their academic program in the fall 2005 or later are required by Board of Regents policy to achieve a “C” or better grade in each class used to satisfy the BScPe degree requirements. This minimum grade must be achieved in each prerequisite course prior to taking the follow-on course.

PROGRAMS OF INSTRUCTION – ENGINEERING
* Elective requirements include 12 credits of humanities, social science, diversity, and arts classes as part of university and COE core requirements (these two requirements may be combined), 16 credits of approved professional electives from the list below, including a minimum of 6 credits in Electrical Engineering and a minimum of 6 credits in Computer Science. In the selection of Electrical Engineering electives, either ELEE 321 or ELEE 477 or both must be among the courses selected. There must be a minimum of 7 credits at the 300 level or above in the student’s approved elective package. 5 additional elective credits must be selected from either the approved Mathematics and Basic Science Electives or Professional Electives listed below, or from the list of courses approved by the MSU Core 2.0 committee in the W, A, H, S, D, N, or Contemporary Issues in Science (CS) categories (i.e., all categories except US and Q).

**Professional Electives**
ACTG 201—Principles of Fin Acct  
ACTG 202—Principles of Mng Acct  
BMKT 325—Marketing  
ECNS 309—Managerial Economics  
ASTR 371—Solar System Astronomy  
ASTR 373—Stars, Galaxies, and the Universe  
BCET 390—Biochemistry  
BIOB 105—Intro to Biotech  
BIOB 160—Principles of Living Systems  
BIOB 170—Organisinal Biology  
BIOB 256—Intro Biol Cells to Organisms  
BIOB 260—Cell & Molecular Biology  
BIOH 185—Integrated Physiology I  
BIOH 201—Human Anatomy & Physiology I  
BIOH 211—Human Anatomy & Physiology II  
CHMY 111—College Chemistry I  
CHMY 112—College Chemistry II  
CHMY 211—Elements of Organic Chemistry  
CHMY 321—Organic Chemistry I  
CHMY 322—Organic Chemistry II  
CS 204—Multimedia Development Methods  
CSCI 252—Adv Data Structures & Algorithms  
CSCI 300 and 400 level courses, with  
SCI 494—Seminar (limited to 1 cr)  
SE 322—Software Engineering  
SE 422—Advanced Software Engineering  
ELEE 300 or 400 level courses, excluding ELEE 354.  
EGEN 201—Engineering Mechanics:Statics  
EGEN 202—Engineering Mechanics:Dynamic  
EGEN 205—Mechanics of Materials  
EGEN 335—Fluid Mechanics  
EGEN 325—Engineering Economic Analysis  
EIND 354—Engineering Probability & Stats I  
EIND 364—Principles of Operational Research I  
EIND 454—Project & Engineering Management  
EIND 455—Engineering Probability and Statistics II  
EMEC 300 or 400 level courses  
GEO 101—Intro to Physical Geology  
GPHV 112C—Intro to Physical Geography  
GPHY 284—Intro to GIS Science & Cartography  
M 221—Introduction to Linear Algebra  
M 242—Methods of Proof  
M 300 and 400 level courses, excluding M 350  
PHSX 224—General & Modern Physics III  
PHSX 300 and 400 level courses, with PHSX 494—Seminar (limited to 1 cr), and excluding PHSX 305 and PHSX 499.  
WRIT 221—Intermediate Tech Writing  
WRIT 429—Professional Writing

**COMPUTER ENGINEERING MINOR**  
(Non-Teaching Minor)  

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 111—Programming with Java I</td>
<td>4</td>
</tr>
<tr>
<td>CSCE 112—Programming with C</td>
<td>5</td>
</tr>
<tr>
<td>CSCE 152—Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>CSCE 252—Adv Data Structure &amp; Algorithms</td>
<td>4</td>
</tr>
<tr>
<td>ELEE 261—Intro to Logic Circuits</td>
<td>3</td>
</tr>
<tr>
<td>ELEE 262—Intro to Logic Circuits Lab</td>
<td>1</td>
</tr>
<tr>
<td>ELEE 371—Microprocess Hardware &amp; Software Systems</td>
<td>4</td>
</tr>
</tbody>
</table>

Take 7 credits minimum from the following:  
ELEE 367—Logic Design | 4 
ELEE 465—Microcontroller Applications | 4 
ELEE 466—Computer Arch & System Organization | 4 
ELEE 475—Hrdwr & Sftwr Eng for Emb Sys | 3 

Students must receive a grade of “C” or better in all required courses for the CoE minor.

**Electrical Engineering**

The Electrical and Computer Engineering Department offers an accredited program leading to the Bachelor of Science degree in Electrical Engineering (BSEE). The Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: (410) 347-7700.

Electrical Engineering offers the graduate extensive opportunities in such fields as telecommunications, control systems, microprocessors, instrumentation, electromagnetics, systems, optical and electro-optical systems, power electronics, fuel cells, electrical power, and computer-controlled devices. In addition, electrical engineers play key roles in interdisciplinary efforts such as communications networks, remote sensing, aerospace systems, medical instrumentation, transportation systems, manufacturing, and numerous other applications of great social impact. Electrical engineers are leaders in the development of such technological innovations as the Internet, high definition television, fiber optic communications, and personal communication systems. As an electrical engineer, employment opportunities are wide open in a broad spectrum of opportunities which includes advanced research and development, design and applications engineering, manufacturing engineering, sales, and management.

The undergraduate program is designed to provide the student with the fundamental background in Mathematics, basic science, engineering, and personal communication to allow the graduate to be a contributing member in the engineering community. The electrical engineering curriculum provides the integrated educational experience whereby the student develops the skills to identify and to solve technical problems by applying pertinent electrical engineering knowledge to the solution of practical problems. This breadth of engineering knowledge and the ability to communicate that knowledge requires a broad-based education in various fields as well as professional elective courses. These professional electives enable the student to study in depth one or more of the following areas: logic design, digital signal processing, computer and microprocessor applications, electromagnetic theory, optics and photonics, control systems, electrical power systems, electronic circuits, and telecommunications.

Technical electives available outside the department allow the student to broaden in other engineering and scientific areas. These electives can also be used to allow the student to expand his or her knowledge in business, finance, law, and management.

The electrical engineering program educational outcomes are:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs.
- An ability to function on multidisciplinary teams.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- The broad education necessary to understand the impact of engineering solutions in a global and societal context.
- A recognition of the need for, and an ability to engage in lifelong learning.
• A knowledge of contemporary issues.
• An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
• Knowledge of the principles of project management and design trade-offs.
• An ability to analyze and synthesize electronic devices and electrical systems.

Electrical Engineering Minor (Non-Teaching)
The Department of Electrical and Computer Engineering offers a non-teaching minor in Electrical Engineering that provides interested students with an introductory understanding of electrical circuits, electronics, and properties of signals. Students then choose electives from among a variety of electrical engineering topics, such as telecommunications, optics, electronics, electrical power, and control systems. This minor requires a minimum of 29 credits in electrical engineering subjects, with 9 of those credits selected from a list of upper division elective courses. This minor complements majors in science or engineering for those seeking a cross-disciplinary academic program.

A CpE major can complete a minor in Electrical Engineering by taking three EELE classes (9 cr min) from the specified elective list for the EE minor. This can be done within the 128 credits required for the CpE degree alone, which requires a total of 17 professional elective credits.

Student Performance and Retention Requirements
Students commencing their academic program in the fall 2005 or later are required by Board of Regents policy to achieve a “C” or better grade in each class used to satisfy the BSEE degree requirements. This minimum grade must be achieved in each prerequisite course prior to taking the follow-on course.

CURRICULUM IN ELECTRICAL ENGINEERING

Freshman Year
CHMY 111-College Chemistry I.........................3
Take one University Seminar course:
Recommended:
COM 110US-Public Communication.........................3
(or)
CLS 101US-Knowledge and Community.........................3
ELE 101-Intro to Electrical Fundamentals.........................2
WRIT 101W-College Writing I.........................3
M 171Q-Calculus I..............................................4
M 172Q-Calculus II..............................................4
PHSX 220-Gen & Mod Phys I............................4
PHSX 222-Gen & Mod Phys II............................4
Electives*.........................................................5

Sophomore Year
CSCL 111-Programming with Java I.......................4
ELE 201-Circuits I for Engineering.........................4
ELE 205-Circuits II for Engineering.........................4
ELE 261-Intro to Logic Circuits.............................3
ELE 262-Intro to Logic Circuits Lab.........................4
M 273Q-Multivariable Calculus............................4
M 274-Q-Intro to Differential Equations..................4
PHSX 224-Gen & Mod Phys III..........................4
ELE 201-Engineering Mechanics-Statics..................3

Junior Year
ELE 308-Signal and System Analysis......................3
ELE 317-Electronics...........................................4
ELE 321-Introduction to Feedback Controls.............4
ELE 354-Electromagnetic Theory I........................3
ELE 355-Electric Machinery Fundamentals Devices......4
ELE 371-Microprocessor Hardware & Software Systems.................................4
ELE 310F-Multidisc Engineering Design...................3
ELE 445-Telecommunication Systems.....................4
ELE 350-Applied Engr Data Analysis......................2
Electives*.........................................................5

Senior Year
ELE 409-EE Material Science..........................3
ELE 487-Professionalism, Ethics & Engr Practice........
ELE 488-Fund of Engineering Exam.......................0
Electives*.........................................................11...13

* Elective requirements include 12 credits of humanities, social science, diversity, and arts classes as part of university and COE core requirements (these two requirements may be combined). 15 credits of professional electives with a minimum of 8 credits in Electrical Engineering and a minimum of 5 credits outside of Electrical Engineering all from the professional electives list below. There must be a minimum of 5 credits at the 300 level or above in the student’s approved electives package.

Additional elective credits must be selected from either the approved Professional Electives listed below, or from the list of courses approved by the MSU Core 2.0 committee in the W, A, H, S, D, N, or Contemporary Issues in Science (CS) categories (i.e., all categories except US and Q).

ELE 321-Introduction to Feedback Controls.............4
ELE 335-Electromagnetic Theory II........................3
ELE 350E-Electric Machinery Fundamentals...........4
ELE 359F-EE Material Science..........................4
ELE 411-Adv Analog Electronics..........................3
ELE 414-Intro to VSLI Design............................3
ELE 422-Intro to Modern Control.........................3
ELE 445-Telecommunication Systems.....................4
ELE 447-Mobile Wireless Communications...............3
ELE 482-Electro Optics Systems........................3
ELE 483-Fiber and Optical Communications............3

Students must receive a grade of “C” or better in all required courses for the EE minor.
Mechanical &
Industrial Engineering
Department of Mechanical & Industrial Engineering
http://www.coe.montana.edu/mie/

The mission of the Mechanical & Industrial Engineering Department is to serve the State of Montana, the region, and the nation by providing outstanding leadership and contributions in knowledge discovery, student learning, innovation and entrepreneurship, and service to community and profession. Our vision is to be a leader in discovery, learning, innovation, and service through focus on core competencies, multi-disciplinary collaborations, and investment in the Departmental community. The Department is particularly focused on excellence in the following thrust areas: design and manufacturing; energy systems; materials and structures; measurement systems; and systems modeling.

The Mechanical and Industrial Engineering Department provides undergraduate programs leading to BS degrees in Industrial Engineering, Mechanical Engineering, and Mechanical Engineering Technology. The Department provides graduate programs leading to the MS degrees in Industrial Engineering and Mechanical Engineering. The Department also participates in an inter-disciplinary doctoral program leading to the Ph.D. degree with options in industrial engineering, mechanical engineering, or engineering mechanics. Further information on all of these programs may be found at http://www.coe.montana.edu/mie.

Grade Policies
The Montana Board of Regents grade policy requires C- or higher marks in all courses required for a degree. (This policy affects students who entered or were readmitted to the system starting in Fall, 2005.) Students who enrolled prior to Fall, 2005, and have not had a break in attendance of one year or more, are exempt from the Board of Regents C-policy. The complete policy is presented in the on-line catalog under Academic Policies - Courses, Credits, and Grades - Minimum Competency Requirements.

Prerequisite Policy
The Mechanical and Industrial Engineering Department enforces prerequisites. A prerequisite course is one which must be successfully completed before a student may enroll in the follow-on course. By Board of Regents policy, in order for a course to serve as a prerequisite, a grade of “C-” or higher must be earned. M&IE students who earn below a “C-” in a course will be instructed to repeat the course during its next offering. They will also be instructed to drop any follow-on course that is affected by the unsatisfactory prerequisite grade.

D- Grade
For students exempt from the Board of Regents “C-” policy requirements, “D+”, “D”, and “D-” grades must be addressed. The M&IE Department does not consider “D-” to be a passing grade. A course in which a “D-” grade is earned must be repeated, and a grade of “D” or higher earned, for it to apply to degree requirements. By M&IE Department policy, in order for a course to serve as a prerequisite, a grade of “D” or higher must be earned. M&IE students who earn below a “D” in a course will be instructed to repeat the course during its next offering. They will also be instructed to drop any follow-on course that is affected by the unsatisfactory grade. It is important to note that students exempt from the BOR policy are, however, required to earn “C-” or higher grades in all Core 2.0 courses.

Industrial Engineering
The mission of the undergraduate program in Industrial Engineering (IE) is to produce graduates well grounded in both classical and current industrial engineering knowledge and skills consistent with the land-grant mission of MSU. Graduates will be prepared to be productive citizens and contributors to the economic well-being of employers. The IE undergraduate program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 – telephone: (410)347-7700. The educational objectives for the IE program follow.

Industrial Engineering graduates will:
• Undertake professional careers in industrial engineering;
• Employ effective communication;
• Work in multidisciplinary professional teams;
• Engage in life-long learning, including post-graduate education for some graduates;
• Contribute to industry and society, in Montana or elsewhere, including involvement in professional and other service activities;
• Design, manage, improve, and integrate systems across a broad range of organizations; and
• Participate in ethical leadership in design and operational activities that contribute to the success of the organization and the community.

The undergraduate curriculum in Industrial Engineering (IE) includes Mathematics, basic sciences, humanities, social sciences, engineering sciences, design, and communication courses distributed over a four-year period. An important feature of the program is to teach students to foster the ability to comprehend, define, and analyze problems; synthesize alternatives; and rationally choose appropriate solutions. This requires a broad technical education that motivates life-long learning to keep pace with technological and social changes.

Industrial Engineering is a broad engineering discipline. Since IEs are employed in every facet of American business and industry, they are usually “people-oriented problem solvers” who enjoy diversity in their assignments and careers. For example, IE alumni include plant managers, manufacturing engineers, teachers, hospital administrators, consultants, quality assurance managers and engineers, technical sales engineers, production supervisors, and department heads. Today IEs are active in all kinds of manufacturing, as well as in service operations such as hospitals, banks, airlines, transportation and distribution companies, retailers, utilities, and local, state, and federal governments.
IEs are qualified for this wide variety of careers because their education is unique. First of all they are people-oriented, but they are also technically trained. IEs take the standard core of engineering courses, including two years of calculus, to provide a background for understanding production, fabrication, assembly processes, etc., required to design systems for business and industry. All engineering curricula require graduates to meet accreditation standards in Mathematics, basic science, engineering science, engineering design, as well as in humanities and social sciences. However, IEs are more knowledgeable of management functions in companies than are other engineering majors. A technically trained, management-oriented man or woman who can solve problems by working with people—that’s an IE graduate.

The IE is an “integrator” of resources, people, material, and equipment. This is accomplished by “designing systems” so that the right people with the proper mix of skills, combined with the right quantities of equipment and materials, are available at the right time to produce a product or provide a service at a cost that will allow a profit to be made. Since these professionals frequently work on problem solving teams, the ability to communicate, coordinate, and work with others is essential. Because IEs design systems for producing products, specifying processes, or providing services, their expertise is applicable to many businesses and industries. Frequently, they become supervisors and managers of the same systems they design.

Today much is written about “re-engineering companies.” IE graduates are uniquely qualified to analyze a company’s customer needs, relate those to products or services, and examine the flow of materials, processes, documentation, information, etc., that result in “re-engineering” the company to compete more effectively. World class companies must have “systems” that consistently provide on-time delivery of defect-free products (or services) that delight the customers—and for a competitive price that allows the company to make a reasonable profit. Industrial Engineers are actively involved in designing these systems, integrating the resources required to make them function, and quite often managing them.

**Graduate Program**

Students who have graduated from a four-year degree program which has sharpened their Mathematical and communication skills will greatly benefit by completing the Master of Science degree in Industrial & Management Engineering or the Doctor of Philosophy in Engineering with Industrial Engineering option. Emphasize in Manufacturing, Human Factors/Ergonomics, Manufacturing Automation, Operations Research/Computer Applications, Quality Management, and Systems Analysis and Modeling are available. Flexible guidelines permit broadening or customizing to meet career objectives. Further details may be found in the Graduate Catalog.

**Student Performance and Retention Requirements**

No further requirements apply in order to advance in the Industrial Engineering program.

**Curricula in Industrial and Mechanical Engineering**

**INDUSTRIAL ENGINEERING**

**Freshman Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 141/College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CSCL 141/College Seminar</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>COM 101US/Public Communication</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CSCI 111/Programming with Java I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>WRIT 101W/College Writing</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>EIND 101/Introduction to Industrial Engineering</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 171Q/Calculus I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 172Q/Calculus II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EMEC 103/Engr Graphics</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>EIND 205/Intro to Production Systems</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>WRIT 101W/College Writing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CSCI 111/Programming with Java I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>COM 110W/Public Communication</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CLS 101W/College Seminar</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMAT 251/Engineering Mechanics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EGEN 205/Engineering Mechanics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 313/Work Design &amp; Analysis</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ETME 215/Manufacturing Processes</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 273Q/Multivariable Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 274/Intro to Differential Equations</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EIND 300/Professional Practice</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 422/Engineering Graphics</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EIND 463/Engineering Graphics</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEG 373/Engineering Economic Analysis</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 354/Engineering Probability &amp; Statistics I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 355/Engineering Probability &amp; Statistics II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WRIT 101W/College Writing</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIND 477/Quality Assurance</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EGEN 488/Fundamentals of Engineering Exam</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 499R/Capstone: Industrial System Design</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 434/Project &amp; Engineering Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 442/Facility/Material Handling System Design</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 454/Engineering Probability &amp; Statistics I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 458/Production &amp; Engineering Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 464/Principles of Operations Research I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 477/Quality Assurance</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 499R/Capstone: Industrial System Design</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 434/Project &amp; Engineering Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 442/Facility/Material Handling System Design</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 454/Engineering Probability &amp; Statistics I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 458/Production &amp; Engineering Management</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EIND 464/Principles of Operations Research I</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Mechanical Engineering**

The specific mission of the undergraduate Mechanical Engineering (ME) program is to prepare students for successful mechanical engineering careers, responsible citizenship, and continued intellectual growth. The goal of the program is to produce graduates strong in fundamentals, applications, design, communication, and professional responsibility. The ME undergraduate program is Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 – telephone: (410)347-7700. The educational objectives for the ME program follow.

Mechanical Engineering graduates will:
- Undertake professional careers;
- Assume leadership roles by advancing in the engineering profession;
- Employ effective communication;
- Work in multidisciplinary professional teams;
- Engage in lifelong learning, including postgraduate education for some graduates;
- Contribute to industry and society, in Montana or elsewhere, including involvement in professional and other service activities; and
• Solve technical problems in design, analysis, manufacturing, project management, or testing.

The undergraduate Mechanical Engineering program is principally oriented toward career preparation, providing students with the engineering and technical education appropriate to the challenges presented by today’s technologically complex and difficult problems. The coursework in mechanical engineering provides four years of study in mathematics, basic sciences, university core subjects, and engineering topics. The overall curriculum provides an integrated educational experience directed toward the development of an ability to apply pertinent knowledge to the identification and solution of practical problems in mechanical engineering.

The profession of mechanical engineering is very broad, with practitioners employed in most areas of technological and industrial management endeavors. Examples of industrial employers which require mechanical engineering background are: process industries including pulp and paper, steel, aluminum, food, petroleum, chemicals and others; manufacturing industries including highway vehicles, instruments, airplanes, rockets and engines, toys, agricultural machinery, and many others; power plants including steam, nuclear, and hydroelectric plants; federal laboratories performing a wide variety of defense and non-defense related engineering design, analysis, and experimental work; and a wide variety of consulting work including heating, ventilating, and air conditioning system design, and forensic engineering. This brief sample gives a view of the wide spectrum of employment possibilities in mechanical engineering. It is the mechanical engineer’s responsibility and challenge to conceive, plan, design, and perform analysis and testing related to devices, machines, and systems used by or manufactured by the employer. This work may include liaison with other engineers, engineering technologists, technicians, outside vendors, and departments within the company. Areas of responsibility following design and prototype testing may include direction of a manufacturing line.

It should be evident that career opportunities abound within this very wide array of employers and engineering activities. The job market for engineers often follows the nation’s economy in general. In spite of these natural fluctuations, however, it is expected that our nation will always depend on uses of technology for creating an improved standard of living and a more efficient industrial base to maintain and enhance international competitiveness. Therefore, we can expect that mechanical engineering graduates will have excellent employment opportunities.

Course requirements include mathematics, basic sciences (physics and chemistry), engineering design; arts, diversity, humanities and social sciences; and at least one year of engineering science. The program also includes engineering graphics, statistics, computer application, solid mechanics, materials science, manufacturing processes, thermodynamics, heat transfer, fluid mechanics, electronics, and design of structural, mechanical, and energy systems. Computing and computer applications are stressed throughout the curriculum. The program culminates with a capstone design experience in which the student is involved in a team that must create a solution to a real-world engineering design problem, and develop a working prototype. Often times these teams are multidisciplinary.

Graduate Program

Students who have completed a Bachelor of Science degree in engineering or closely related discipline may take graduate work leading to the Master of Science in Mechanical Engineering or Doctor of Philosophy in Engineering with Mechanical Engineering or Engineering Mechanics options typical. Advanced degrees are necessary for university teaching and are increasingly important in industry, particularly in the areas of new product development and research. Further details may be found in the Graduate Catalog.

Student Performance and Retention Requirements

No further requirements apply in order to advance in the Mechanical Engineering program.
Mechanical Engineering Technology

The mission of the Mechanical Engineering Technology (MET) program is to prepare students for successful careers, responsible citizenship, and professional growth. The MET program seeks to produce graduates with a good foundation in engineering fundamentals as well as one strong in applications, design, problem recognition and resolution, project management, communication, and professional and ethical responsibility.

The MET undergraduate program is accredited by the Technology Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 - telephone: (410)347-7700.

The educational objectives of the MET program follow:

Mechanical Engineering Technology graduates employed in the field will:
• Undertake professional careers in engineering technology;
• Employ effective communication;
• Work effectively in multidisciplinary professional teams;
• Engage in life-long learning, including post-graduate education for some graduates;
• Contribute to industry and society, through service activities and/or professional organization;
• Engage in professional problem-solving activities using applied methods;
• Fulfill their responsibilities ethically; and
• Advance in the profession.

The undergraduate Mechanical Engineering Technology program is designed with an applications-oriented structure. Many of the technical science courses have an accompanying laboratory component providing hands-on activities, as well as emphasizing measurement, data collection and analysis, documentation, and written/oral report preparation/presentation. The program aims to develop core competencies in engineering fundamentals (statics, strengths of materials, materials science, fluid dynamics, and electrical circuits), manufacturing applications (manufacturing processes, machining, welding, design for manufacturing and tooling, and quality assurance), mechanical design (computer-aided design, mechanisms, machine design, fluid power technology, measurement and test, etc.), and thermal sciences (thermodynamics, heat transfer, and heating, ventilation, and air conditioning). Extensive course work in the physical sciences and Mathematics is included. Technical elective courses are chosen by the student in consultation with an academic advisor. Courses in the humanities and social sciences are also included. The overall curriculum is designed to provide the student with an ability to apply scientific and engineering knowledge and methods combined with technical skills in support of engineering activities.

Mechanical engineering technology (MET) is concerned with the application of scientific and engineering knowledge in support of engineering activities. Specifically, the mechanical engineering technologist provides the professional services needed in transforming the results of scientific endeavors into useful products and services. Students who choose a career in mechanical engineering technology may pursue any number of career paths including, but not limited to: machine and product design, product and system evaluation, research laboratory experimental support, prototype evaluation, plant operation and management, quality assurance, technical sales, manufacturing methods improvement, HVAC systems design and installation, project management, and energy exploration. The mechanical engineering technologist’s mission is to make necessary analysis and plans to convert design drawings into finished products in the most efficient and safe manner. He or she is the professional who produces design drawings and sets up and operates manufacturing equipment, handles inspections, analyzes production problems, and manages the implementation of improvement activities and/or projects. The demand for the engineering technologist in general, and mechanical engineering technologists in particular, has been strong for the past several years, and average starting salaries are very competitive. Indications are that this trend will continue. MSU Mechanical Engineering Technology graduates are actively recruited, and many of our alumni hold positions of considerable responsibility in industry and government.

Student Performance and Retention Requirements

No further requirements apply in order to advance in the Mechanical Engineering Technology program.

MECHANICAL ENGINEERING TECHNOLOGY

Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGEN 105</td>
<td>Introduction to Engineering Technology</td>
<td>4</td>
</tr>
<tr>
<td>M 165Q</td>
<td>Calculus for Technology I</td>
<td>3</td>
</tr>
<tr>
<td>M 166Q</td>
<td>Calculus for Technology II</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 121N</td>
<td>Intro to General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>University Core Electives</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETME 215</td>
<td>Manufacturing Processes</td>
<td>3</td>
</tr>
<tr>
<td>ETME 203</td>
<td>Mechanical Design Graphics</td>
<td>3</td>
</tr>
<tr>
<td>EMAT 251</td>
<td>Materials Structures</td>
<td>3</td>
</tr>
<tr>
<td>ETME 216</td>
<td>Manufacturing Process Lab</td>
<td>1</td>
</tr>
<tr>
<td>EGEN 208</td>
<td>Applied Strength of Materials</td>
<td>3</td>
</tr>
<tr>
<td>ETME 205</td>
<td>Mechanical Design Graphics</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 324</td>
<td>Applied Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 121N</td>
<td>Intro to General Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>EGEN 311</td>
<td>Applied Mechanics of Fluids</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 310R</td>
<td>Multidisciplinary Design</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 331</td>
<td>Engineering Functional Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 325</td>
<td>Engineering Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGEN 325</td>
<td>Engineering Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ETME 400</td>
<td>MET Senior Seminar</td>
<td>1</td>
</tr>
<tr>
<td>ETME 415</td>
<td>Design for Manufacturing &amp; Tooling</td>
<td>3</td>
</tr>
<tr>
<td>ETME 422</td>
<td>Principles of HVAC I</td>
<td>3</td>
</tr>
<tr>
<td>ETME 489</td>
<td>Capstone:MET Technical Design II</td>
<td>2</td>
</tr>
<tr>
<td>ETME 499R</td>
<td>Capstone:MET Technical Design II</td>
<td>2</td>
</tr>
<tr>
<td>ETME 424</td>
<td>Thermal Processes Lab</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 488</td>
<td>Fund of Engineering Exam</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

*From approved elective list.
Aerospace Minor

Montana State University, Bozeman offers a minor (minor for which there is no major) in aerospace called the Aerospace Minor. This minor provides a suite of courses from a wide variety of disciplines which are relevant to aerospace. The minor requires a minimum of 28 credits. Required courses comprise 16 credits in four (4) specified courses, which are common to Mechanical Engineering, Electrical Engineering, Physics, Civil Engineering, Chemical Engineering, Chemistry, and Industrial Engineering at MSU Bozeman. An additional required course, EMEC 368, Introduction to Aerospace is the cornerstone, foundational course for the Aerospace Minor. An additional 9 elective credits (minimum of three courses) are required from a specified list which comprises the Aerospace Elective Courses. This minor is a useful complement to majors in science or engineering for those seeking a cross-disciplinary academic program with topics in aerospace. The required courses are carefully selected to ensure that students seeking the Aerospace Minor at MSU have the requisite math and science background to engage in specific applications to aerospace. The Aerospace Elective Courses were developed to provide students with the minimum background of specific topics applicable to aerospace. These are Materials and Structures (needed for development of aerospace systems; structures, hardware, sensors, system packages, etc.), Thermo/Fluids (needed for an understanding of aeronautical systems, momentum equations relevant to propulsion systems, environmental needs, etc.), and Focused Topics (a series of focused and advanced topics applicable to aerospace. These courses include design, dynamics and control, Computer Aided Design (CAD), space science, etc.) The Certifying Officer for the Aerospace Minor is the current MSU Lyle A. Wood Distinguished Professor, and students with questions are encouraged to seek him/her out by contacting the MSU Mechanical & Industrial Engineering Department.

AEROSPACE MINOR

Required Courses (or acceptable substitute* for Aerospace Minor courses (listed below))

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 171Q</td>
<td>4</td>
</tr>
<tr>
<td>M 172</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 220</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 222</td>
<td>4</td>
</tr>
<tr>
<td>EMEC 368</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>19</td>
</tr>
</tbody>
</table>

Aerospace Minor Courses

<table>
<thead>
<tr>
<th>Course Category</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials and Structures</td>
<td>3-4</td>
</tr>
<tr>
<td>Thermo/Fluids</td>
<td>3-4</td>
</tr>
<tr>
<td>Focused Topics</td>
<td>3-4</td>
</tr>
<tr>
<td></td>
<td>9-12</td>
</tr>
</tbody>
</table>

Three (3) or more credit course from any of the above three categories will comprise the Additional Aerospace Minor Elective course credits. This may be accomplished within the maximum 128 credits for certain B.S. degrees at MSU (with the Aerospace Minor inclusive). Students who have less than 19 course credits for “acceptable substitute” required courses will fill the additional minimum 28 course credits with approved Aerospace Minor elective course credits.

Aerospace Minor Courses

Materials and Structures

(Students take at least one of the following;)

- EMEC 444 Mechanical Behavior of Materials
- EMAT 463 Composite Materials: advanced materials, very important to aerospace structures
- EMEC 447 Aircraft Structures: unique MSU course developed in conjunction with practicing aerospace engineers
- EMEC 460 Finite Element Analysis: basic analysis technique for aerospace systems
- PHSX 442 Novel Materials: specialty materials course
- EMAT 350 Engineering Materials: specialty materials engineering course

Thermo/Fluids

(Students take at least one of the following;)

- EGEN 335 Fluid Mechanics: fluid mechanics, applicable to aerospace and momentum equations related to aerospace systems
- EGEN 435 Fluid Dynamics: steady and unsteady flow; computer applications
- EGEN 324 Applied Thermodynamics: engineering thermodynamics
- EMEC 326 Fundamentals of Heat Transfer: heat transfer in mechanical and electrical aerospace systems
- EMEC 436 Dynamics of Fluids: fluid mechanics with topics applicable to aerospace
- ETME 422 Principles of HVAC: applicable to aerospace systems environmental control
- ECHM 424 Transport Analysis, combined mass, momentum, and heat transfer phenomena

Focused Topics

(Students take at least one of the following;)

- ETME 415 Design for Manufacturing & Tooling: tooling for aerospace manufacturing and structures
- EMEC 403 CAD IV/Design Integration: advanced CAD principles
- ETME 410 CNC & CAM Technology: computer aided manufacturing for aerospace systems

Notes: The following constraints will be imposed on Aerospace Minor Courses:

- If a course (or redundant equivalent) is a specifically required course for the student’s major degree program, it will not be accepted as an Aerospace Minor elective.
- Additional Clarification: Elective courses in a student’s major degree program are not considered as required courses and can, therefore, be used as Aerospace Minor electives. Pre-requisites for courses will be enforced.
- An appeal to include additional classes for the Aerospace Minor can be made if the student/instructor can make a cogent argument as to how the course is relevant to aerospace.
- All academic policies relevant to MSU are in effect for the Aerospace minor; in particular, all courses used to fulfill the minor must have a grade of C- or better.

Mechatronics Minor (non-teaching)

The College of Engineering offers a non-teaching minor in Mechatronics. The field of Mechatronics combines the principles of mechanical engineering with the principles of electronic instrumentation and computerized control. Mechatronics exploits the synergy of mechanical and electrical engineering to design unique and innovative electromechanical products, machines, robots, tools, and manufacturing processes.

The minor requires a minimum of 37 credits in specified subject areas: computer science, engineering mechanics, mechanical engineering, and electrical and computer engineering (see table below).
**MECHATRONICS MINOR**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Majors</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 111---Programming with Java I</td>
<td>4</td>
<td>CpE, EE, EE</td>
</tr>
<tr>
<td>CSCI 112---Programming with C I</td>
<td>3</td>
<td>CpE, EE, EE</td>
</tr>
<tr>
<td>EGEN 201---Engineering Mechanics—Statics</td>
<td>3</td>
<td>√</td>
</tr>
<tr>
<td>EGEN 202---Engineering Mechanics—Dynamics</td>
<td>3</td>
<td>√</td>
</tr>
<tr>
<td>EGEN 205---Mechanics of Materials</td>
<td>3</td>
<td>√</td>
</tr>
<tr>
<td>EMEC 103---CAE I: Engineering Graphics</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>EMEC 320---Thermodynamics I</td>
<td>3</td>
<td>√</td>
</tr>
<tr>
<td>EMEC 326---Fundamentals of Heat Transfer</td>
<td>4</td>
<td>√</td>
</tr>
<tr>
<td>ELE 201---Introductions to Logic Circuits</td>
<td>3</td>
<td>√</td>
</tr>
<tr>
<td>ELE 202---Intro to Logic Circuits Lab</td>
<td>1</td>
<td>√</td>
</tr>
<tr>
<td>ELE 321---Introduction to Feedback Controls</td>
<td>4</td>
<td>√</td>
</tr>
<tr>
<td>ELE 371---Microprocessor Hardware and Software Systems</td>
<td>4</td>
<td>√</td>
</tr>
<tr>
<td>Total for Minor (minimum)</td>
<td>141</td>
<td>135, 139</td>
</tr>
</tbody>
</table>

√ indicates additional courses required for the minor that are not required for the major.

* Course may also satisfy a professional elective in the major.

Students must receive a grade of "C" or better in all required courses for the Mechatronics minor.

**Military Science - Army ROTC**

Army Reserve Officers’ Training Corps (ROTC) is a unique course of study that complements an existing degree-producing program. By taking the Military Science courses, in addition to their regular major, MSU students are offered the opportunity to receive a Presidential Commission as an officer in the U.S. Army. A graduate of the program may elect to serve as an officer in either the active Army or in the National Guard/Army Reserve as a part-time soldier (one weekend a month and two weeks in the summer).

ROTC enhances a student’s education by providing unique leadership and management training. The experiences provided by Army ROTC have proven to make a significant impact in the graduate’s endeavors with many large businesses and corporations actively seeking this qualification for potential professional employees. Army ROTC provides leadership experience.

**The Four-Year Program**

The four-year Army ROTC Program is divided into two parts called the Basic Course and the Advanced Course.

The Basic Course is usually taken during the first two years and covers such subjects as management principles, national defense, military history, and leadership development. In addition, a variety of outside social and professional enrichment activities are available. All necessary ROTC uniforms and other essential materials are furnished at no cost. After completing the Basic Course, students who have demonstrated the potential to become an officer and who have met the physical, medical, and scholastic standards are eligible to enroll in the Advanced Course.

The Advanced Course is taken during the final two years of college. It includes instruction in organization and management, tactics, ethics, professionalism, and advanced leadership development.

During the summer between the junior and senior years of college, Advanced Course students attend a five-week training session called the Leader Development and Assessment course. The Leader Development and Assessment course gives students the chance to practice what they have learned in the classroom, and apply their leadership skills.

**The Two-Year Program**

The two-year program is designed for a student who did not take ROTC during their first two years of school, or for students who have prior military service to their credit. The two-year program is also available to National Guard and Army Reserve college students that are participating in the Simultaneous Membership Program.

Several options exist for students to enter the Two-Year Program. For students with no previous military experience, a summer introductory military orientation session called the Leaders’ Training Course is most often required. This is a fully-paid four-week course.

After successfully completing Leader’s Training Course, students who meet all the necessary enrollment requirements continue in the Advanced Course.

**Army ROTC Scholarships and Financial Assistance**

Army ROTC scholarships for two, three, and four years are awarded on a competitive basis to the best qualified students who apply.

Four-year scholarships are awarded to students who will be entering college as freshmen. Based on the availability of scholarships, three- and two-year scholarships are awarded to students already enrolled in college.

Each scholarship covers tuition and fees, a specified amount for textbooks, supplies and equipment, plus an allowance of $2,500 to $4,000 for every year the scholarship is in effect.

Special consideration for an Army ROTC scholarship is given to students pursuing degrees in nursing, engineering, the physical sciences, and other technical skills in demand by the Army. Students who receive a scholarship must earn an undergraduate degree in the field in which the scholarship is awarded.

**High Technology in Today’s Army**

Today’s Army offers students the opportunity to learn valuable cutting-edge technology skills. Army careers in such fields as aviation, advanced electronics, laser technology, and computer programming are available to students who can accept the challenge of working within a rapidly changing technological environment. In the Army, students learn from experts and gain first-hand experience working with some of the most sophisticated equipment available.

Students who complete ROTC training and receive a degree in a high-tech area can look forward to an important career experience in the Army and a solid future in the world of rapidly expanding technology.

**Minor in Military Studies**

The minor in Military Studies is offered to any student completing the courses of study listed below. The minor not only prepares cadets for active duty service but also provides them the opportunity to study one of our country’s major instruments of power, the United States Military. In addition to study-
ing Air Force & Army organization, missions, and operations, the student will gain a broader perspective of the military in general by completing a course in American Military History & a cross-service curriculum emphasizing our country’s focus on “Joint” military operations.

MINOR IN MILITARY STUDIES

Take four of the following:

- MAS 110—Foundations of the Air Force I ........ 1
- MAS 111—Foundations of the Air Force II ......... 1
- Take four of the following:
  - MINOR IN MILITARY STUDIES
  - Operations.
  - Our country’s focus on “Joint” military
  - A course in American Military History &
  - will gain a broader perspective of the
  - missions, and operations, the student
  - in American Military History, and
  - in general by completing a course in
  - cross-service curriculum emphasizing

**Take five of the following:............................................

- MSG 200—Leadership Management Concepts and Communication Skills ............. 2
- MSG 201—Advanced Leadership Concepts and Communication Skills ............. 2
- MSG 203—American Military History .................3
- MSG 301—Small Unit Tactics
- MSG 302—Preparation for Ldr Dev & Assessment Course
- MSG 303—Field Training, 4 week .................2
- MSG 304—Military Science Ldr Dev & Assessment Course
- Pre-Medical/Pre-Health Professions
- Pre-Med Intake Major (Non-degree)

**If a student is not accepted into MAS 309 or MSG 303 by the respective military service, the student can substitute an additional upper division course along with MSG 492, physical fitness training.

In addition to various options within each degree, and minors in most of the areas listed above, the College administers the following minors:
- Minor in Anthropology
- Minor in Native American Studies
- Minor in Museum Studies
- Minor in Japan Studies
- Minor in Religious Studies
- Minor in Sociology
- Minor in Women’s Studies
- Minor in Water Resources

The selection of a minor provides students the opportunity to have a recognized second area of concentration.

American Studies

College of Letters and Science
http://www.montana.edu/amst/

The American Studies program is designed to meet the needs of students, including non-traditional majors and lifelong learners, who want to pursue a flexible, multi-disciplinary curriculum within American Studies. Students explore the experience and values of the people of the United States as embodied in their history, literature, art, and other forms of cultural expression. All students are required to choose one of three program focus areas, American Arts, American History, or American Literature.

Students must complete a minimum of 45 credits in the program after declaring themselves to be American Studies majors. Up to 12 credits required in a minor or in a second degree program may be applied toward the American Studies degree requirements. Courses taken to complete requirements in the American Studies program may also be used to satisfy University Core requirements.

For details about the American Studies degree, contact the Program Administrator, Scarlet Reierson, at 406-994-3561 or scarlet.reierson@montana.edu, or check the American Studies web site www.montana.edu/amst.

Foundation Courses

All students, regardless of program focus area, must complete the following courses: AMST 201D, Introduction to American Studies, LIT 110H Intro to Lit, NASX 105D, Introduction to Native

PROGRAMS OF INSTRUCTION – LETTERS AND SCIENCE
American Studies, and PSCI 210IS, Introduction to American Government.

Foreign Language Requirement and Study Abroad

Students are required to take the first two courses in a foreign language (8 credits) or to demonstrate equivalent competency. Additionally, to better understand how America is perceived in the world, students are encouraged (although not required) to spend at least one semester abroad at a Center for American Studies.

Capstone Experience

All students in the major take a common 4-credit capstone course in their final year (AMST 401, Seminar in American Studies). Students will work together in small groups to design solutions to contemporary issues in American society (e.g., immigration). Each small-group project will result in a scholarly product (typically a paper or presentation) that will serve as a measurable indication of the extent to which students have mastered the critical thinking, reading, writing, and oral communication skills that are the principal learning objectives of the program.

American Studies Courses (General and Focus Area Requirements)

With the exception of the foundation courses described above, all courses that apply to the American Studies requirements are listed below. This includes a general component, required of all focus areas, as well as the more specific requirements of the individual focus areas.

American Studies Courses - General Requirement

In consultation with their advisor, students will select 33 credits from the list of American Studies Courses (below). Courses used to satisfy this requirement cannot be used to satisfy other American Studies requirements, although they may count toward CORE 2.0. Students in the American Arts focus area may select no more than 12 credits from English (ENGL.). Regardless of their focus area, all students will complete the following:

- One (1) ENGL course
- One (1) 300 or 400-level HIST course
- One (1) NAS course

ANTY 215 Human Prehistory
ANTY 225 Culture, Language & Society
ANTY 352 Native North America
ANTY 351 Archaeology of North America
ARTH 201A Art of World Civilization II
ARTH 340 19th Century Art
ARTH 440 20th Century Art
ECNS6101 Economic Way of Thinking
ECNS6792 Economic History of the U.S.
LIT 214 Regional Lit
LIT 308 Multicultural Lit
LIT 310 Early American Lit
LIT 311 19th Century Amer Lit
LIT 371 20th Ctry Brit/Amer Lit
LIT 372 Contemp Brit/Amer Lit
LIT 414 Lit of Place
LIT 431 Studies in a Major Author/s
LIT 436 Studies in Emergent Lit
GPHY 121D Human Geography
GPHY 325 Cultural Geography
GPHY 431 Historical Geography
HSTA 311 Early America
HISTA 516 American Civil War Era
HSTA 318 Gilded Age to 1940
HSTA 322 American History: WWII to Present
HSTA 464 Trans-Mississippi West
HSTA 407 Gender in US & Canadian West
HSTA 460 Montana and the West
HSTA 406 McCarthy/Ike/Truman
HSTA 408 Gender in America
HSTA 416 Race & Class in America
HISTA 411 History of the American Constitution
HSTA 450 History of American Indians
HSTA 482 History of American Technology
HSTA 412 American Thought & Culture
HSTA 468 History of Yellowstone
HISTA 470 American Environmental History
MTA 101A Film in America
MTA 103A Understanding Photography
MTA 305 Early History of Photography
MTA 304 Recent History of Photography
MOR 301 Introduction to Museum Practices
MUSI 103RA Understanding Photography
MUSI 303 Early History of Photography

American Studies Courses - Focus Area Requirements

Students must complete the following:

AMST 202RA The Arts in America
MUSI 203 IA American Popular Music: Reflections of Politics & Society
LIT 210, American Lit I, or LIT 211 American Lit II
HISTA 101H American History I, or HISTA 102H American History II, or HISTA 161D Introduction to the American West

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS 301RH Integrative Seminar in Women’s Studies</td>
<td>3</td>
</tr>
<tr>
<td>WS 201IH Introduction to Feminist Studies</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 441 Montana Local Politics</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 352 American Political Thought</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 306 Legislative Process</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 346 American Presidency</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 305 Law &amp; Inequality</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 340 Social Movements</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 345 Complex Organizations</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 352 Consumer Society</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 359 Work &amp; Occupations</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 445 Sociology of Religion</td>
<td>3</td>
</tr>
<tr>
<td>WS 201PH Introduction to Feminist Theories &amp; Methodologies</td>
<td>3</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMST 101D (Formerly AMST 201D)</td>
<td>3</td>
</tr>
<tr>
<td>NAS 105D</td>
<td>3</td>
</tr>
<tr>
<td>Modern Language</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMST 202RA The Arts in America</td>
<td>3</td>
</tr>
<tr>
<td>LIT 110H*</td>
<td>3</td>
</tr>
<tr>
<td>HISTA 101H or 102H or 161D</td>
<td>3</td>
</tr>
<tr>
<td>MUSI 203A</td>
<td>3</td>
</tr>
<tr>
<td>American Studies general requirements</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMST 401</td>
<td>4</td>
</tr>
<tr>
<td>American Studies general requirements</td>
<td>6</td>
</tr>
<tr>
<td>Focus Area requirements</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>6</td>
</tr>
</tbody>
</table>

A minimum of 42 credits must be in courses numbered 300 and above. In addition to AMST 401, at least 9 credits must be in courses numbered 400 and above.

*Students have the option to take WRIT 101W in the spring semester and 3 additional university core electives in the fall semester.
AMERICAN HISTORY FOCUS AREA
(18 cr.)

Students will acquire a broad understanding of the major events and processes of American history, and of the ways in which modern American society has been shaped by its historical development.

Students must complete the following:
HSTA 101H, American History I
HSTA 102H, American History II
HSTA 160D, Introduction to the American West
AMST 202RA The Arts in America,
or MUSI 203IA American Popular Music:
Reflections of Politics & Society
LIT 210 American Lit I,
or LIT 211 American Lit II

Freshman Year
F S
WRIT 101W* ........................................... 3
AMST 101D .............................................. 3
NASX 105D .............................................. 3
Modern Language .................................. 4  4
University Core and Electives ................. 5  8

Sophomore Year
F S
AMST 202RA or MUSI 203IA ..................... 3
LIT 110H .................................................. 3
HSTA 101H .............................................. 4
HSTA 102H .............................................. 4
LIT 310 or 311 ......................................... 3
American Studies general requirements .......... 3
University Core and Electives ................. 5  5

Junior Year
F S
HSTA 160D .............................................. 4
PSCI 210IS ............................................. 3
American Studies general requirements ...... 6  6
Focus Area requirements ...................... 5  3
Electives ............................................ 5  3

Senior Year
F S
AMST 401 ................................................ 4
American Studies general requirements .... 6  3
Focus Area requirements ...................... 6  3
Electives ............................................ 6  5

A minimum of 42 credits must be in courses numbered 300 and above. In addition to AMST 401, at least 9 credits must be in courses numbered 400 and above.

*Students have the option to take WRIT 101W in the spring semester and 3 additional university core electives in the fall semester.

AMERICAN LITERATURE FOCUS AREA
(13 cr.)

This focus area will examine critical approaches to studying the American literary tradition, and its relationship to the major social and cultural movements of American history.

Students must complete the following:
AMST 202RA The Arts in America,
or MUSI 203IA American Popular Music:
Reflections of Politics & Society
LIT 210, American Lit I
LIT 211, American Lit II

HSTA 101H, American History I
HSTA 102H, American History II
HSTA 160D, Introduction to the American West

Freshman Year
F S
WRIT 101W* ........................................... 3
AMST 202RA The Arts in America,
or MUSI 203IA American Popular Music:
Reflections of Politics & Society
LIT 210 American Lit I,
or LIT 211 American Lit II

Sophomore Year
F S
AMST 202RA or MUSI 203IA ..................... 3
LIT 310 .................................................. 3
LIT 240 .................................................. 3
American Studies general requirements ...... 3
University Core and Electives ................. 9  6

Junior Year
F S
HSTA 101H or 102H or HSTA 160D .......... 4
PSCI 210IS ............................................. 3
American Studies general requirements ...... 6  6
Focus Area requirements ...................... 5  3
Electives ............................................ 5  6

Senior Year
F S
AMST 401 ................................................ 4
American Studies general requirements .... 6  3
Focus Area requirements ...................... 6  3
Electives ............................................ 6  5

A minimum of 42 credits must be in courses numbered 300 and above. In addition to AMST 401, at least 9 credits must be in courses numbered 400 and above.

*Students have the option to take WRIT 101W in the spring semester and 3 additional university core electives in the fall semester.

Anthropology

Department of Sociology & Anthropology
http://socanth.msu.montana.edu/~dept

Students earning a B.S. in anthropology obtain a broad, anthropological perspective on the study of humankind. As part of the curriculum, students are expected to become familiar with and understand the interrelationships among the diverse aspects of our humanity – both present and past. These include the biological evolution of our species, the adaptive advantage of human symbolic capacities and technological abilities, and the development of culture from earliest recognizable traces through the emergence of complex civilizations. Historical concerns include investigations of the diversity of human languages, the relationship between language and world view, the ethnography of communicated practices, the cultural construction of the social and physical world, and the social and structural relationships that make sense out of people’s daily activities. These concepts are introduced and applied through course offerings in the four subfields of anthropology: social/cultural anthropology, archaeology, evolutionary/biological anthropology, and linguistic anthropology. Students work closely with faculty to gain a well-grounded knowledge of anthropological theories and methods that allows them to pursue research in one or more subfields of study.

Anthropology is a diverse field that provides students with a solidly-grounded liberal arts education. At the same time it is a cornerstone for understanding issues of diversity in an increasingly global world. In order to gain the skills needed to pursue research, students will learn how to think critically, read in a discerning manner, formulate logical arguments, and write in a coherent fashion. The B.S. degree in Anthropology prepares students for graduate work in this discipline. Graduate degrees are typically required for professional participation in this field. In addition to professional employment as research scientists or college-level professors, anthropologists often find positions as consultants, teachers, museum curators, or as specialists in historic preservation. Equally, domestic and foreign assignments with international, federal, or state agencies and institutions, and jobs in private industry, are available. Anthropologists are also found in public service organizations, medical and public health programs, environmental organizations, non-governmental organizations, and in positions that require community organizing abilities or ethnographic and social survey research skills.

While students are not required to apply for formal admission to the anthropology program, students must obtain a grade of “C” or better in all Anthropology courses in order to receive credit toward graduation. Before enrolling in 394 and 494 level ANTY courses, Anthropology majors must have completed the following university core courses: WRIT 101W, University Seminar, Math Core. Students who enroll in anthropology courses without the required core or anthropology
prerequisite(s) must obtain the permission of the instructor. Otherwise, those students will be required to withdraw from the course.

Academic advisors in anthropology work closely with each student to establish a viable educational plan. Ongoing interactions between students and advisors ensure that a student’s educational objectives are being met as she or he moves toward a degree.

Anthropology Minor (non-teaching)

The Anthropology Minor is a non-teaching minor designed to encourage students from any discipline to explore the cross-cultural study of humankind in order to complement or supplement course work in their respective majors. The minor introduces students to the four subfields of anthropological study (evolutionary/biological anthropology, social/cultural anthropology, archaeology, and linguistics); it also allows students within the minor the flexibility to select among a range of advanced courses in prehistory, ethnography, theory, and topical domains relative to their particular interests. The curriculum stresses critical thinking, awareness of culture-specific meanings and values, consideration of the potential sustainability of various cultural adaptations, student involvement in the learning process, and opportunities for research. For graduation, students must have a “C-” or higher in all required and elective courses in the minor.

Curriculum in Anthropology

### Freshman

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTY 101D—Anthropology &amp; Human Experience</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W—College Writing</td>
<td>3</td>
</tr>
<tr>
<td>SOC 101S—Sociological Inquiry or SOC 101D</td>
<td>3</td>
</tr>
<tr>
<td>University Core Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Math Core</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>15</td>
</tr>
</tbody>
</table>

### Sophomore

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTY 213S—Human Prehistory</td>
<td>3</td>
</tr>
<tr>
<td>ANTY 223S—Culture, Language &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>PHL 256Q—Logic............................................</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>18</td>
</tr>
</tbody>
</table>

### Junior

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTY 313—Biological Anthropology</td>
<td>3</td>
</tr>
<tr>
<td>ANTY 326—Language &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>ANTY 472—Descriptive Linguistics</td>
<td>3</td>
</tr>
<tr>
<td>ANTY 300—Archaeology Elective</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following three courses:</td>
<td></td>
</tr>
<tr>
<td>PHL 345—Philosophy of Science</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 417—Sci, Tech, Soc 1500-1800</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 419—Modern Science</td>
<td>3</td>
</tr>
<tr>
<td>ANTY 300—Archaeology Elective</td>
<td>3</td>
</tr>
<tr>
<td>ANTY 300—Electives</td>
<td>6</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>12</td>
</tr>
</tbody>
</table>

### Senior

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following two courses:</td>
<td></td>
</tr>
<tr>
<td>ANTY 428—Anthropological Theory or ANTY 425R—Social Organization</td>
<td>3</td>
</tr>
<tr>
<td>ANTY 300—Electives</td>
<td>9</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>15</td>
</tr>
</tbody>
</table>

Anthropology majors must complete one of the following sequences of courses.

#### Sequence A

- A minor approved by the student’s advisor Min 18

#### Sequence B

- Design an array of supporting coursework to complement your course of study in Anthropology 18

Departmental Honors: Students may graduate with Departmental Honors if they meet the following requirements: GPA of 3.5 or higher and complete an undergraduate thesis in Anthropology.

### ANTHROPOLOGY MINOR (Non-Teaching)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTY 213S—Human Prehistory</td>
<td></td>
</tr>
<tr>
<td>or ANTY 212S—Bones, Apes, and Ancestors</td>
<td>3</td>
</tr>
<tr>
<td>ANTY 223S—Culture, Language &amp; Society</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Anthropology Electives

- At least 12 of the 15 electives must be from upper division courses numbered 300 and above 15
- The maximum number of Anthropology transfer credits that may be applied toward the minor is 9; additional transfer credits may be accepted as negotiated with your advisor.
- For Anthropology majors, the maximum number of Anthropology transfer credits accepted is 18. Major requirements include 21 elective Anthropology credits of which 18 must be upper division (300 and above) and no more than 3 credits of ANTY 490 and 492 combined can count toward fulfillment of the elective credits.
- For graduation in Anthropology students must have a grade of C- or higher in all Anthropology courses. A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

### Biological Sciences

**Department of Ecology**

http://www.montana.edu/ecology

Note: MSU’s programs in the biological sciences are distributed across multiple departments. MSU does not have a single Department of Biology. For additional options see pages 78 and 155.

Four options are available in the Department of Ecology which lead to the B.S. in Biological Sciences:

- **Biology Teaching**
- **Conservation Biology and Ecology**
- **Fish and Wildlife Ecology and Management**
- **Organismal Biology**

Students interested in secondary school biology teaching and Montana state certification must fulfill a Biological Sciences major and the professional education courses; a teaching minor or second area of certification is recommended.

Most positions for professional biologists require a graduate degree. The degree options are intended to provide the prerequisite educational background for graduate programs. However, admission to graduate programs is highly competitive and will depend on academic performance, scores on standardized exams (the Graduate Record Exams), and other factors.

### Requirements for Admission to Upper Division Courses in Biology

For admission to upper division (numbered 300 or higher) Biology (BIOB, BIOE, BIOO, BIOM) and Fish and Wildlife Management (WILD) courses, students must have completed at least 45 total university credits, with a cumulative GPA of at least 2.5 for all courses with a “C-” or better for any prerequisite courses. Any student who enrolls in an upper division biology course without satisfying these requirements will be required to withdraw from the course.

### Grade Requirements

To graduate with a B.S. in Biological Sciences, students must earn a grade of “C-” or better for every course required for the specific option (Conservation Biology and Ecology, Fish and Wildlife Ecology and Management, Organismal
Biology, and Biology Teaching), including courses taken to fulfill required biology elective credits, all required courses in non-biology rubrics, and all upper division courses.

Curricula in Biological Sciences

CONSERVATION BIOLOGY AND ECOLOGY OPTION

The Conservation Biology and Ecology option will give students a clear understanding of the ways that natural and human-related processes affect species, communities and ecosystems, and relate this knowledge to its broad societal context. This option provides students with strong preparation for graduate study which is necessary for most jobs in Ecology and Conservation Biology. The defining characteristics of the degree include:

- Understanding natural and human-related processes that affect populations, species, communities, and ecosystems.
- Understanding methods to quantify and mitigate effects on populations, species, communities and ecosystems.
- Strong emphasis on background in basic biology.
- Required grounding in courses on physical environment & human dimensions of conservation, including economics, law, history and social science.
- High standards for statistical knowledge.
- Emphasis on classes in written and spoken communication.

Freshman Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIB 103CS</td>
<td>Environmental Science &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>BIB 105N</td>
<td>Principles of Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>BIB 109</td>
<td>Principles of Living Systems</td>
<td>4</td>
</tr>
</tbody>
</table>

Sophomore Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIEB 375</td>
<td>Genetics</td>
<td>3</td>
</tr>
<tr>
<td>CHM 143</td>
<td>Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHM 211</td>
<td>Elements of Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>ENSC 110</td>
<td>Land Resources &amp; Environmental Science</td>
<td>3</td>
</tr>
<tr>
<td>ENCC 115</td>
<td>Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 11C3</td>
<td>Intro to Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>PHL 236</td>
<td>Logic</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 301</td>
<td>College Writing II</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216</td>
<td>Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 217Q</td>
<td>Intermediate Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

Junior Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCHM 389</td>
<td>Biochemistry</td>
<td>5</td>
</tr>
<tr>
<td>ENSC 245</td>
<td>Soil Resources</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 370</td>
<td>General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 412</td>
<td>Ecol Effect Climate Change</td>
<td>2</td>
</tr>
<tr>
<td>BIEB 490</td>
<td>Conservation Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 420</td>
<td>Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 412</td>
<td>Animal Physiology</td>
<td>4</td>
</tr>
<tr>
<td>BIEB 433</td>
<td>Plant Physiology</td>
<td>4</td>
</tr>
<tr>
<td>STAT 410</td>
<td>Methods for Data Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University CORE</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Additional Electives</td>
<td>6-9</td>
<td></td>
</tr>
</tbody>
</table>

Senior Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIEB 460</td>
<td>Conservation Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB</td>
<td>Research in Conservation Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 415</td>
<td>Ichthyology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 475</td>
<td>Mammalogy</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 470</td>
<td>Ornithology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 455</td>
<td>Plant Ecology</td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University CORE and Additional Electives</td>
<td>6-9</td>
<td></td>
</tr>
</tbody>
</table>

Social Sciences Elective Block  

Take at least two of the following (6 credits):  
- ENSC 132 | Econ & the Environment | 3 |
- STAT 216Q | Introduction to Statistics | 3 |
- GPHY 611 | Biogeography | 3 |
- WILD 301 | Principles of Fish & Wildlife Management | 3 |
- BIOM 415 | Microbial Diversity | 3 |
- ENSC 465 | Environmental Biophysics | 3 |
- ENSC 468 | Ecosystem Biogeochimistry & Global Change | 3 |

Freshman Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIB 103CS</td>
<td>Environmental Science &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>BIB 105N</td>
<td>Principles of Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>BIB 109</td>
<td>Principles of Living Systems</td>
<td>4</td>
</tr>
</tbody>
</table>

Sophomore Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIEB 375</td>
<td>Genetics</td>
<td>3</td>
</tr>
<tr>
<td>CHM 143</td>
<td>Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHM 211</td>
<td>Elements of Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>ENSC 110</td>
<td>Land Resources &amp; Environmental Science</td>
<td>3</td>
</tr>
<tr>
<td>ENCC 115</td>
<td>Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 11C3</td>
<td>Intro to Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>PHL 236</td>
<td>Logic</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 301</td>
<td>College Writing II</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216</td>
<td>Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 217Q</td>
<td>Intermediate Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

Junior Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCHM 389</td>
<td>Biochemistry</td>
<td>5</td>
</tr>
<tr>
<td>ENSC 245</td>
<td>Soil Resources</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 370</td>
<td>General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 412</td>
<td>Ecol Effect Climate Change</td>
<td>2</td>
</tr>
<tr>
<td>BIEB 490</td>
<td>Conservation Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 420</td>
<td>Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 412</td>
<td>Animal Physiology</td>
<td>4</td>
</tr>
<tr>
<td>BIEB 433</td>
<td>Plant Physiology</td>
<td>4</td>
</tr>
<tr>
<td>STAT 410</td>
<td>Methods for Data Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University CORE</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Additional Electives</td>
<td>6-9</td>
<td></td>
</tr>
</tbody>
</table>

Senior Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIEB 460</td>
<td>Conservation Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB</td>
<td>Research in Conservation Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 415</td>
<td>Ichthyology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 475</td>
<td>Mammalogy</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 470</td>
<td>Ornithology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 455</td>
<td>Plant Ecology</td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University CORE</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Additional Electives</td>
<td>6-9</td>
<td></td>
</tr>
</tbody>
</table>

Social Sciences Elective Block  

Take at least two of the following (6 credits):  
- ENCC 132 | Econ & the Environment | 3 |
- STAT 216Q | Introduction to Statistics | 3 |
- GPHY 611 | Biogeography | 3 |
- WILD 301 | Principles of Fish & Wildlife Management | 3 |
- BIOM 415 | Microbial Diversity | 3 |
- ENSC 465 | Environmental Biophysics | 3 |
- ENSC 468 | Ecosystem Biogeochimistry & Global Change | 3 |

Freshman Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIB 103CS</td>
<td>Environmental Science &amp; Society</td>
<td>3</td>
</tr>
<tr>
<td>BIB 105N</td>
<td>Principles of Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>BIB 109</td>
<td>Principles of Living Systems</td>
<td>4</td>
</tr>
</tbody>
</table>

Sophomore Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIEB 375</td>
<td>Genetics</td>
<td>3</td>
</tr>
<tr>
<td>CHM 143</td>
<td>Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHM 211</td>
<td>Elements of Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>ENSC 110</td>
<td>Land Resources &amp; Environmental Science</td>
<td>3</td>
</tr>
<tr>
<td>ENCC 115</td>
<td>Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 11C3</td>
<td>Intro to Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>PHL 236</td>
<td>Logic</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 301</td>
<td>College Writing II</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216</td>
<td>Introduction to Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STAT 217Q</td>
<td>Intermediate Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

Junior Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCHM 389</td>
<td>Biochemistry</td>
<td>5</td>
</tr>
<tr>
<td>ENSC 245</td>
<td>Soil Resources</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 370</td>
<td>General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 412</td>
<td>Ecol Effect Climate Change</td>
<td>2</td>
</tr>
<tr>
<td>BIEB 490</td>
<td>Conservation Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 420</td>
<td>Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 412</td>
<td>Animal Physiology</td>
<td>4</td>
</tr>
<tr>
<td>BIEB 433</td>
<td>Plant Physiology</td>
<td>4</td>
</tr>
<tr>
<td>STAT 410</td>
<td>Methods for Data Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University CORE</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Additional Electives</td>
<td>6-9</td>
<td></td>
</tr>
</tbody>
</table>

Senior Year  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIEB 460</td>
<td>Conservation Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB</td>
<td>Research in Conservation Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 415</td>
<td>Ichthyology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 475</td>
<td>Mammalogy</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 470</td>
<td>Ornithology</td>
<td>3</td>
</tr>
<tr>
<td>BIEB 455</td>
<td>Plant Ecology</td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social Sciences Elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University CORE</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Additional Electives</td>
<td>6-9</td>
<td></td>
</tr>
</tbody>
</table>

Social Sciences Elective Block  

Take at least two of the following (6 credits):  
- ENCC 132 | Econ & the Environment | 3 |
- STAT 216Q | Introduction to Statistics | 3 |
- GPHY 611 | Biogeography | 3 |
- WILD 301 | Principles of Fish & Wildlife Management | 3 |
- BIOM 415 | Microbial Diversity | 3 |
- ENSC 465 | Environmental Biophysics | 3 |
- ENSC 468 | Ecosystem Biogeochimistry & Global Change | 3 |

University requirements for graduation also must be completed, including university core requirements and a minimum of 129 total credits of which 42 must be in courses numbered 300 and above. The classes listed above satisfy university core requirements except that you must take also take one class each for the Diversity, Arts and Humanities requirements (courses with suffixes of D, A and H). Some of the suggested electives meet these core requirements. The curriculum above completes 57-41 credits numbered 300 and above (including 6 credits in the Social Sciences elective block). You have some flexibility in the classes that you select to fill your Junior and Senior years. It is intended that you use these credits to develop strength in an area of emphasis that matches your interests and goals. We recommend that you consult the list of suggested elective below and speak to your advisor.

Ecology And Evolution Option

The Ecology and Evolution Option has been superseded by the Conservation Biology and Ecology Option. New students will not be admitted to this option effective summer semester 2012. Current majors in this option may continue in this option or transfer to another Ecology Department option.

The option in Ecology and Evolution combines (1) a basic sequence of courses in ecology, (2) a broad background in the sciences and Mathematics, and (3) a flexible curriculum of upper-division courses in biology and related disciplines. The program requires students to develop strength in one supporting science or in Mathematics and statistics. Because most professional positions in ecology and evolution require an M.S. or Ph.D., this program is designed to prepare students for graduate study, while allowing the flexibility to develop an area of specialization, or to study a broad range of disciplines related to ecology.

There are two possible biology sequences for Ecology and Evolution:
- BIB 160 and BIB 170N or
BIOB 260 & BIOC 258. The choice of sequence depends on prerequisites and influences both the freshman and sophomore year. If you prefer to begin biology immediately, or you will not complete STAT 216Q and CHMY 141 during your freshman year, you should take the BIOC 160 and BIOC 170IN sequence. If you will take CHMY 141 and STAT 216Q during your freshman year, and you intend to complete the B Chemistry sequence (see below), you may prefer to take the BIOC 260 and BIOC 258 sequence your sophomore year.

Students pursuing the Ecology and Evolution Option should begin each of the two supporting sequences in their freshman year. As the two supporting sequences are completed, students should shift their effort toward satisfying the requirements for upper division courses in BIOL and related disciplines.

ECOLOGY AND EVOLUTION OPTION

BIOB 170 & BIOC 160 Sequence
Freshman Year
BIOB 170IN-Principles of Biological Diversity.................4
BIOB 160-Principles of Living Systems.................4
Begin the Support Courses.................4
(Optional I) below
Other Required Courses** and
University Core.........................8

Sophomore Year [Recommended].................8
WRIT 201-College Writing II.................3
Other Required Courses** and
University Core.........................12

BIOB 258 & 260 Sequence
Freshman Year
BIOB 160--Principles of Living Systems....................4
BIOB 258--Intro Biology: to Cells.........................5
BIOB 256-Intro Biology: Molecules to Populations..................4
WRIT 201-College Writing II
[Recommended].........................3
Other Required Courses** and
University Core.........................3

Both Sequences
Junior Year
BIOB 375-General Genetics.................3
BIOC 370-General Ecology.................3
Other Required Courses** and
University Core.........................12

Senior Year
BIOC 420-Evolution.........................3
BIOC 499-Senior Thesis/Capstone.................2
Other Required Courses** and
University Core.........................15

*Depending on first letter of your last name.
Students are told at Orientation when to take WRIT 101W.

**Other Required Courses from
University Core and Electives.................3-6

FISH AND WILDLIFE ECOSYSTEMS

The option in Fish and Wildlife Ecology and Management is a professional degree program offered for those students who have an interest in employment in these fields. Study leading toward a bachelor’s degree emphasizes basic principles of animal ecology, with considerable work in related fields. Students graduating with a bachelor’s degree will be qualified for entry-level positions in natural resource management. However, the four-year option primarily provides prospective fish and wildlife biologists an adequate background for graduate work, which is required for most professional positions in natural resource agencies.

Freshman Year
WRIT 201-Intro to Fish & Wildlife.................1
BIOB 170IN-Principles of Biological Diversity.................4
BIOB 160-Principles of Living Systems.................4
CHMY 121IN-Intro to Organic & Biochem.................4
Total chemistry credits. Sequence A.........................8

Sequence B
CHMY 141-College Chemistry I.................4
CHMY 145-College Chemistry II.................4
CHMY 211-Elements of Organic Chemistry.................5
BCH 380-Biochemistry.................5
Total chemistry credits. Sequence B.........................18

Physics category
Sequence A
PHSX 205-College Physics I.................4
PHSX 207-College Physics II.................4
Total physics credits. Sequence A.........................8

Sequence B
PHSX 220-Physics I.................4
PHSX 222-Physics II.................4
Total physics credits. Sequence B.........................8

Mathematics and Statistics Category
Sequence A
M 161Q-Survey of Calculus.................4
BIOC 318-Biometry.................3
Total Math and statistics credits. Sequence A.........................8

Sequence B
M 161Q-Survey of Calculus.................4
STAT 216Q-Intro to Statistics.................3
STAT 217Q-Interned Statistical Concepts.................3
Total M and statistics credits. Sequence B.........................10

(II) Biology Electives: A minimum of 25 elective credits must be completed. Of these 25 credits at least 15 must be upper division; no more than 6 total credits of BIOL, BIOE, BIOC, BIOM and fish and wildlife management (F&W) rubrics. Certain courses in other rubrics (LRES, BCH (UD only), ARNR, ERTH, GEO, and STAT) can be applied toward the 25 elective credits, with the prior approval of both your advisor and the certifying officer for the Ecology and Evolution option before the course is taken. If BIOC 258 and BIOC 260 are taken, then BIOC 256 is a highly recommended elective.

University requirements for graduation also must be completed, including university core requirements and a minimum of 120 total credits of which at least 42 credits must be in courses numbered 300 and above. Depending on supporting and biology elective courses selected, the curriculum requires 27 to 42 credits from courses numbered 300 and above. From 0 to 15 additional credits must be taken from courses numbered 300 and above to satisfy the university requirement for 42 credits.
PROGRAMS OF INSTRUCTION – LETTERS AND SCIENCE

**ORGANISMAL BIOLOGY OPTION**

The Organismal Biology option provides a rigorous program of study in plant or animal biology at the whole-organism, species, population, and community levels, while allowing students flexibility in selecting those biology courses that best meet their interests and objectives. It accomplishes this by requiring students to select 20 required credits in biology in consultation with their advisor to achieve a personal curriculum. In addition, students can use the elective credits to develop strength in a second area which may enhance

their prospects of gaining employment with a bachelor’s degree or their prospects of acceptance into specialized graduate programs. Most professional positions in biology require completion of one or more graduate degrees, and the Organismal Biology option is excellent preparation for graduate studies.

There are two possible biology sequences for Organismal Biology: BIO 160 & BIO 170 or BIO 256 & BIO 260. The recommended sequence depends on prerequisites and influences both the freshman and sophomore year.

**BIOB 160 & 170 Sequence**

If you prefer to begin biology immediately, have not had high school chemistry, or will not take STAT 216 during Fall semester of your freshman year:

**Freshman Year**

- **BIOB 160**: Principles of Living Systems
- Take one of the following:
  - BIOE 405–Behavioral & Evol Ecology
  - BIO 440–Conservation Biology
  - BIO 480–Conservation Genetics
  - BIOE 455–Plant Ecology
- University Core and Electives

**Sophomore Year**

- Take one of the following:
  - BIOB 170N: Principles of Biological Diversity
  - BIO 160: Principles of Living Systems
- CHMY 141-College Chemistry I
- CHMY 143–College Chemistry II
- Take one of the following:
  - BLIN 101–University Seminar
  - WRIT 101W
- University Core and Electives

**Senior Year**

- Take one of the following:
  - BIOB 258: Intro Biology: The Organism
  - BIOO 412: Animal Physiology
  - BIOM 497
- University Core and Electives

A minimum of 120 credits is required for graduation; at least 42 of these credits must be in courses numbered 300 and above. The curriculum includes 35-39 credits numbered 300 and above, so an additional three credits may need to be selected.

Additional upper division electives must be taken in biology, fish and wildlife, or a related field (ANSC, NRSM, ENSC, GPHY, and STAT). You should consult with your advisor about the appropriateness of potential upper division electives taken outside the Biology set or WILD rubrics. This curriculum satisfies all but about 12-18 credits of the University Core Requirements depending on which core courses are taken to meet the Diversity and Humanities core requirement. Students are expected to be aware of all requirements for graduation and to ensure that they meet these requirements.

---

**BOTH SEQUENCES**

**Junior Year**

- BIO 375–General Genetics
- Take one of the following:
  - BIOE 380–Biochemistry
  - PHSX 205–College Physics I
- University Core and Electives

**Sophomore Year**

- BIO 256–Intro Biol Cells to Organisms
- Take one of the following:
  - CHMY 141-College Chemistry I
  - CHMY 143–College Chemistry II
- Take one of the following:
  - BLIN 101–University Seminar
  - WRIT 101W
- University Core and Electives

**Senior Year**

- BIO 420–Evolution
- BIOE 405–Behavioral & Evol Ecology
- University Core and Electives

---

**ADDITIONAL REQUIRED BIOLOGY ELECTIVES**

A minimum of 20 credits of Biology electives also must be completed, from courses in BIOB, BIOE, BIOO, ANSC, NRSM, WILD, BCH (UD only), BIOM (except BIOM 497). At least 16 of these credits must be in upper division courses numbered 300 and above. Credits must be for regularly scheduled courses, except that up to 4 total credits of under-graduate research in Biology (BIOE 490, 492) and up to 2 credits of Biology Teaching (BIOB 497) may be included. Up to 6 credits of certain courses in basic biological sciences from departments other than these may be included, with the prior approval of the advisor and Organismal Biology Certifying Officer before the course is taken.

University requirements for graduation also must be completed, including university core requirements and a minimum of 120 total credits of which at least 42 credits must be in courses numbered 300 and above. Depending on courses selected, the curriculum includes 30 to 42 credits numbered 300 and above, so an additional three credits may need to be selected.

---

**BIOLOGICAL TEACHING OPTION**

The Biology Teaching Option certifies graduates to be qualified to teach secondary school biology. It is similar to the Organismal Biology Option, but includes professional preparation courses required for state teacher licensure. Since the Biology Teaching Option includes 40 credits of biology courses, it is an extended major and the State of Montana does not require a teaching...
minor. However, employment opportunities will be enhanced by obtaining a second area of licensure, usually a teaching minor (listed under College of Education, Health and Human Development). Obtaining a Biology Teaching major, a teaching minor, and licensure will require more than eight semesters.

The Biology Teaching Option includes 40 credits of Biology (24 to 25 credits of basic biology courses, plus BIOM 103 or BIOM 360, and 12 Biology elective credits); supporting chemistry, physics, and Mathematics courses; 32 credits in the university core; and 32 credits of professional preparation. Biology electives must include 7 to 8 credits of advisor-approved upper division credits in biological sciences.

### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 170N--Principles of Biological Diversity</td>
<td>4</td>
</tr>
<tr>
<td>BIB 160--Principles of Living Systems</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>COM 110US--Public Communication (or)</td>
<td>4</td>
</tr>
<tr>
<td>CLS 101US--University Seminar</td>
<td>3</td>
</tr>
<tr>
<td>M 161Q--Survey of Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

Take one of the following:

- HDCF 150US--Lifespan Human Development
- EDEC 160--Early Childhood through
- Adolescent Development
- University Core and Electives


### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 380--Biochemistry</td>
<td>5</td>
</tr>
<tr>
<td>CHMY 211--Elements of Organic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>EDUC 202--Early Field Experience</td>
<td>1</td>
</tr>
<tr>
<td>EDUC 225--Psy &amp; Adolescent Development</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

- BIOM 103N-Unseen Universe: Microbes
- BIOM 360-General Microbiology
- PHSX 295-College Physics I
- PHSX 297-College Physics II


### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>BIB 570-General Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIB 577--Practical Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIB 420--Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIB 499--Senior Thesis/Capstone</td>
<td>2</td>
</tr>
</tbody>
</table>

Take one of the following:

- BIB 412--Animal Physiology
- BIB 435--Plant Physiology
- PHSX 370--Integrating Tech in Education
- EDU 382--Assessment, Curric., Instruction

Take one of the following:

- BIB 518--Biomathematics
- STAT 216Q--Introduction to Statistics
- University Core and Electives


### Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIB 408—Rocky Mountain Ecosystems</td>
<td>2</td>
</tr>
<tr>
<td>EDU 497--Methods: 5-12 Science</td>
<td>3</td>
</tr>
<tr>
<td>EDU 395--Practicum: 5-12</td>
<td>1</td>
</tr>
<tr>
<td>IHD 356--Exceptional Needs</td>
<td>3</td>
</tr>
<tr>
<td>EDU 211D--Multicultural Education</td>
<td>3</td>
</tr>
<tr>
<td>EDU 495--Student Teaching: 5-12</td>
<td>10-12</td>
</tr>
<tr>
<td>EDU 408--Professional Issues: 5-12</td>
<td>2</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
</tr>
</tbody>
</table>

*Must be taken in assigned semester

University requirements for graduation also must be completed, including university core requirements and a minimum of 120 total credits of which 42 must be in courses numbered 500 and above. In order to student teach, your GPA in sciences and M must be at least 2.50, and your GPA in basic skills (M verbal writing) must be at least 2.50 with no grade less than “C”.

### Cell Biology and Neuroscience

**Department of Cell Biology and Neuroscience**

http://cbn.montana.edu/

Note: MSU’s programs in the biological sciences are distributed across multiple departments. MSU does not have a single Department of Biology. For additional options see pages 78 and 155.

The department participates in MSU’s Genetics Minor and recommends this minor to students particularly interested in genetics.

Two options are available in the Department of Cell Biology and Neuroscience which lead to the B.S. in Cell Biology and Neuroscience with options in Biomedical Sciences and in Cell Biology and Neuroscience.

### Premedicine, Predentistry, Pre-Physician Assistant and Preoptometry

Students may prepare for admission to medical, dental, or optometry school by following the option in Biomedical Sciences in the Department of Cell Biology and Neuroscience. The Department of Cell Biology and Neuroscience provides advising on matters pertaining to the biomedical sciences curriculum; advising on matters pertaining to admission to professional schools is provided by the Pre-Health Professions advisor in the Health Professions Advising Office.

### Requirements for Admission to Upper Division Courses in Biology

For admission to upper division (numbered 300 and above) courses taught in the Department of Cell Biology and Neuroscience, students must have completed at least 30 total university credits with a cumulative GPA of at least 2.5 for all courses.

### Grade Requirements for Fulfillment of Degree Options

In order to graduate with a B.S. in the department, students must earn a grade of “C-” or better for every course required for the specific option, including courses taken to fulfill required elective credits.

### Graduation in Absentia

Some professional programs accept students before their degree requirements are completed. It is often possible to transfer credits from the first year of professional school to MSU to graduate in absentia. The mechanics involve sending an official copy of the year one professional school transcript to the MSU academic advisor; he/she then writes a letter to the MSU Registrar explaining which credits transfer and how they fulfill the degree requirements. The student then registers in absentia at MSU for the semester in which the B.S. degree will be awarded.

### Curricula in the Cell Biology and Neuroscience Department

**BIOMEDICAL SCIENCES OPTION**

The curriculum of the biomedical sciences option provides a strong background for students who are (1) interested in a biomedical sciences career in research or teaching, or (2) plan on a career in medicine or other health professions. The curriculum has sufficient breadth to introduce the student to a wide range of disciplines, but is flexible enough so that students can focus in their last two years on areas of specific interest. Students interested in a career in a health science profession should consult the Pre-Health Professions Advisor for information regarding admission to professional schools while those interested in veterinary medicine should consult the Pre-Veterinary Advisor in the Department of Immunology and Infectious Diseases.
Employment opportunities, especially at the technical level, are available with a B.S. in Cell Biology and Neuroscience with a biomedical sciences option. However, this curriculum is designed to better prepare students for professional or graduate training.

The biomedical sciences curriculum is designed to allow the students to take basic courses in physical sciences while tailoring the courses in life sciences to meet their personal objectives and interests. This is done by allowing 24 of the required 44 credits in Biology to be elective credits in life sciences; biology, biochemistry, microbiology, or other appropriate fields. Advanced students are strongly encouraged to enroll in BIOL 490, Undergraduate Research.

This course provides an opportunity to gain valuable experience in biomedical research.

### Programs of Instruction – Letters and Science

#### Freshman Year
- **F S**
  - BIOL 185–Integrative Physiology .......... 4
  - BIOL 256–Intro Bio: Cells to Organisms .......... 4
  - CHMY 141–College Chemistry I .......... 4
  - CHMY 145–College Chemistry II .......... 4
  - WRIT 101W–College Writing I .......... 3
  - M 161Q–Survey of Calculus .......... 4
  - STAT 216Q–Introduction to Statistics .......... 3
  - CLS 101US–Knowledge & Community .......... 3
  - University Core and Electives .......... 4

#### Sophomore Year
- **F S**
  - BIOL 260–Cellular & Molecular Biology .......... 4
  - BIOL 258–Intro Bio:Organisms to Populations .......... 4
  - CHMY 321–Organic Chemistry I .......... 4
  - CHMY 325–Organic Chemistry II .......... 4
  - PSX 205–College Physics I .......... 4
  - PSX 207–College Physics II .......... 4
  - University Core and Electives .......... 3

#### Junior Year
- **F S**
  - BIOL 380–Biochemistry .......... 5
  - BIOL 520–Biomedical Genetics .......... 3
  - WRIT 221–Intermediate Tech Writing (or) .......... 3
  - M 171Q–Calculus II .......... 4
  - University Core and Electives .......... 7

#### Senior Year
- **F S**
  - BIOL 499–Senior Thesis/Capstone .......... 2
  - University Core and Elective .......... 13

#### Additional Requirements
A minimum of 24 additional elective credits of courses in the life sciences must be completed, most typically from courses in Cell Biology & Neuroscience, Microbiology, and Biochemistry. Of these 24 credits, at least 18 must be upper division; no more than 6 credits of BIOL 490 and no more than 2 credits of BIOL 494 or BIOL 470 can be applied toward these 24 elective credits. See the department office for a full list of electives.

### Examples of elective courses include, but are not limited to:
- BIOL 201–Human Anatomy and Physiology I .......... 5
- BIOL 211–Human Anatomy and Physiology II .......... 4
- BIOL 510–Comparative Vertebrate Anatomy .......... 4
- BIOL 525–Human Developmental Biology .......... 5
- BIOL 340–Principles of Histology .......... 3
- BIOL 315–Physiology .......... 3
- BIOL 305–Human Pathophysiology .......... 3
- BIOL 490–Advanced Human Anatomy and Physiology .......... 4
- BIOL 411–Advanced Human Anatomy .......... 4
- BIOO 422–Genes and Cancer .......... 3
- BIOO 425–Sensory Neurophysiology .......... 3
- BIOO 430–Neuroendocrinology .......... 3
- BIOO 458–Developmental Mechanisms .......... 3
- BIOO 455–Cognitive Neuroscience .......... 3
- BIOL 449–Neuroscience of Mental Illness .......... 5
- BIOL 476–Gene Construction .......... 3
- BIOO 455–Molecular Medicine .......... 3
- BIOL 470–Individual Problems .......... 1
- BIOL 490R–Undergraduate Research .......... 16

### Cell Biology and Neuroscience Option

The curriculum in the cell biology and neuroscience option provides a strong background for students who are interested in a career in research or teaching in cell biology, molecular biology, developmental biology, or neuroscience. The curriculum provides the opportunity to take the courses necessary to make a competitive application to graduate school or to obtain a technical position. There is a possibility to focus the curriculum in one of the three areas listed by using elective credits in specific disciplines. Advisor approved substitutions are possible for upper division courses to tailor the degree to the student’s interests.

Advanced students are strongly encouraged to enroll in BIOL 492 Individual Problems and BIOL 490 Undergraduate Research. These courses provide an opportunity to gain valuable experience in biomedical research. Such experiences are useful for both an appreciation of the research effort required in graduate school and for gaining experience in technical methods for a technical position.

### Sophomore Year
- **F S**
  - BIOL 260–Cellular & Molecular Biology .......... 4
  - BIOL 520–Biomedical Genetics .......... 3
  - CHMY 321–Organic Chemistry I .......... 4
  - CHMY 325–Organic Chemistry II .......... 4
  - PHSX 205–College Physics I .......... 4
  - PHSX 207–College Physics II .......... 4
  - University Core and Electives .......... 0

### Junior Year
- **F S**
  - BIOL 380–Biochemistry .......... 5
  - BIOL 520–Biomedical Genetics .......... 3
  - WRIT 221–Intermediate Tech Writing (or) .......... 3
  - M 171Q–Calculus II .......... 4
  - University Core and Electives .......... 7

### Senior Year
- **F S**
  - BIOL 499–Biomed Sci Sr Sem .......... 2
  - University Core and Electives .......... 15

* Students should take either CHMY 321 and 312 or CHMY 211 and 301

### Additional Requirements
For a focus in Cell, Molecular, or Developmental Biology any 3 of the following courses must be taken plus any 3 elective credits in life sciences. A minimum of 18 additional upper division elective credits in the life sciences must be completed from Cell Biology & Neuroscience, Microbiology or Biochemistry courses. Of these 15, at least 6 must be from 400 level courses. No more than 6 credits of BIOL 490 can be applied toward the 18 elective credits.

### Suggested Courses
Following is a list of suggested courses that students can choose as electives to focus their major on a particular area of interest.

#### Cell/Developmental Biology:
- BIOL 325–Human Developmental Biology .......... 3
- BIOL 540–Principles of Histology .......... 3
- BIOL 422–Genes and Cancer .......... 3
- BIOL 490R–Undergraduate Research .......... 3

#### Neuroscience:
- BIOL 440–Neuroscience of Mental Illness .......... 3
- BIOL 425–Sensory Neurophysiology .......... 3
- BIOL 455–Cognitive Neuroscience .......... 3
- BIOL 490R–Undergraduate Research .......... 3

#### Anatomy and Physiology:
- BIOL 310–Comparative Vertebrate Anatomy .......... 4
- BIOL 395–Human Pathophysiology .......... 4
- BIOL 499–Advanced Human Anatomy .......... 4
- BIOL 411–Advanced Human Anatomy .......... 4
- BIOL 490R–Undergraduate Research .......... 3
The Department of Chemistry and Biochemistry offers approved programs emphasizing modern areas in Chemistry and biochemistry at both the undergraduate and graduate levels. The curriculum for the Bachelor of Science degree in chemistry provides basic education in chemistry with sufficient breadth and flexibility to allow students to enter a variety of chemistry-related careers. Several curricular options are available, each of which is career- and employment-directed. Employment opportunities are extensive. For example, at least 36 percent of the research and development workforce in the United States have degrees in chemistry, more than any other discipline. The different options allow the student to emphasize his or her personal choices in course selection.

All of the options emphasize current aspects of chemistry and biochemistry with particular attention given to instrumentation, modern concepts and methods, and use of computers to help solve chemical problems. Participation in undergraduate research within an active research group in the department is an important and rewarding part of the overall program. A wide range of fundamental research programs are ongoing in all major areas of chemistry: organic, analytical, inorganic, physical, and biochemistry.

The Department of Chemistry and Biochemistry participates in several instructional and research programs of an interdisciplinary nature. These include nanomaterials, optical technology, thermal biology, biofilm engineering, computer modeling of proteins and nucleic acids, and the WWAMI medical education program. The department has active graduate programs leading to the degrees of Master of Science and Doctor of Philosophy. These degrees may be obtained in either chemistry or biochemistry.

The department encourages majors in allied fields to consider either a chemistry or a biochemistry minor.

Chemistry (Professional) Option
This option includes a central core of chemistry courses that, together with technical electives, allows the students to prepare for careers in chemistry or related fields such as medicine, patent law, chemical business, or science writing. Students interested in the more quantitative and physical aspects of chemistry may wish to include additional Mathematics and/or physics courses. Students electing this option will be well prepared both for advanced study and for immediate employment in industry, government, or business.

Biochemistry Option
This option includes a core of chemistry, biochemistry, and biology courses for the student interested in the molecular nature of biological materials and life processes. A broad choice of biological science electives will allow the students to prepare for careers in human, animal, plant, or microbial biochemistry. Trained biochemical scientists are in demand for research and teaching in universities and for research and development work in chemical, pharmaceutical, and biotechnical industries, in medical laboratories, and in state and federal governments. Students who complete the curriculum satisfactorily will be prepared to assume responsible professional positions or undertake graduate level work in the life sciences. The curriculum also provides an excellent preparation for medical, dental, or veterinary school.

Teaching Option
This option is designed to prepare prospective teachers of chemistry at the secondary level. It provides a thorough background in the basic fields of chemistry and an acquaintance with aspects of chemistry in society that are essential to the practicing teacher of chemistry. The chemistry Teaching option certifies graduates to be qualified to teach secondary school chemistry. Employment opportunities will be enhanced by obtaining a second area of certification, usually a teaching minor. Obtaining a teaching major, a teaching minor, and certification will require more than 120 credits.

Chemistry/Biochemistry Minors (Non-teaching)
A minor in either chemistry or biochemistry is offered for students with other majors who wish to receive formal acknowledgement for taking a core of intermediate-level chemistry and/or biochemistry courses. The minor is designed to strengthen the students’ opportunities for admission to graduate school or for industrial employment.

Curricula in Chemistry and Biochemistry
CHEMISTRY (PROFESSIONAL OPTION)

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 151-Honors College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 153-Honors College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 194-Seminar/Workshop</td>
<td>1</td>
</tr>
<tr>
<td>M 171Q-Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>M 172Q-Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>PHSX 205-College Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 220-Gen &amp; Mod Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 290-Honors Gen &amp; Mod Physics</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>CHMY 321-Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 351-Honors Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>M 273Q-Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>PHSX 207-College Physics II</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 222-Physics II</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 242-Honors Gen &amp; Mod Phys II</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>CHMY 394-Seminar/Workshop</td>
<td>1</td>
</tr>
<tr>
<td>CHMY 373-Phys Chem-Qtm Chm &amp; Spectscopy</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 375-Phys Chem-Kntcs &amp; Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 372-Physical Chemistry Lab I</td>
<td>1</td>
</tr>
<tr>
<td>CHMY 374-Physical Chemistry Lab II</td>
<td>2</td>
</tr>
<tr>
<td>CHMY 401-Advanced Inorganic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>*CHMY 490R-Undergraduate Research</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>
**PROGRAMS OF INSTRUCTION – LETTERS AND SCIENCE**

**Senior Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 417-Synthetic Chemistry</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 494-Capstone Seminar I</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CHMY 421-Adv Instrument Analysis Lab</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>CHMY 499-Senior Thesis/Capstone</strong></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Physical Science Electives</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

- Six (6) credits of chemistry 499 are tabulated. It is expected that substantially more than this minimum will be taken by prospective graduates.
- **CHMY 499 (Senior Year) is required for majors who are writing a thesis for Departmental Honors consideration.**
- **BIOB 260 is strongly recommended, because it is a pre-requisite to BCH 380.**

A computer science (CS) course is highly recommended. A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. All students are encouraged to take a 200 level English writing course. Please note that this course would be in addition to the WRIT 101W core requirement.

**Acceptable Physical Science**

<table>
<thead>
<tr>
<th>Electives Include:</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 411-Biochem of Macromolecules</td>
<td>3</td>
</tr>
<tr>
<td>BCH 442-Metabolic Regulation</td>
<td>5</td>
</tr>
<tr>
<td>BCH 444-Biochem Mtab Molc Biol</td>
<td>5</td>
</tr>
<tr>
<td>CHMY 513-Struct &amp; Bonding Inorg Chem</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 516-Mech &amp; Dynamics Inorg Chem</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 523-Organic Rxn Mech</td>
<td>1</td>
</tr>
<tr>
<td>CHMY 524-Mass Spec</td>
<td>5</td>
</tr>
<tr>
<td>CHMY 526-Advanced Protein NMR</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 535-Physical Organic Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 536-Physical Organic Chemistry</td>
<td>1</td>
</tr>
<tr>
<td>CHMY 540-Organic Smith</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 551-Organic Structure Elucidation</td>
<td>5</td>
</tr>
<tr>
<td>CHMY 554-Organometallic Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>CHMY 557-Quantum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 558-Classical &amp; Statistical Therm</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 559-Kinetics &amp; Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>M 221-Introduction to Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>M 274-Intro to Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>M 333-Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 244-Physics III</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 320-Classical Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 425-Electricity &amp; Magnetism I</td>
<td>3</td>
</tr>
</tbody>
</table>

**BIOCHEMISTRY OPTION**

**Freshman Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 256-Intro Biol &amp; Cells to Organisms</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 151-Honors College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 153-Honors College Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BCH 194-Seminar/Workshop</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 160Q-Survey of Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 165Q &amp; M 166Q-Calculus for Technology I &amp; II</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>M 171Q &amp; M 172Q-Calculus I &amp; II</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>STAT 210Q-Introduction to Statistics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 294-Seminar/Workshop</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BIBO 290-Cellular &amp; Molecular Biology</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 311-Analytical Chem-Quant Analysis</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHMY 401-Advanced Inorganic Chemistry</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHMY 331-Senior Thesis/Capstone</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 323-Organic Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 333-Honors Organic Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 205-College Physics I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PHYS 200-Gen &amp; Mod Phys I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS 205-College Physics II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PHYS 200-Gen &amp; Mod Phys II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 384-Seminar/Workshop</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BCH 380-Biochemistry</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>BCH 442-Metabolic Regulation</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BCH 498-Undergraduate Research</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 361-Elements of Physical Chemistry</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 362-Elements of Physical Chemistry</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>or these:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 371-Phys-Chem-Qntm &amp; Spec</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHMY 373-Phys-Chem-Kits &amp; Thermodynamics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>CHMY 372-Physical Chemistry Lab I</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences Elect (500+)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 498-Senior Thesis/Capstone</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BCH 441-Biochem of Macromolecules</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BCH 444-Biochem Mtab Molc Biol</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BCH 498-Undergraduate Research</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>CHMY 499-Senior Thesis/Capstone</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences Elect (500+)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

- Students with a B or better in CHMY 321/323 or 331/333 may take BCH 411 in place of BCH 380 in their junior year.
- **CHMY 499 (Senior Year) is required for majors who are writing a thesis for Departmental Honors consideration.**

All students are encouraged to take a 200 level English writing course. Please note that this course would be in addition to the WRIT 101W core requirement.

**Acceptable Biological Science Electives Include:**

<table>
<thead>
<tr>
<th>Credits</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 375-General Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOB 425-Adv Cell &amp; Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOO 310-Comparative Vertebrate Anatomy</td>
<td>3</td>
</tr>
<tr>
<td>BIOH 323-Human Developmental Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOH 340-Principles of Histology</td>
<td>3</td>
</tr>
<tr>
<td>BIOO 415-Neurophysiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 315-The Visual System &amp; Its Discovery</td>
<td>3</td>
</tr>
<tr>
<td>420-Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 410-Advanced Human Anatomy</td>
<td>3</td>
</tr>
</tbody>
</table>

**TEACHING OPTION**

**Freshman Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 151-Honors College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 153-Honors College Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 194-Seminar/Workshop</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EDU 202-Early Field Experience</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EDU 210-Child Development</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 151-Precalculus</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 161Q-Survey of Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BIOB 260-Cellular &amp; Molecular Biology</strong></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 294-Seminar/Workshop</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CHMY 311-Analytical Chem-Quant Analysis</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 321-Organic Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 331-Honors Organic Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 321-Organic Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 333-Honors Organic Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDU 223-Ed Psy &amp; Adolescent Dev</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 370-Integrating Tech into Education</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
### CHEMISTRY MINOR (NON-TEACHING)

<table>
<thead>
<tr>
<th>Required Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 153-Honors College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 153-Honors College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>CHMY 321-Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 331-Honors Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>CHMY 325-Organic Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 353-Honors Organic Chemistry II</td>
<td>4</td>
</tr>
</tbody>
</table>

*Any CHMY or CHEM class 301 or higher (except 494, 492 & 499).

**BIOB 260 is strongly recommended, because it is a pre-requisite to BCH 380.

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. The Chemistry Teaching option certifies graduates to be qualified to teach secondary school chemistry. Employment opportunities will be enhanced by obtaining a second area of certification, usually a teaching minor. Obtaining a teaching major, a teaching minor, and certification will require more than 120 credits.

CHMY 499 (Senior Year) is required for majors who are writing a thesis for Departmental Honors consideration. Twelve credits (14 weeks) of EDSD 410 is optional.

### BIOCHEMISTRY MINOR (NON-TEACHING)

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 441-Biochem of Macromolecules</td>
</tr>
<tr>
<td>BCH 442-Metabolic Regulation</td>
</tr>
<tr>
<td>BCH 444-Biochem Mtrls Molec Biol</td>
</tr>
<tr>
<td>Take one of the following:</td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
</tr>
<tr>
<td>CHMY 153-Honors College Chemistry I</td>
</tr>
<tr>
<td>Take one of the following:</td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
</tr>
<tr>
<td>CHMY 153-Honors College Chemistry II</td>
</tr>
<tr>
<td>Take one of the following:</td>
</tr>
<tr>
<td>CHMY 321-Organic Chemistry I</td>
</tr>
<tr>
<td>CHMY 331-Honors Organic Chemistry I</td>
</tr>
<tr>
<td>Take one of the following:</td>
</tr>
<tr>
<td>CHMY 325-Organic Chemistry II</td>
</tr>
<tr>
<td>CHMY 353-Honors Organic Chemistry II</td>
</tr>
</tbody>
</table>

*Students with a B or better in CHMY 321/325 or 331/333 may take BCH 441 without first taking BCH 380.

### Earth Sciences

**Department of Earth Sciences**

http://www.montana.edu/wwwes/

The department offers the Bachelor of Science degree in Earth Sciences which may be earned in any one of five options (Geography, Geographic Information Science/Planning, Geology, Paleontology, and Snow science). Each option tabulated below requires courses from within the Department of Earth Sciences and courses outside the department. Some of the courses fulfill both department requirements and University Core Curriculum requirements. Academic minors are offered in Spatial Analysis/GIS and Earth Science Teaching (http://www.montana.edu/wwwcat/programs/minors.html#ESCT), the TEP form is at http://www.montana.edu/fieldplacement/TEPPForms/TEPPMinor2010-12/EarthScienceMinor10-12.pdf.

The Department also offers a Master of Science Degree and Doctor of Philosophy in Earth Sciences. Thesis and course work for these graduate degrees usually emphasize some aspect of geology, geography, or geobiology with specific course and research plans approved by a graduate committee.

The department collaborates with the interdisciplinary Master of Science in Land Rehabilitation, the Ph.D. Program in Ecology and Environmental Science http://www.montana.edu/eces/ and with the Big Sky Institute.

**Geology Option**

The Geology Option offers students a liberal university education with an emphasis in geography. The Geography option provides a general education as well as the more specialized knowledge and skills necessary to pursue many career objectives. Geographers find professional opportunities in urban and land use planning as well as spatial analysis in the public and private sectors, analysis of regions, resource and environmental management, as well as the application of geographical skills in map making (cartography), remote sensing, and geographic information science (GIS). Geography also offers an outstanding background for more advanced education in environmental law, international business, resource planning, and other specialized graduate school opportunities. Students may enhance their employment opportunities with a Master’s degree, or a Ph.D. if college teaching or advanced research positions are of interest.

The student, in consultation with an adviser, is given the opportunity to develop a program to meet his or her own particular interests and needs through a series of core geography courses and an emphasis in physical or human geography or an approved minor. The Geography Option introduces students to lower division course work in world regional, physical, and human geography. These courses emphasize the importance of spatial relationships, the global distributions of physical and cultural phenomena, the complex interplay between natural and human systems, and the factors contributing to the evolution of the earth’s varied landscapes. In addition, advanced skills courses and a capstone course prepare the student to apply their training in a variety of jobs and/or graduate school.

**Geology Option**

The Geology Option is a degree program designed for students who are motivated to apply the principles of chemistry, physics, and mathematics to the study of the Earth’s surface and interior. There are growing opportunities for employment in the public and private sectors in fields such as petro-
leum geology, mining geology, seismology (including earthquake and volcanic risk assessment), hydrology (surface and ground water) natural-hazard geology, environmental clean-up and containment of environmental hazards, mitigation of future environmental problems related to development, preservation of water resources (both surface and ground water), and the study of the processes of climate change. The optimal degree for employment and advancement in the geological sciences in the private sector is the Master’s Degree, and the undergraduate Geology Option is an excellent preparatory degree for graduate study. Some students interested in college teaching or advanced research may require a Ph.D. degree.

In the Geology Option, students are given the opportunity to learn in the tremendous natural laboratory that surrounds Bozeman. Course work progresses from core courses which all students must take (introductory geology, mineralogy, igneous petrology, metamorphic petrology, sedimentary petrology, historical geology, sedimentation and stratigraphy, structural geology, tectonics, geomorphology; two geographic information science courses and field geology (a summer capstone course)) to a variety of elective courses in geology, paleontology, hydrology, and remote sensing. These courses prepare the student for a variety of jobs and/or graduate school.

GIS/Planning Option

The GIS (Geographic Information Science)/Planning Option in the Department of Earth Sciences is designed to offer students a mix of technical skills and academic training that prepares them for careers in local, state, and federal planning as well as opportunities in private consulting firms that are involved in the planning process. The GIS/Planning Option recognizes the growing importance of Geographic Information Systems and Science in our society and how these analytic tools are applied in a wide variety of settings. The GIS/Planning Option takes advantage of excellent GIS facilities, lab space, expertise, and software available on campus and allows students to learn in an active hands-on environment. Students are prepared as map makers (cartographers) spatial analysts, and planners. The Department of Earth Sciences has connections with various local, state, and federal planning agencies within Montana and throughout the West. As part of their training, students may also be able to take advantage of internship opportunities as a way to further prepare for a wide variety of professional careers within the fields of planning and resource management. The optimal degree for employment and advancement in the in GIS/Planning area is the Master’s Degree, and this undergraduate option is an excellent preparatory degree for graduate study. Some students interested in college teaching or advanced research may require a Ph.D. degree.

At the Freshman and Sophomore level, students take basic courses in physical and human geography as well as introductory skills classes in GIS and cartography, statistics, intermediate technical writing, and design graphics. In addition, courses in economics and political science lay the foundation for understanding the broader context of the planning process. As juniors and seniors, students complete an advanced 2-course sequence in GIS/Spatial Analysis (GPHY 484/494) and take skills-related coursework in Remote Sensing and in GPS technologies. Students also take courses in geographical planning, tourism and recreational planning, and in the politics of state and local government. All students also complete basic coursework in soils and geomorphology because these variables are critical in the planning process. Electives in advanced classes in urban and economic geography, public/urban policy and political science, water resources, and/or ecology allow students to specialize in areas of particular interest and develop their own emphases in subjects related to the planning process. All students take the Geography Capstone course (GPHY 425) which emphasizes the broad integrative skills of Geography.

Paleontology Option

The paleontology option focuses on understanding fossils within their geologic context, while Montana’s geology provides the opportunity for hands-on fieldwork. The paleontology option in the Department of Earth Sciences is designed for those students who have a strong interest in either invertebrate or vertebrate fossils (evolution, biology of ancient organisms, the environment in which the organism lived, and the changes the fossil has undergone since death). Students who study paleontology find employment with natural history museums (e.g. fossil preparation, collection, curation, exhibit design, education), as scientific illustrators, writers, paleontology consultants for energy resource companies, and resource specialists for local, state, and federal land-management agencies or parks. Because students who study this option are trained in core geology courses, employment may be found in areas outside paleontology that require geologic expertise. Graduate training beyond the bachelor’s degree desirable for those seeking careers in the paleontology (normally a master’s degree) or in teaching and/or research (typically a doctorate).

This option combines training in geology, and paleontology. The paleontology option builds on courses that form the core of the traditional geology option, while providing strong background in paleontology through four required courses (including the paleontology field course) and two elective courses. All of the paleontology courses offered through the department provide upper division credits. Internships and summer field research experience is available to some students. These courses prepare the student for a variety of jobs and/or graduate school.

Snow Science Option

The snow program in the Department of Earth Sciences provides a foundation for understanding the distribution of snow (geography), mechanics of snow (physics, engineering), composition of snow (chemistry), variability of snow (statistics), and ecological effects of snow (ecology, hydrology). It is also one of the best pre-professional programs in the world for those who want to carry their interests in snow into a professional career. Employment ranges from ski patrol, director of snow safety, avalanche-center employee, snow scientist with a federal agency, to work in consulting in the area of land use planning, transportation engineering or avalanche protection. The optimal degree for employment and advancement in snow science is the Master’s Degree. Some students interested in college teaching or advanced research
may require a Ph.D. degree. The snow science option is an excellent preparatory degree both for employment and for advanced graduate studies.

In the Snow Science Option, students progress through a broad-based core of courses that includes introductory geology and geography, calculus, chemistry, physics, weather and climate, geomorphology, glacial geology, and mountain geography. In addition to the core of snow science courses, students focus on snow geography, snow mechanics, or snow statistics. Snow geography examines spatial analysis of factors important to snow distribution, snow hydrology, snow melt, and the analysis of factors which influence the spatial distribution of snow or snow avalanche factors. Snow mechanics prepares the student to study the mechanics of snow as it relates to transportation, avalanche release, and the impact of snow on buildings (loading and avalanche impact forces), as well as snow metamorphism and snow strength. The snow statistics emphasizes the student to apply statistical techniques to questions about spatial and temporal variability of snow properties such as strength, depth, grain size, grain type, water content, and fracture initiation. The capstone course is snow dynamics and accumulation. Students are strongly encouraged to consider a graduate degree in snow science to prepare for professional jobs, but such training is not always required.

Undergraduate Research Participation
Research opportunities are available to undergraduate students who demonstrate the interest and ability. Senior-level students may enroll in ERTH 490 (Undergraduate Research), which provides the opportunity to participate in a research project under the guidance of a faculty member. Successful completion of ERTH 490 credits requires that the student write a senior thesis report and orally present and defend the results in a public forum, such as an annual conference of a professional society. Collaborative opportunities exist with the university’s Undergraduate Scholars Program.

Departmental Honors in Earth Sciences
The Department of Earth Sciences awards Departmental Honors at graduation to students who demonstrate exceptional undergraduate performance through the following criteria: 1) a minimum 3.5 grade-point average (GPA) in the major; 2) a minimum 3.0 GPA overall; 3) completion of at least 4 credits of undergraduate research with a grade of “B” or better; and 4) completion of a Senior Thesis (ERTH 490)–written, bound, and orally presented and defended by the last day of classes prior to graduation.

Curricula in Earth Sciences

GEOLOGY OPTION

Some courses listed below are offered alternate years. A student's course sequence may differ from that shown depending upon the date the student enters the program and the availability of courses.

Freshman Year
- GEO 101IN-Intro to Physical Geography...........4
- GPHY 111CS-Intro to Physical Geography........4
- GPHY 141D-Geography of World Regions.........3
- University Core and Electives...................19

Sophomore Year
- GPHY 121D-Human Geography.....................3
- GPHY 284-Intro to GIS Science & Cartography....5
- STAT 216Q-Introduction to Statistics.............3
- STAT 217Q-Intro to Probability and Statistics...3
- One Year Modern Lang..........................8

Junior and Senior Years
- GPHY 384-Adv GIS and Spatial Analysis........3
- ERTH 303-Weather and Climate..................3

Capstone Course
- Take the following in your senior year:
  - GPHY 425-Geographic Thought................3
- Selected minor or minor emphasis..............21
- Take 5 courses from the following and 1 methods course OR 1 course from the following and 2 methods courses:
  - ERTH 490-Snow Distribution and Accumulation....3
  - ERTH 450-Snow Dynamic & Accumulation..........3
  - ERTH 455-Physiography of the U.S..............3
- GPHY 411-Biogeography..........................3
- GPHY 325-Cultural Geography...................3
- GPHY 321-Urban Geography....................3
- GPHY 322-Economic Geography..................3
- GPHY 365-Geographical Planning................3
- GPHY 451-Historical Geography................3
- GPHY 461-Tourism Planning.....................3
- GPHY 414R-Mountain Geography................4
- GPHY 446-East Asia in the Global System......3
- GPHY 445-Regional Geography................3

Methods Courses
- GPHY 414R-Adv GIS & Spatial Analysis........3
- GPHY 426-Remote Sensing & Digital Image Proc...3
- GPHY 357-Fundamentals & Applications in Mapping3
- STAT 410-App Mult Regression................3

Capstone Course
- Take the following in your senior year:
  - GPHY 425-Geographic Thought................3
- Selected minor or minor emphasis..............21

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

GEOLOGY OPTION

Freshman Year
- CHMY 141-College Chemistry I...................4
- CHMY 143-College Chemistry II...............4
- GEO 101IN-Intro to Physical Geography.........4
- GPHY 111CS-Intro to Physical Geography........4
- GEO 111-Earth History and Evolution............3
- M 171Q-Calculus I..................................4
- M 172Q-Calculus II.................................4
- University Core and Electives................3

Sophomore Year
- GPHY 325-Cultural Geography..................3
- GPHY 321-Urban Geography....................3
- GPHY 322-Economic Geography................3
- GPHY 365-Geographical Planning................3
- GPHY 451-Historical Geography................3
- GPHY 461-Tourism Planning.....................3
- GPHY 414R-Mountain Geography................4
- GPHY 446-East Asia in the Global System......3
- GPHY 445-Regional Geography................3

Methods Courses
- GPHY 414R-Adv GIS & Spatial Analysis........3
- GPHY 426-Remote Sensing & Digital Image Proc...3
- GPHY 357-Fundamentals & Applications in Mapping3
- STAT 410-App Mult Regression................3

Capstone Course
- Take the following in your senior year:
  - GPHY 425-Geographic Thought................3
- Selected minor or minor emphasis..............21

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

Students, in consultation with their Earth Science advisor, must also select a minor from a minor tabulated in the catalog OR one of the emphases listed below.

Human Geography Emphasis

Take 12 credits from the following:
- ANTY 101D-Auth & Human Experience..........3
- PSCE 210S-Intro to American Government.....3
- PSCE 260-Intr to State and Local Govt........3
- SOCI 101S-Intro to Sociology..................3
- ECNS 101S-Social & Economic Way of Thinking3
- ECNS 202S-Principles of Macroeconomics.....3

Physical Geography

Take 12 credits from the following:
- BIOL 1501-Intr to Geology and Geography....4
- CHMY 121IN-Intr to Geo Chemistry..........4
- ENSC 245N-Soils.................................3
- ERTH 212RN-Yellowstone Scientific Lab.......4

The advisor-approved upper division electives (minimum 9 credits) will be selected from courses offerings in Anthropology, Economics, History, Native American Studies, Political Science, Sociology, as well as Earth Science, Geology, and Geography (1 course only). The courses used here cannot be used to fulfill the other course requirements in the Geography Option.

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.
Junior Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERTH 307</td>
<td>Principles of Geomorphology</td>
<td>4</td>
</tr>
<tr>
<td>GEO 306</td>
<td>Igneous Petrology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 307</td>
<td>Sedimentary Petrology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 308</td>
<td>Metamorphic Petrology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 309</td>
<td>Sedimentation and Stratigraphy</td>
<td>4</td>
</tr>
<tr>
<td>GEO 315</td>
<td>Structural Geology</td>
<td>3</td>
</tr>
<tr>
<td>STAT 332</td>
<td>Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

Summer of Junior or Senior Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO 429</td>
<td>Field Geology</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

Senior Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO 435</td>
<td>Global Tectonics</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

Geology Electives

Take 5 courses from the following two blocks, at least three of which must come from the Geology block.

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERTH 494</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>GEO 310</td>
<td>Invertebrate Paleontology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 411</td>
<td>Vertebrate Paleontology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 417</td>
<td>Taphonomy and Fossil Record</td>
<td>3</td>
</tr>
<tr>
<td>GEO 440</td>
<td>Volcanology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 445</td>
<td>Glacial Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 490</td>
<td>Undergraduate Research</td>
<td>3</td>
</tr>
<tr>
<td>GEO 492</td>
<td>Individual Problems**</td>
<td>3</td>
</tr>
<tr>
<td>GEO 493</td>
<td>Special Topics</td>
<td>3</td>
</tr>
<tr>
<td>GEO 498</td>
<td>Internship</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

**Notes:** Can be repeated, but can only be counted once (each) as a Geology elective.

Geoscience Spatial Methods Block

1 course from the following can be counted as an elective;

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPHY 484</td>
<td>Applied GIS &amp; Spatial Analysis</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 406</td>
<td>Remote Sensing</td>
<td>2</td>
</tr>
<tr>
<td>GPHY 337</td>
<td>Fundamentals and Applications in Mapping</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

Additional advisor-approved 300+ courses in ESCL, GEOG, or IRES.

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 or above.

**G/S/PLANNING OPTION**

Freshman Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO 101I</td>
<td>Intro to Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>GPHY 111C</td>
<td>Intro to Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 111D</td>
<td>Intro to Environmental Science</td>
<td>4</td>
</tr>
<tr>
<td>ENCS101H</td>
<td>Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 121N</td>
<td>Intro to Environmental Science</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

Take One of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 202</td>
<td>Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 132</td>
<td>Economics and the Environment</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

Sophomore Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPHY 121D</td>
<td>Human Geography</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 284</td>
<td>Intro to GIS Science &amp; Cartography</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 245E</td>
<td>Soils</td>
<td>3</td>
</tr>
<tr>
<td>PSCH 210R</td>
<td>Intro to American Government</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

Take EITHER:

| STAT 216Q   | Introduction to Statistics               | 3       |
| STAT 217Q   | Intern Statistical Concepts              | 3       |
| OR
| STAT 332    | Statistics for Engineers                 | 3       |

Take One of the following:

| WRIT 201    | College Writing                          | 3       |
| WRIT 221    | Intermediate Tech Writing                | 3       |
| **Total**   |                                         | **30**  |

Junior Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPHY 384</td>
<td>GIS and Spatial Analysis</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 357</td>
<td>Fundamentals &amp; Applications in Mapping</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 462</td>
<td>Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 321</td>
<td>Urban Geography</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 322</td>
<td>Economic Geography</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

Senior Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPHY 425</td>
<td>Geographic Thought</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 484</td>
<td>Applied GIS &amp; Spatial Analysis</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 461</td>
<td>Tourism &amp; Recreational Planning</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

Take FOUR of the following:

| BIEO 570    | General Ecology                          | 3       |
| NRSM 421    | Holistic Thought & Management            | 3       |
| NRSM 430    | Natural Resources Law                    | 3       |
| ENSC 444    | Watershed Hydrology                      | 3       |
| GPHY 429R   | Remote Sensing                           | 3       |
| GPHY 457    | Advanced GPS Mapping for GIS             | 3       |
| GPHY 461    | Tourism & Recreational Planning          | 3       |
| PSCI 456    | Public Admin and Policy                  | 3       |
| CE 453      | Photogrammetry                           | 2       |
| **Total**   |                                         | **30**  |

Take ONE of the following:

| BIOE 500    | Environmental Science & Management       | 3       |
| ENSC 444    | Watershed Hydrology                      | 3       |
| OR
| GPHY 499    | Senior Thesis                            | 3       |
| **Total**   |                                         | **30**  |

**Additional 2 credits of upper division credits needed to graduate.**

**SNOW SCIENCE OPTION**

Freshman Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPHY 111C</td>
<td>Intro to Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>GEO 101N</td>
<td>Intro to Physical Geography</td>
<td>4</td>
</tr>
<tr>
<td>M 171Q</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>M 172Q</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

Take One of the following:

| ECNS 202    | Principles of Macroeconomics             | 3       |
| ECNS 132    | Economics and the Environment            | 3       |
| **Total**   |                                         | **30**  |

Sophomore Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 111D</td>
<td>Intro to Environmental Science</td>
<td>4</td>
</tr>
<tr>
<td>CHMY 145</td>
<td>Intro to Environmental Science</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 220</td>
<td>Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 222</td>
<td>Physics II</td>
<td>4</td>
</tr>
<tr>
<td>ERTH 303</td>
<td>Weather and Climate</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

Junior Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERTH 307</td>
<td>Principles of Geomorphology</td>
<td>4</td>
</tr>
<tr>
<td>Courses from Core and Snow Geography, Mechanics, or Statistics Emphasis</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Senior Year

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERTH 456R</td>
<td>Snow Dynamics &amp; Accumulation</td>
<td>4</td>
</tr>
<tr>
<td>GPHY 441R</td>
<td>Mountain Geography</td>
<td>4</td>
</tr>
<tr>
<td>GEO 445</td>
<td>Glacial Geology</td>
<td>3</td>
</tr>
<tr>
<td>Courses from Core and Snow Geography, Mechanics, or Statistics Emphasis</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following three emphases:

**Snow Geography Emphasis**

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 170</td>
<td>Biological Diversity</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 121D</td>
<td>Human Geography</td>
<td>3</td>
</tr>
<tr>
<td>STAT 332</td>
<td>Statistics for Engineers</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

**Snow Mechanics Emphasis**

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGEN 350</td>
<td>Applied Engr Data Analysis</td>
<td>2</td>
</tr>
<tr>
<td>M 277Q</td>
<td>Multivariable Calculus</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>26</strong></td>
</tr>
</tbody>
</table>

**Snow Statistics Emphasis**

**Credits**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 221I</td>
<td>Matrix Theory</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 284</td>
<td>Intro to GIS &amp; Cartography</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 384</td>
<td>Advanced GIS &amp; Spatial Analysis</td>
<td>3</td>
</tr>
<tr>
<td>GPHY 365</td>
<td>Geographical Planning</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

**Notes:** Statistics is integral to snow science and students with an interest in numerical analysis are encouraged to take this option.
A C- is required in all curriculum courses to graduate by Regents’ policy. This includes electives in this curriculum.

This option meets the requirements for a Statistics Minor.

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 or above.

All offerings are dependent upon available staffing.

PALEONTOLOGY OPTION

Freshman Credits

CHMY 141-College Chemistry I..............................4
CHMY 143-College Chemistry II............................4
GEO 1011N-Intro to Physical Geography..................4
GPHY 111CS-Intro to Physical Geography................4
M 171Q-Calculus I...........................................4
M 172Q-Calculus II.........................................4
University Core and Electives.............................3

Sophomore Year Credits

BIBO 170IN-Principles of Biological Diversity........4
GPHY 284-Intro to GIS Science & Cartography............4
GPHY 384-Adv GIS and Spatial Analysis ..................3
GEO 211-Early History and Evolution......................4
PHSX 205-College Physics I................................4
PHSX 207-College Physics II................................4
University Core and Electives.............................8

Junior Credits

GEO 306-Igneous Petrology..................................3
GEO 307-Sedimentary Petrology............................3
GEO 308-Metamorphic Petrology............................3
GEO 309-Sedimentation and Stratigraphy................4
GEO 315-Structural Geology.................................4
STAT 352-Stat for Scientist & Engineers................5
University Core and Electives..............................7

Summer of Junior or Senior Year

GEO 409-Field Geology........................................6

Senior Credits

GEO 416-Vertebrate Paleontology.........................5
University Core and Electives..............................6

Upper Division Paleontology Course Electives

In order to complete the Paleontology Option, students complete the following course requirements, in addition to those listed above.

Required courses

GEO 310-Invertebrate Paleontology.......................5
GEO 330-Paleontology Lab Techniques.....................2
GEO 411-Vertebrate Paleontology.........................5
GEO 417-Taphonomy/Fossil Preservation..................3
GEO 419* -Field Paleontology..............................2

Elective courses

It is strongly recommended that students take a minimum of two of the following courses:

BIOO 310-Comparative Vertebrate Anatomy..............4
GEO 312-Dinosaur Paleontology..........................4
GEO 415-Macroevolution/Fossil Record....................3
GEO 491-Special Topics - Paleontology................3
GPHY 411-Biogeography.................................10
GPHY 357-Fundamental Applications....................3

Note:

Only GEO 491 courses that cover a specific paleontology topic are applicable.

A C- minimum is required in all curriculum courses to graduate by Regents’ policy. This includes electives in the curriculum.

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 or above.

GEOPHYSICAL INFORMATION SCIENCE (GIS) MINOR (NON-TEACHING)

Not available to geography majors

GPHY 284-Intro to GIS Science & Cartography............3
GPHY 384-Adv GIS and Spatial Analysis ..................3
GPHY 484R-Advanced GIS Mapping for GIS..............3
GPHY 426-Remote Sensing..................................3

Take One of the following:

STAT 217Q-Intermediate Statistics........................3
STAT 352-Stats for Scientists & Engineers.............3

Take Two of the following:

CE 201-Surveying.............................................3
TE 290-29D Computer Aided Drafting......................3
STAT 408-Stat Computing & Graph Analysis.............3
CE 463-Photogrammetry....................................2
GPHY 429R-Remote Sensing.................................3
GPHY 457-Adv GPS Mapping for GIS......................3
GPHY 492-Independent Study..............................3

Minimum Credits.............................................5

Minimum Total Credits....................................23

Note:

A C- minimum is required in all curriculum courses to graduate by Regents’ policy. This includes electives in the curriculum.

WATER RESOURCES MINOR (NON-TEACHING)

The Water Resources Minor is designed to encourage a student from any discipline to explore water resources beyond course work in their major. As a result, the minor includes courses from the College of Agriculture, the College of Engineering, and the College of Letters and Science. The minor is administered by a board with the following representatives: Brian McGlynn (Agriculture and Outreach), Michael Brody (Education), Otto Stein (Engineering), Jerry Johnson (Letters and Science), and the Chair of the Board from Letters and Science. Any board member may serve as an advisor for the minor. The chair of the board serves as the curriculum review officer and signs the Application for a Non-teaching Minor form approved and forwarded by the other advisors.

This minor requires a minimum of 21 credits. The courses below are broadly grouped into biology courses, physical courses and chemical courses about water. Students are encouraged to create a diverse program. No more than 12 credits may be used to simultaneously fulfill both Water Resources Minor requirements, University Core and the student’s major. The student’s major advisor must certify that the 12 credit restriction is not exceeded. Students can petition the Water Resources Minor Board to add a course. The petition should explain the linkage to water resources. Course substitutions are allowed only by appeal to and approval by the Water Resources Minor Administrative Board and should be sent to the Chair of the Board after review by one of the advisors. The written appeal should identify the substitution and present a brief rationale.

ECNS 132-Econ & the Environment.........................3
ECNS 352-Econ of Natural Resources......................3
ENSC 436-Natural Resource Law..........................3
ECNS 422-Benefit-Cost Analysis..........................3
HSTA 470-American Environmental History..............3
PIEL 364-Water Resources Policy..........................3
PSCI 409-Environmental Politics.........................3
ENSC 272CS-Introduction to Water Resources.............3
BIOE 105CS-Environmental Science & the Environment....3
BIOE 490-Stream Ecology..................................3
BIOE 499-Stream Ecology..................................3
ENSC 375-Environmental Engineering........................2
ENSC 340-Principles of Environmental Engineering....3
ENSC 342-Advanced Engineering Hydrology.............3
ENSC 454-Groundwater Supply and Remediation........3
ENSC 450-Water Chemistry for Environmental Engineers..3
ENSC 441-Natural Treatment Systems.....................3
ENSC 445-Hazardous Waste Treatment.....................3
ENSC 447-Hazardous Waste Management...................3
ENSC 243N-Soils............................................3
ENSC 448-Stream Restoration Ecology.....................3
ERTH 303-Weather and Climate............................3
ERTH 450-Rain Dynamic Accumulation.....................4
ECHM 306S-Energy and Sustainability....................3
ENSC 370-Water Quality....................................3
ENSC 353-Environmental Biogeochemistry...............3
ENSC 444-Watershed Hydrology............................3

PROGRAMS OF INSTRUCTION – LETTERS AND SCIENCE

Brody (Education), Otto Stein (Engineering), Michael Brody (Agriculture and Outreach), Michael Brody
Economics
Department of Agricultural Economics & Economics
http://www.montana.edu/econ/

The Bachelor of Science degree in economics stresses the use of economics as a means of understanding current economic activities and problems and their relationship to our social environment. Economics is the study of critical decision-making behavior. It is a mode of thinking and reasoning with widespread application. The skills that employers value most highly are the ability to think critically and carefully, the ability to learn new skills and the ability to solve problems. Some vocations may require very specific skills (for example, knowledge of a particular computer software package). However, skill requirements change over time. The need for people who can think, learn and solve problems is timeless.

Economics honors these time-honored abilities.

The objective of the program is to provide the student with a liberal university education with particular emphasis on economics. In keeping with this objective, requirements are specified largely in terms of broad subject areas rather than designation of particular courses. The student, with the help of the advisor, is given the opportunity to develop a program to meet his or her own particular needs and interests. With this freedom, however, comes the responsibility of building an overall program that is both cohesive and academically sound. The program focuses on teaching students to think, to use logic and reason, and to organize their thoughts in order to solve problems rather than simply memorize and recite the subject matter. The courses also focus on instilling in students a desire to learn, so that they will leave our courses prepared and eager for lifelong learning.

The economics program, with its flexibility, offers the opportunity to acquire a general university education and the necessary background and preparation for many career objectives. Economics majors pursue a wide variety of careers after graduation. Students with a bachelor’s degree in economics are often employed in the financial, retailing, and industrial sectors of the economy. Economics majors also work in such diverse fields as actuarial science, elementary and secondary education, journalism, investment banking, securities analysis, corporate finance, insurance, law, politics, and environmental regulation, as well as in government and academia. Graduate schools regard a degree in economics as excellent preparation for advanced work toward a degree in law as well as a Ph.D. in a number of social science fields such as economics, international relations, public policy, and political science. Economics is also an excellent undergraduate major for students seeking an MBA. What can you do with an education in economics is unlimited!

Curriculum in Economics

**ECONOMICS**

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 110US-Public Communication</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 101S-Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 202-Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

- M 161Q-Survey of Calculus
- M 171Q-Calculus I

University Core and Electives: 14

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 201-Principles of Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 201-College Writing II</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

University Core and Electives: 18

**Junior and Senior Years**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 301-Intermediate Micro with Calculus</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 305-Intermediate Macro with Calculus</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose one of the following Capstones:

- ECNS 435R-Benefit-Cost Analysis
- ECNS 450R-Intro to Econometrics

STAT 217Q-Introductory Statistical Concepts: 3

University Core and Electives: 48

**NOTE:** ECNS 251BS (Honors Economics, 4 credits) may be substituted for the 3 course sequence ECNS101S, ECNS 202, and ECNS 204S.

Electives Must Include:

- One of the following:
  - AGBE 357-Agricultural Law
  - BGEN 361-Intro to Law

- One of the following:
  - BMGT 205-Management
  - WMGT 221-Intermediate Tech Writing

- WRIT 326-Advanced Composition

- WRIT 429-Professional Writing

Social Sciences

- (excluding AGBE/ECNS; the 6 credits must be from one or more of the following disciplines: anthropology, geography, political science, psychology, sociology, or history)

Upper division selected courses in AGBE/ECNS: 15

*At least two AGBE/ECNS courses (6 credits) at the 400 level or higher are required, excluding seminars, 490s/492s.

Students completing a double major with economics as one of the majors are only required to meet their University Core or Social Science requirements.

Students completing a double major with finance and economics as the two majors may use ECNS513 - Money & Banking as an elective in the economic major.

**Entrance to the Economics Program:**

Program entrance requirements are that a student must (1) have a cumulative GPA of at least 2.50 and received a grade of C or better in each of the following courses: ECNS 101S, ECNS 292, ECNS 204S, and M 161Q or M 171Q (or their equivalents). OR (2) be an incoming transfer student or of freshman standing.

**Graduation Requirements**

Economics students must receive a grade of C or better in ECNS 101S, ECNS 292, ECNS 204S, ECNS 301, ECNS 303, and M 161Q or M 171Q (or their equivalents) to meet departmental graduation requirements. All other courses counting toward departmental requirements must be graded C- or better. Thirty-three (33) economics credits are needed to graduate.

A minimum of 120 credits is required for graduation; 42 credits must be in courses numbered 300 and above.

**ECONOMICS MINOR**

**NON-TEACHING**

A student must receive a grade of C or better in all courses required for the minor.

**Economics Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 101S-Economic Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 202-Principles of Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 204S-Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 301-Intermediate Micro with Calculus</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 305-Intermediate Macro with Calculus</td>
<td>3</td>
</tr>
</tbody>
</table>

Three additional ECNS courses at the 300 - 400 level (No seminars, 490 or 492)*: 9

**Supporting Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 216Q-Introduction to Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

- M 161Q-Survey of Calculus
- M 171Q-Calculus I

31
NOTE: ECNS 251HS (Honors Economics, 4 credits) may be substituted for the three-course sequence: ECNS 101HS, ECNS 202, and ECNS 204HS.

"P" grades may be accepted at the discretion of the department only for courses transferred from outside the Montana State University System.

The three additional ECNS courses at the 300-400 level (no seminars, 492s, or 490s) may include one and only one ECNS 300 level courses being utilized to satisfy a student’s major requirements.

English
Department of English
http://www1.english.montana.edu/

The curriculum leading to the Bachelor of Arts in English provides the student three options: 1) the literature option for students who wish to specialize in the study of literature, especially those preparing for a broad range of careers including graduate study in English or related fields; 2) the writing option for students who wish to specialize in the study and production of expository and creative writing and rhetoric, in preparation for professional writing careers or graduate study; and 3) the English teaching option for students wishing to specialize in the study of literature, language, and composition as preparation for certification for secondary school teaching.

There are many professional opportunities open to English graduates. In addition to teaching, professional schools (law and business, for example) consider the B.A. in English to be excellent preparation. The study of literature and effective writing is also useful in the areas of corporate management, personnel work, finance, consulting, journalism and public relations, Intermediate Tech Writing and editing, and many other fields, as various industries continue to seek people who are literate and articulate.

In addition to these programs for its majors, the Department of English offers many courses that satisfy University core requirements.

Curriculum in English

Students desiring to obtain the B.A. in English will choose one of the following options. Those seeking endorsement as teaching majors will follow the teaching option. In order to graduate, students must earn a grade of "C" or better in every course required for the English major.

LITERATURE OPTION

This option is designed for students wishing to specialize in the study of literature as preparation for graduate work or for general education.

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>LIT 201-Intro to Literary Studies</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>LIT 240- Bible as Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 253- Classical Fratns of Lit</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>ENGL 258H- Thry &amp; Meths in Linguist</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 258-Strct &amp; Funct of Lang</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>15</td>
</tr>
</tbody>
</table>

Sophomore and Junior Years

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 300-Literary Criticism</td>
<td>3</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td></td>
</tr>
<tr>
<td>LIT 283D- Mythologies</td>
<td>3</td>
</tr>
<tr>
<td>LIT 308-Multicultural Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 335-Women &amp; Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 382-Lit for Children/Adolescents</td>
<td>3</td>
</tr>
<tr>
<td>LIT 400-Studies in World Lit</td>
<td>3</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td></td>
</tr>
<tr>
<td>LIT 325-Old/ Mid Eng Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 324-16th/17th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 325-Rest/ 18th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 310-Early American Lit</td>
<td>3</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td></td>
</tr>
<tr>
<td>LIT 311-19th Ctry Amer Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 326-19th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 371-20th Ctry Brit/Amer Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 372-Contemp Brit/Amer Lit</td>
<td>3</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td></td>
</tr>
<tr>
<td>LIT 241D-Regional Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 337- Oral Traditions</td>
<td>3</td>
</tr>
<tr>
<td>LIT 431H-Studies in Major Author/s</td>
<td>3</td>
</tr>
<tr>
<td>LIT 437-Studies in Genres</td>
<td>3</td>
</tr>
<tr>
<td>LIT 438-Studies in Literary Topics</td>
<td>3</td>
</tr>
<tr>
<td>LIT 473H-Studies in Shakespeare</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>WRIT 201-College Writing II</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 221-Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 326-Advanced Composition</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 328-Creative Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 385-History of the English Language</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 428-Advanced Creative Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 429-Professional Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 258H- Introduction to Language and Linguistics</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 258-Structure and Function of Language</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 338- Lang and English Education</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 339-Teaching Writing in Secondary Schools</td>
<td>3</td>
</tr>
<tr>
<td>LIT 450- Hist &amp; Theory of Rhet/Comp</td>
<td>3</td>
</tr>
</tbody>
</table>

Senior Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 440--Studies in World Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 335--Women &amp; Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 324--16th/17th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 323--Old/Middle Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 310--Early American Lit</td>
<td>3</td>
</tr>
</tbody>
</table>

WRITING OPTION

This option is designed for students wishing to specialize in the study of writing and rhetoric as preparation for graduate study, professional practice, or liberal education.

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 201-Intro to Writing Studies</td>
<td>3</td>
</tr>
<tr>
<td>LIT 201-Intro to Lit Studies</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

Sophomore and Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRIT 326--Advanced Composition</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 328--Creative Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 371--Digital Rhetorics &amp; Multimodal Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 450-Hist &amp; Theory of Rhet/Comp</td>
<td>3</td>
</tr>
</tbody>
</table>

Take four of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRIT 221--Intermediate Technical Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 372--Science Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 373--News and PR Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 428--Advanced Creative Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 429--Professional Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 258H- Introduction to Language and Linguistics</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 258-Structure and Function of Language</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 338- Lang and English Education</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 339-Teaching Writing in Secondary Schools</td>
<td>3</td>
</tr>
</tbody>
</table>

Take four of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 310--Early American Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 325--Old/ Middle Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 324-16th/17th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 325-Rest/ 18th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 311-19th Ctry Amer Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 326-19th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 371-20th Ctry Brit/Amer Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 372-Contemp Brit/Amer Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 451H-Studies in a Major Author/s</td>
<td>3</td>
</tr>
<tr>
<td>LIT 437-Studies in Genres</td>
<td>3</td>
</tr>
<tr>
<td>LIT 438-Studies in Literary Topics</td>
<td>3</td>
</tr>
<tr>
<td>LIT 473H-Studies in Shakespeare</td>
<td>3</td>
</tr>
<tr>
<td>LIT 308-Multicultural Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 335-Women and Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 382-Lit for Children/Adolescents</td>
<td>3</td>
</tr>
<tr>
<td>LIT 440-Studies in World Lit</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRIT 498--Internship</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 49RH--Seminar/Writing Research and Publication</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

WRIT 101W credits count for the Core Foundations written requirement. These credits are not counted as part of the total English Major, Writing Option.
ENGLISH TEACHING OPTION

This option is designed for students wishing to prepare for secondary school teaching. Employment opportunities may be enhanced if students also obtain a second area of certification, usually a teaching minor. Obtaining a minor in addition to the English major will require more than eight semesters.

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 202-Early Field Experience</td>
<td>1</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>LIT 201-Intro to Literary Studies</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 1506-Individual Fam Develop/Well-Being Lifespan</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 240-Bible as Lit.</td>
<td>3</td>
</tr>
<tr>
<td>LIT 255-Classical Fndtns of Lit</td>
<td>3</td>
</tr>
</tbody>
</table>

University Core and Electives .......................... 16

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 226-Ed Pr &amp; Adolescent Dev.</td>
<td></td>
</tr>
</tbody>
</table>

Take one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 325-Old/ Mid Engl Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 324-16th–17th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 325-Rest/18th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 310-Early American Lit</td>
<td>3</td>
</tr>
</tbody>
</table>

Take two of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 311–19th Ctry Amer Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 326–19th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 371–20th Ctry Brit/Amer Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 372–Contemp Brit/Amer Lit</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one or more in either of the two preceding categories

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRIT 201-College Writing II</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 238-Struct &amp; Funct of Lang</td>
<td>3</td>
</tr>
<tr>
<td>EDU 211-Multicultural Education</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>11</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 370-Integrating Tech into Education</td>
<td>2</td>
</tr>
<tr>
<td>EDU 382-Assessment, Curric, Instruction</td>
<td>2</td>
</tr>
<tr>
<td>EDU 497-Methodic 5-12 English</td>
<td>3</td>
</tr>
<tr>
<td>LIT 306-Literary Criticism</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 358-Language and English Education</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 359-Teaching Writing in Sec Schools</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 445-Teaching Reading and Lit in Sec Schs</td>
<td>3</td>
</tr>
</tbody>
</table>

University Core and Electives .......................... 9

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take two of the following:</td>
<td></td>
</tr>
<tr>
<td>LIT 214D-Regional Lit</td>
<td></td>
</tr>
<tr>
<td>LIT 337-Oral Traditions</td>
<td>3</td>
</tr>
<tr>
<td>LIT 431RH-Studies in Major Author/s</td>
<td>3</td>
</tr>
<tr>
<td>LIT 437-Studies in Genres</td>
<td></td>
</tr>
<tr>
<td>LIT 456-Studies in Literary Topics</td>
<td>3</td>
</tr>
<tr>
<td>LIT 473RH-Studies in Shakespeare</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 308-Multicultural Lit</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 326-Advanced Composition</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 385-History of the English Lang</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 429-Advanced Creative Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 429-Professional Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 450-Hst &amp; Thry of Rhetoric/Comp</td>
<td>3</td>
</tr>
<tr>
<td>LIT 285D–Mythologies</td>
<td>3</td>
</tr>
<tr>
<td>LIT 355-Women &amp; Lit.</td>
<td>3</td>
</tr>
<tr>
<td>LIT 382-Lit for Children/Adolescents</td>
<td>3</td>
</tr>
<tr>
<td>LIT 440-Studies in World Lit</td>
<td>3</td>
</tr>
<tr>
<td>EDU 405-Student Teaching</td>
<td>5-12</td>
</tr>
<tr>
<td>EDU 408-Professional Issues</td>
<td>5-12</td>
</tr>
<tr>
<td>HDCF 306-Exceptional Children</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 461R-Issues in English Education</td>
<td>3</td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Students must receive a grade of “C” or better in all required courses.

### ENGLISH MINOR: WRITING (NON-TEACHING)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRIT 201-Intro to Lit Studies</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 201-Intro to Lit Composition</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 428-Creative Writing</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRIT 221-Intermediate Tech Writing</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 429-Professional Writing</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 236-Thry &amp; Meths in Linguist</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 285-Struct &amp; Funct of Lang</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 429-Professional Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 450-Hst &amp; Thry of Rhetoric/Composition</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one additional upper division English class ...3

**Total English Credits Required** 21

Students must receive a grade of a “C” or better in all required courses.

### ENGLISH MINOR: LITERATURE (NON-TEACHING)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 201-Intro to Lit Studies</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 255-Classical Fndtns of Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 240-Bible as Lit.</td>
<td>3</td>
</tr>
</tbody>
</table>

Take two of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 310-Early American Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 311-19th Ctry Amer Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 325-Old/ Mid Engl Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 324-16th–17th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 325-Rest/18th Ctry Brit Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 372-Contemp Brit/Amer Lit</td>
<td>3</td>
</tr>
</tbody>
</table>

Take three of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIT 100H Intro to Lit</td>
<td>3</td>
</tr>
<tr>
<td>LIT 285D-Mythologies</td>
<td>3</td>
</tr>
<tr>
<td>LIT 214D-Regional Lit</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total English Credits Required** 21

Students must receive a grade of a “C” or better in all required courses.

### History

**Department of History**

http://www.montana.edu/history/

The curriculum leading to the Bachelor of Arts in history allows students to specialize in the study the American west, U.S. history, environmental history, and the history of science and technology. The history degree also provides an analytical gateway to areas beyond the United States, with courses of advanced study related to South Asia, East Asia, Latin America, Europe, and the ancient world. Internships at historical societies, museums, and Yellowstone National Park are also an important part of the educational experience and are strongly encouraged by the department.

A degree in history prepares students for teaching, graduate studies, public resource management, government service, law school, journalism, and other career opportunities that require critical thinking and clarity of communication. Students participate in original research projects and student-centered learning activities; they learn to read and analyze primary texts, as well as secondary literature, and write thoughtfully about them. Students learn to create knowledge by thinking creatively and basing their ideas in the empirical authority inherent in careful examination of historical documents.

At all levels of the curriculum, the history degree provides students with the tools to think rigorously, to research and thereby generate knowledge empirically, and to articulate their thoughts coherently. In consultation with an advisor, students may select from a range of Fields of Concentration that are consistent with his or her interests and educational objectives.

The department encourages students to engage in independent study through the Yellowstone Internship Program and Departmental Honors Option. This option has the following requirements:

- Students must have a minimum 3.5 grade-point average in their major and a 3.0 GPA overall.
- Students must present an acceptable, bound senior thesis, and an oral defense of the thesis.
- Students may attain 3-6 undergraduate independent study credits while working for the thesis. These credits will fulfill part, or all, of the UNRESTRICTED-
ED upper division history electives requirement. Qualified students may enroll in the honors option through their departmental advisers.

Curricula in History

HISTORY OPTION

Freshman Year Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLS 101US--Freshman Seminar</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>Math Core</td>
<td>3</td>
</tr>
</tbody>
</table>

Take one of the following:

HSTR 101H-Western Civilization I...4
HSTR 102H-Western Civilization II...4
HSTR 145D-Reinventing Japan...4
HSTR 160D-Introduction to the American West...4
HSTA 101H-American History I...4
HSTA 102H-American History II...4
HSTA 292CS-Darwinian Revolution...3

Take one of the following:

HSTA 102IH--American History II...4
HSTA 160D-Introduction to the American West...4
One Year Modern Lang...8
University Core and Electives...5

The student may elect to take an additional nine credits of upper-division history courses instead of the one year of modern language.

Sophomore Year Credits

Take two of the following:

HSTR 130D-Latin American History...4
HSTR 153D-Middle Eastern...4
HSTR 140D-Modern Asia...4
HSTR 145D-Reinventing Japan...4
HSTR 160D-Modern World History...4
RLST 110D-Religion, Conflict & Politics...4
HSTR 207CS-Science & Tech in World History...3
HSTR 292CS-History of Religion in Latin America...3

Take one of the following for U.S. Region:

HSTA 511-Early America...3
HSTA 516-American Civil War Era...3
HSTA 518-Gilded Age to 1940...3
HSTA 322-American History: WWII to Present...3

HSTA 406-McCarthy/Ike/Truman...3
HSTA 407-- Gender in US & Canadian West...3
HSTA 408-Gender in America...3
HSTA 409-Food in America...3
HSTA 410--Gender in US & Canadian West...3
HSTA 472-The World at War...3
HSTA 425-European Intellectual History...3

Take two of the following:

HSTA 499-Sen Capstone: Hist Methodology...3
HSTA 522-19TH Century Europe...3
HSTA 524-20TH Century Europe...3
HSTA 530-History of Mexico...3
HSTA 540-Age of the Shoguns...3
HSTA 542-Japan’s Long 19TH Century...3
HSTA 545-Modern China...3
HSTA 546-Modern India...3
HSTA 547-Eurasian Borderlands...3
HSTA 548-World Environmental History...3
University Core and Electives...21

Senior Year Credits

Take five of the following, excluding courses that were taken to fulfill the Required World Regions above.
Three of the five history electives from the below list constitute the student’s Field of Concentration. Fields of Concentration include: Environmental History, History of Race & Gender, History of Science & Technology, Asian History, Latin American History, European History, U.S. History, History of the American West, Cultural & Intellectual History, History Scholar’s Program.

HSTR 592-Ancient Greece...3
HSTA 594-Ancient Rome...3
HSTA 511-Early America...3
HSTA 516-American Civil War Era...3
HSTA 518-Gilded Age to 1940...3
HSTA 522-American History: WWII to Present...3
HSTA 522-19TH Century Europe...3
HSTA 524-20TH Century Europe...3
HSTA 530-History of Mexico...3
HSTA 540-Age of the Shoguns...3
HSTA 542-Japan’s Long 19TH Century...3
HSTA 545-Modern China...3
HSTA 546-Modern India...3
HSTA 547-Eurasian Borderlands...3
HSTA 548-World Environmental History...3

HSTR 410--Family/Gender, Law in Ancient Greece/Rome...3
HSTR 412-American Thought & Culture...3
HSTR 415--Gender and Technology...3
HSTR 416-Race & Class in America...3
HSTR 417-Early Modern Science...3
HSTR 419-Modern Science...3
HSTR 425-European Intellectual History...3
HSTR 430-Latin Amer Soc History...3
HSTR 450-Race in Latin America...3
HSTR 452-Colonial Latin America...3
HSTR 455-Modern Latin American Perspectives...3
HSTR 454-Gender in Latin America...3
HSTA 499-Sen Capstone: Hist Methodology...3

HSTR 443-Gender in Asia...3
HSTR 444-Gender in Japan...3
HSTR 468-Making of Modern Turkey...3
HSTR 470-American Environmental History...3
HSTR 482-History of American Technology...3
HSTR 482-Race & Gender Perspectives...3
HSTR 484-World Environmental History...3
HSTR 486-Museum History...3

University Core and Electives...30

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Students must receive a grade of C- or better in all required courses.

HISTORY TEACHING OPTION

Candidates seeking a teaching career in Montana’s public schools with a major in history may follow the teaching option as listed below. Students must be careful to complete their core requirements in their first three years as their senior year will be almost completely filled with required courses.

Freshman Year Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLS 101US--Freshman Seminar</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>EDU 202--Early Field Experience</td>
<td>1</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td>6</td>
</tr>
<tr>
<td>HSTR 101H-Western Civilization I</td>
<td>4</td>
</tr>
<tr>
<td>HSTA 102H-Western Civilization II</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 292CS-Darwinian Revolution</td>
<td>3</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td>6</td>
</tr>
<tr>
<td>HSTA 592-Ancient Greece</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 511-Early America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 516-American Civil War Era</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 518-Gilded Age to 1940</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following for U.S. Region:</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 406-McCarthy/Ike/Truman</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 407-- Gender in US &amp; Canadian West</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 408-Gender in America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 409-Food in America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 410--Gender in US &amp; Canadian West</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

Sophomore Year Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 223--Ed Psy &amp; Adolescent Dev</td>
<td>3</td>
</tr>
<tr>
<td>EDU 382-Assessment,Curric, Instruction</td>
<td>3</td>
</tr>
<tr>
<td>EDU 211D-Multicultural Education</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 150S-LifeSpan Human Devlpt</td>
<td>3</td>
</tr>
<tr>
<td>Take two of the following:</td>
<td>6</td>
</tr>
<tr>
<td>HSTR 130D-Latin American History</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 153D-Middle Eastern</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 140D--Modern Asia</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 145D-Reinventing Japan</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 160D-Modern World History</td>
<td>4</td>
</tr>
<tr>
<td>RLST 110D-Religion, Conflict &amp; Politics</td>
<td>4</td>
</tr>
<tr>
<td>Take one of the following for U.S. Region:</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 311--Early America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 316-American Civil War Era</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 318-Gilded Age to 1940</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 322-American History</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
</tr>
</tbody>
</table>

Junior Year Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSTR 392-Ancient Greece</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 394-Ancient Rome</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 322-American History</td>
<td>3</td>
</tr>
<tr>
<td>WWII to Present</td>
<td>3</td>
</tr>
</tbody>
</table>
| HSTA 410--Family/Gender, Law in Ancient Greece/Rome...3
| HSTA 412-American Thought & Culture        | 3       |
| HSTR 415--Gender and Technology             | 3       |
| HSTR 416-Race & Class in America            | 3       |
| HSTR 417-Early Modern Science               | 3       |
| HSTR 419-Modern Science                    | 3       |
| HSTR 425-European Intellectual History      | 3       |
| HSTR 430-Latin Amer Soc History             | 3       |
| HSTR 451-Race in Latin America              | 3       |
| HSTR 452-Colonial Latin America             | 3       |
| HSTR 455-Modern Latin American Perspectives | 3       |
| HSTR 454-Gender in Latin America            | 3       |
| HSTR 468-Making of Modern Turkey            | 3       |
| HSTR 470-American Environmental History     | 3       |
| HSTR 482-History of American Technology    | 3       |
| University Core and Electives               | 3       |

Take one of the following:

HSTA 466-Science & Medicine in China...3
HSTA 450-History of American Indian...3
HSTA 460-Montana and the West...3
HSTA 464-Trans-Mississippi West...3
HSTR 482-History of American Technology...3
HSTR 482-Race & Gender Perspectives...3
HSTR 484-World Environmental History...3
HSTR 486-Museum History...3

University Core and Electives...3

20

29
The SETS major offers students a multi-disciplinary course of study that analyzes science, technology, and the environment within their broader cultural contexts, including intellectual and social history, environmental history, religious studies, and philosophy.

Students will choose one of several specialties as a focus for their coursework, such as Philosophy of Science, History of Science and Technology, Science and Technology Policy, or Environmental History. Moreover, students are required to become knowledgeable about one or more areas of science, technology, environmental studies, or public policy, as the Department believes that such literacy is an important part of a liberal arts education in a land-grant institution. Students will therefore be required to take at least 12 credits in an appropriate science, social science, or engineering discipline. Finally, a capstone is required for all students; each will complete an original research paper synthesizing their scientific, technological, and humanistic knowledge.

Sets Option

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRIT 101W-College Writing</td>
<td>3</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHL 101H-Reason and Reality: Intro to Philosophy</td>
<td>3</td>
</tr>
<tr>
<td>PHL 101H-Problems of Good &amp; Evil: Intro to Ethics</td>
<td>3</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Core and Electives</td>
<td>30</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSTA 485--Gender in America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 489--Gender and Medicine in China</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 497--History of American Indian</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 499R--Sen Capstone: Hist Methodology</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 501--Environmental Health</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 516--Modern Civil War Era</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 518--Gilded Age to 1940</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 522--American History/WWII to Present</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 522--Philosophy of Science</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 530--History of Mexico</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 540--Age of the Shoguns</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 542--Japan's Long 19th Century</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 545--Modern China</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 546--Modern India</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 550--Modern Britain</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 551--Modern French</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 552--Modern German</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 556--Modern East/20th Century</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 575--Eurasian Borderlands</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 582--History of American Technology</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 572--The World at War</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 575--Truman-Eisenhower Years</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 576--Twentieth Century War</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 584--Russia to 1917</td>
<td>3</td>
</tr>
</tbody>
</table>

**University Core and Electives**

- Humanities: 21 credits
- Science and Technology: 9 credits
- Social Science: 10 credits
- World Languages: 3 credits
- One Year of Modern Language: English

**One Year Modern Language:**

- The student may elect to take an additional nine credits of upper-division history courses instead of one-year modern language requirement.
- One-Year Modern Language: English

**University Core and Electives**

- Humanities: 21 credits
- Science and Technology: 9 credits
- Social Science: 10 credits
- World Languages: 3 credits
- One Year of Modern Language: English

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHL 321--Philosophy &amp; Biomedical Ethics</td>
<td>3</td>
</tr>
<tr>
<td>PHL 322--Philosophy of Science</td>
<td>3</td>
</tr>
<tr>
<td>PHL 354--Approaches to Epistemology</td>
<td>3</td>
</tr>
<tr>
<td>PHL 354--Philosophy of Race</td>
<td>3</td>
</tr>
<tr>
<td>PHL 354--Philosophy of Science</td>
<td>3</td>
</tr>
<tr>
<td>PHL 355--Philosophy and Technology</td>
<td>3</td>
</tr>
<tr>
<td>RLST 492--Natural, Unnatural, Supernatural</td>
<td>3</td>
</tr>
</tbody>
</table>

**Take two approved Science/Technology**:

- Social Science courses

**University Core and Electives**

- Humanities: 21 credits
- Science and Technology: 9 credits
- Social Science: 10 credits
- World Languages: 3 credits
- One Year of Modern Language: English
JAPAN STUDIES OPTION

The Japan Studies major offers students a curriculum that investigates Japanese history, culture, and language in an interdisciplinary setting and that encourages students to study abroad in Japan at partner universities. Areas of coursework include Japanese spoken and written language, pre-modern and modern Japanese literature, conventional and animated film studies, early modern and modern Japanese history, Japanese anthropology, and the history of Japanese science, technology, and environment.

Students may choose an area of specialization during their coursework, such as in literature or history, but all students will be required to take three years or 22 credits of Japanese language. Japanese language skills are at the heart of meaningful exchange and interaction with Japanese people. Through this demanding curriculum, students will acquire the highly specialized skills needed to succeed in Japan or in Japanese contexts, whether pursuing careers in business, academia, or science.

The Japan Studies major also trains students in useful liberal arts methodologies, such as critical thinking, stylistically sound writing, and the clear public articulation of complex ideas. During their senior year, students are required to complete a “capstone” research project, which focuses on student designed and executed projects. The “capstone” project may be a significant research assignment in an upper-division Japan Studies course or it may be independent study with a Japan Studies faculty member.

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLS 101US-Freshman Seminar</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W-College Writing</td>
<td>3</td>
</tr>
<tr>
<td>Math Core</td>
<td>3</td>
</tr>
<tr>
<td>JPNS 101-ID—Elementary Japanese I</td>
<td>4</td>
</tr>
<tr>
<td>JPNS 102D—Elementary Japanese II</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 145D—Reinventing Japan</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>JPNS 201D—Intermediate Japanese I</td>
<td>4</td>
</tr>
<tr>
<td>JPNS 202D—Intermediate Japanese II</td>
<td>4</td>
</tr>
<tr>
<td>Take one of following:</td>
<td></td>
</tr>
<tr>
<td>ANTY 343—Popular Culture-Japan</td>
<td></td>
</tr>
<tr>
<td>JPNS 340—Age of the Shoguns</td>
<td></td>
</tr>
<tr>
<td>HSTR 342—Japan’s Long 19th Century</td>
<td></td>
</tr>
<tr>
<td>HSTR 444—Gender in Japan</td>
<td></td>
</tr>
<tr>
<td>HSTR 445—Environment, Health, and Science</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>18</td>
</tr>
</tbody>
</table>

Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>JPNS 305—Japanese Architecture &amp; Grammar</td>
<td>3</td>
</tr>
<tr>
<td>Take two of following:</td>
<td></td>
</tr>
<tr>
<td>ANTY 343—Gender and Sexuality-Japan</td>
<td></td>
</tr>
<tr>
<td>JPNS 490—Undergraduate Research</td>
<td></td>
</tr>
<tr>
<td>JPNS 492—Independent Study</td>
<td></td>
</tr>
<tr>
<td>JPNS 450R—Sem: Japanese Literature</td>
<td></td>
</tr>
<tr>
<td>JPNS 490—Undergraduate Research</td>
<td></td>
</tr>
<tr>
<td>JPNS 450—Modern Japanese Literature</td>
<td></td>
</tr>
<tr>
<td>JPNS 492—Independent Study</td>
<td></td>
</tr>
<tr>
<td>HSTR 342—Japan’s Long 19th Century</td>
<td></td>
</tr>
<tr>
<td>HSTR 444—Gender in Japan</td>
<td></td>
</tr>
<tr>
<td>HSTR 445—Environment, Health, and Science</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>18</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>JPNS 450—Sem: Japanese Literature &amp; Culture</td>
<td></td>
</tr>
<tr>
<td>JPNS 490—Undergraduate Research</td>
<td></td>
</tr>
<tr>
<td>HSTR 492—Independent Study</td>
<td></td>
</tr>
<tr>
<td>JPNS 492—Independent Study</td>
<td></td>
</tr>
<tr>
<td>JPNS 490—Undergraduate Research</td>
<td></td>
</tr>
<tr>
<td>JPNS 450—Modern Japanese Literature</td>
<td></td>
</tr>
<tr>
<td>JPNS 492—Independent Study</td>
<td></td>
</tr>
<tr>
<td>HSTR 450—Modern Japan</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>21</td>
</tr>
</tbody>
</table>

The Japan Studies Option requires 47 credits in Japan-related courses. Not all of the four upper-division Japan Studies electives can be from the same department. Students must have a total of at least 120 credits to graduate. Of these, 42 credits must be in upper-division courses (300 level or higher). With the expressed consent of the program director, the following courses may be substituted by similar courses taken in Japan under student-exchange programs: ARTH 560; HSTR 140, 345, 346, 443; JPNS 101, 102, 219, 220, 315; PHL 270; and RLIST 202, 203. Students must receive a grade of C or better in all required courses.
## HISTORY RELIGIOUS STUDIES OPTION

The Religious Studies option in History is being withdrawn from the curriculum effective Fall 2012. Students already enrolled in the option will be able to take all courses that are required to complete it. For additional information, contact the Department of History & Philosophy, 2-155 Wilson Hall; 406-994-4395; www.montana.edu/whjiw/.

### Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLS 101U--Freshman Seminar</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W--College Writing</td>
<td>3</td>
</tr>
<tr>
<td>Math Core</td>
<td>1</td>
</tr>
<tr>
<td>Take one of following:</td>
<td></td>
</tr>
<tr>
<td>HSTR 101IH-Western Civilization I</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 102IH-Western Civilization II</td>
<td>4</td>
</tr>
<tr>
<td>292CS--Darwinson Revolution</td>
<td>3</td>
</tr>
<tr>
<td>Take one of following:</td>
<td></td>
</tr>
<tr>
<td>HSTA 101IH--American History I</td>
<td>1</td>
</tr>
<tr>
<td>HSTA 102IH--American History I</td>
<td>1</td>
</tr>
<tr>
<td>1600IH--Introduction to the American West</td>
<td>4</td>
</tr>
<tr>
<td>Take one of following:</td>
<td></td>
</tr>
<tr>
<td>RLIST 110D--Religion, Conflict &amp; Politics</td>
<td>4</td>
</tr>
<tr>
<td>RLIST 202D--Asian Religions</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 203D--Taosim to Zen</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>9-10</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>29-31</strong></td>
</tr>
</tbody>
</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSTR 1400D--Modern Asia</td>
<td>4</td>
</tr>
<tr>
<td>HSTR 1450D--Reinventing Japan</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 1600D--Modern World History</td>
<td>3</td>
</tr>
<tr>
<td>Take one of following:</td>
<td></td>
</tr>
<tr>
<td>RLIST 294IH--Introduction to Hebrew Bible</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 295IH--Introduction to New Testament</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 297IH--Myth and Metaphor</td>
<td>3</td>
</tr>
<tr>
<td>Take two of following:</td>
<td></td>
</tr>
<tr>
<td>RLIST 105D--Introduction to the Theory of Religions</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 206IH--Origins of God</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 217IH--Religion and Science</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 220IH--Interpretation of American Religion</td>
<td>3</td>
</tr>
<tr>
<td>One Year Modern Language</td>
<td>8</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>50-52</strong></td>
</tr>
</tbody>
</table>

### Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take one of the following for U.S. Region:</td>
<td></td>
</tr>
<tr>
<td>HSTA 311--Early America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 316--American Civil War Era</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 318--Gilded Age to 1940</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 322--American Hist.-WWII to Present</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 406--McCarthy/Ike/Truman</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 407--Gender in US &amp; Canadian West</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 412--American Thought &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 416--Race &amp; Class in America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 417--Sci Tech Soc 1500-1800</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 419--Modern Science</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 425--European Intellectual History</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 439--Latin American Soc History</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 431--Race in Latin America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 432--Colonial Latin America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 433--Religion Ancient Egypt</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 444--Japanese Women's History</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 445--Gender in Japan</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 446--Science and Medicine in Japan</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 447--History of North American Indian</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 469--Montana and the West</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 464--Trans-Mississippi West</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 470--American Environmental History</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 482--History of American Technology</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following for Euro-American Regional</td>
<td></td>
</tr>
<tr>
<td>HSTR 300--Ancient Greece</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 304--Ancient Rome</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 311--Early America</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 316--American Civil War Era</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 318--Gilded Age to 1940</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 322--American Hist.-WWII to Present</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 329--Modern China</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 366--Middle East/20TH Century</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 575--Modern India, Pakistan &amp; Bangladesh</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 408--Gender in America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 430--Latin Amer Soc History</td>
<td>3</td>
</tr>
<tr>
<td>HSTA/SPNS 430--Latin American Perspectives</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 431--Gender in Latin America</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 434--Gender Sexuality &amp; Social Change in Lat Am.</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 435--Gender in Asia</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 444--Japanese Women's History</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 446--Science and Medicine in China</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 447--History of North American Indian</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 469--Montana and the West</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 464--Trans-Mississippi West</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 468--History of Yellowstone</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 470--American Environmental History</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 482--History of American Technology</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 482--Animal History</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 484--World Environmental History</td>
<td>3</td>
</tr>
<tr>
<td>HSTA 486--Museum History</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>18</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td><strong>30-31</strong></td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses 300 and above. Students must receive a grade of C- or better in all required courses.

## JAPAN STUDIES MINOR (NON-TEACHING)

The Japan Studies Program offers a non-teaching, interdisciplinary minor in Japan Studies through the Department of History and Philosophy and the Department of Modern Languages and Literatures. The Program’s mission is to provide students with the skills and understanding they need to succeed in Japanese contexts. The minor requires basic Japanese language proficiency and a broad knowledge of Japanese history, literature, and civilization. It includes 8 credits in Japanese language training, 12 credits in elective course work, and a 3-credit capstone course, for a total of 25 credits.

Those wishing to declare a minor in Japan Studies must submit an “Application for a Non-teaching Minor” to the Registrar’s Office by the end of the semester one year prior to the semester of completion. In order to receive the minor, students must successfully complete the following course work:
HISTORY MINOR (NON-TEACHING)

Take one of the following:

HST 101IH-Western Civilization I .................................................4
HST 102IH-Western Civilization II .................................................4

Take two of the following:

HST 130D-Latin American History .................................................4
HST 135D-Modern Middle East .....................................................4
HST 140D-Modern Asia ..............................................................4
HST 145D-Imagining Japan ..........................................................4
HST 160D-World Modern History ..................................................4
HST 207CS-Sci and Tech in World History ......................................3
HST 232D-Hist of Religion in Latin Amer .......................................3

Take one of the following:

HST 101IH-American History .......................................................4
HST 102IH-American History .......................................................4
HST 160D-Intro to the American West ..........................................4

Take three of the following:

HSTR 392-Ancient Greece .............................................................3
HST 394-Ancient Rome .................................................................3
HST 311-Early America .................................................................3
HST 316-American Civil War Era ...................................................3
HST 318-Gilded Age to 1945 .........................................................3
HST 322-American History: WWII to Present ..................................3
HST 322-19TH Century Europe .......................................................3
HST 324-20TH Century Europe .......................................................3
HST 330-History of Mexico ..........................................................3
HST 340-Age of Shoguns ............................................................3
HST 342-Japan’s Long 19th Century ..............................................3
HST 345-Modern China ...............................................................3
HST 346-Modern India .................................................................3
HST 350-Modern Britain ...............................................................3
HST 355-Modern France ...............................................................3
HST 359-Russia to 1917 .................................................................3

The minimum number of credits for a non-teaching minor is twenty-one, with none of those being upper division credits.

MUSEUM STUDIES MINOR (NON-TEACHING)

To understand the cultural significance of museums and to explore contemporary museum practices, Montana State University-Bozeman offers an interdisciplinary minor in Museum Studies that is administered through the Department of History and Philosophy. The Museum Studies minor offers students in many disciplines the opportunity to learn about the role of museums in advancing public education and academic research, to deepen students’ understanding of museums, and to better position them to learn about possible employment in the museum field.

In consultation with a Museum Studies Minor advisor in the Department of History and Philosophy, students in the minor select 12 credits from a secondary field outside of their major and appropriate to museum topics. Half of these credits must be at the 300 or 400 level. The goal of this secondary field is for students to develop expertise beyond their major that would be of use to them in a museum career. Generally, all 12 credits should be in one area, though interdisciplinary secondary fields may be considered where intellectually warranted. The minimum number of credits for a non-teaching minor is twenty-one, with none of those being upper division credits, therefore the total number of credits for the Museum Studies Minor must meet this requirement. Students may also fulfill this requirement by majoring in one of the following secondary fields if, in addition, they choose 12 credits from an additional one of the secondary fields. Some possible secondary fields are noted below, though other appropriate fields may be considered in consultation with an advisor.

- Anthropology
- Art History
- Biology
- Business Administration
- Education
- English Literature
- English Writing
- Geography
- Geology
- History
- Native American Studies
- Sociology

In addition, all students must take the following Museum Studies (MOR) courses:

- MOR 301-Museum Practices .........................................................3
- HSTR 486-Museum History .........................................................3

In consultation with the Museum Studies minor advisor in the Department of History and Philosophy, students select 6 credits of Museum Experience work, either through an internship alone or a combination of internship and undergraduate research. All students must do at least 3 credits of internship (476) at a museum or other similar institution. Students may earn the remaining 3 credits either by continuing their internship or through an undergraduate research program (489/490). The 3 credits of undergraduate research may be done in either their major or secondary fields. Each student’s specific Museum Experience program will be determined in consultation with an advisor in the Department of History and Philosophy, and when appropriate, an advisor in the student’s secondary field.
LATIN AMERICAN AND LATINO STUDIES MINOR (NON-TEACHING)

A Latin American and Latino Studies minor (LALS) is available to provide students interested in Latin American and Latino history and language with valuable interdisciplinary skills. Because this is an interdisciplinary program, students will enroll in courses in History and Philosophy and Modern Languages and Literatures. Courses in Sociology and Anthropology, as well as other departments with relevant course content, will also be allowed for credit subject to approval by the program coordinator. This minor will complement majors for students pursuing graduate school and professional programs in agriculture, engineering, history, literature, political science, sociology, international business, and more. The minor will also strengthen the skill-sets of students who wish to become more competitive in the Spanish speaking job market, either abroad or in the United States. A minor in LALS will prepare students for the close relationship developing between Latin American and the United States in trade agreements, the growing immigrant laborers, and the expansion of Latin American and Latino communities in the United States with significant political and economic power.

Those wishing to declare a minor in Latin American and Latino Studies must submit an “Application for a Non-Teaching Minor” to the Registrar’s Office by the end of the semester one year prior to the semester of completion.

The equivalent of four semesters of Spanish language is required. Students with prior experience in Spanish language may have some requirements waived. Students interested in the LALS minor should consult with the Modern Language Department immediately upon their decision to fulfill the minor so that they can ascertain the language requirements that are appropriate for them.

**Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPNS 101</td>
<td>Elementary Spanish I</td>
<td>4</td>
</tr>
<tr>
<td>SPNS 102D</td>
<td>Elementary Spanish II</td>
<td>4</td>
</tr>
<tr>
<td>SPNS 201D</td>
<td>Intermediate Spanish I</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 220D</td>
<td>Spanish Language &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 130D</td>
<td>Latin American History</td>
<td>4</td>
</tr>
</tbody>
</table>

**Elective Courses**

Select 12 credits from the following:

- HSTR 232/RLST 232D - History of Religion in Latin America (3)
- HSTR 530 - History of Mexico (3)
- HSTR 430 - Latin American Soc History (3)
- HSTR 431 - Race in Latin America (3)
- HSTR 435 - SPNS 430 - Latin American Perspectives (3)
- HSTR 434 - Gender in Latin America (3)
- SOCI 368 - Latino Immigration (3)
- SOCI 370 - Sociology of Globalization (3)
- SPNS 329 - Early Cultures of Latin America (3)
- SPNS 350 - Modern Cultures of Latin America (3)
- SPNS 332 - Contemp Latin Amer Literature (3)
- SPNS 335H - Travel in Latin American Lit & Film (3)
- SPNS 351 - US Latino Literature (3)
- SPNS 350 - US Latino Cultures (3)
- SPNS 352 - Hisp Texts & Cinema (3)
- SPNS 360 - Latin American History (3)
- SPNS 330 - Modern Cultures of Latin America (3)
- SPNS 335HI - Latin American Literature (3)
- SPNS 332 - Contemp Latin Amer Literature (3)
- SPNS 410 - Culture and Revolution (3)
- SPNS 416 - Spanish Culture and Revolution (3)

Not all elective courses may be taken in the same department. A total of 9 credits must be at the 300 or 400 level. This list may expand as other disciplines develop courses that contain a substantial Latin American or Latino component.

**Liberal Studies**

**University College**

http://www.montana.edu/lsdegree/

All students are required to choose one of two program options, either the Quaternity (option I), which offers the more traditional broad-based liberal arts education, or a cross-disciplinary cluster of thematically related courses (option II), which currently includes the Environmental Studies and the Global and Multicultural Studies options. Courses that are used to satisfy one degree requirement cannot be used to satisfy another. Students must complete a minimum of 45 credits in the program after declaring themselves to be Liberal Studies majors.

Students who have successfully completed the first two years of any MSU-Bozeman degree with a minimum of 60 credits (all degree requirements and completion of the university core) will be able to construct a program of study for completion of the Quaternity option, in consultation with the Program Director and the Liberal Studies Program Committee, requiring no more than 60 additional credits.

For details about the Liberal Studies degree, contact Liberal Studies by calling 406-994-3561, sending email to liberalstudies@montana.edu or checking the liberal studies web site at www.montana.edu/lsdegree.

**Liberal Studies Seminars**

All students in Liberal Studies, regardless of option, will take a series of integrative seminars (LS 101 and LS 301). These seminars are designed to provide a sense of academic community, improved critical thinking and communication skills, and a better understanding of the factual knowledge and theoretical foundations of the disciplines encompassed by the arts, humanities, natural sciences, and social sciences.

**Integrative Studies Requirement**

Students are required to take 4 courses (minimum of 12 credits) in addition to the university’s Core curriculum, one course each in arts, humanities, natural science, and social sciences.

**Foreign Language Requirement**

Students in the Quaternity option are to complete the first two courses in a foreign language (8 credits) or to demonstrate equivalent competency. Students in the Global and Multicultural option are to complete the first three courses in a foreign language (11 credits) or to demonstrate equivalent competency.

**Capstone Experience**

All students in the major take a common 4-credit capstone course in their final year. Students work together in small groups to design solutions to contemporary public policy issues (e.g., overpopulation). Each small-group project results in a scholarly product (typically a paper or presentation) that serves as a tangible and measurable indication of the extent to which students have mastered the critical thinking, reading, writing, and oral communication skills that are the principal learning objectives of the program.

**ENVIRONMENTAL STUDIES OPTION**

This option is designed for students interested in developing a broad understanding of environmental issues from scientific and public policy perspectives. In addition to some common foundations courses, students select 21 credits each from approved lists of science and public policy courses. Proposed substitutions must be submitted in writing to the Program Director.
Freshman Year  
F S  
LS 101 .......................................................... 3  
WRIT 101W* ................................................. 5  
BIOB 170N .................................................. 4  
GPHY 111 ..................................................... 4  
STAT 216Q .................................................. 3  
GPHY 212D .................................................. 3  
University Core ............................................ 3  
Electives ..................................................... 2  5  
15 15

Sophomore Year  
F S  
LS 301 .......................................................... 1  
Integrative Studies ......................................... 6  6  
Natural Science Electives* .................................. 6  6  
Public Policy Electives* ..................................... 3  3  
University Core ............................................. 3  3  
Electives ..................................................... 2  3  
15 15

Junior Year  
F S  
LS 301 .......................................................... 1  
PHIL 340 ..................................................... 3  3  
Natural Science Electives* .................................. 6  6  
Public Policy Electives* ..................................... 3  3  
University Core ............................................. 3  3  
Electives ..................................................... 2  3  
15 15

Senior Year  
F S  
LS 401 .......................................................... 1  
Modern Language .......................................... 4  4  
Natural Science Electives* .................................. 6  6  
Public Policy Electives* ..................................... 6  6  
Electives ..................................................... 2  5  
15 15

A minimum of 42 credits must be in courses numbered 300 and above. In addition to LS 401, at least 9 credits must be in courses numbered 400 and above.

* Students have the option to take WRIT 101W in the spring semester and 3 additional university core electives in the fall semester.

**Natural science electives to be selected from: AGBE 315, Follow the Grain; NRSM 101, Natural Resource Conservation; NRSM 102, Montana Range Plants Lab; NRSM 240, Natural Resource Ecology; NRSM 455, Riparian Ecology and Management; NRSM 553, Grazing Ecology & Management; NRSM 330, Fire Ecology & Management; WILD 438, Wildlife Habitat Ecology; CHMY 125, Intro to Organic & Biochem; BIOE 103, Environmental Science & Society; BIOE 162, Insects & Human Society; BIOE 220, General Botany; BIOE 270, General Ecology; BIOE 405, Behavioral & Ecological Evolutionary Ecology; BIOE 421, Yellowstone Wildlife Ecology; BIOE 459, Stream Ecology; BIOE 440, Conservation Ecology; CHMY 102, Applying Chemistry to Society or CHMY 121, Intro to General Chemistry or CHMY 141/151, College/Honors Chemistry I; CHMY 143/153, College/Honors Chemistry II; GEO 101, Intro to Physical Geology; ERTH 212, Yellowstone Scientific Lab; ERTH 307, Principles of Geomorphology; ERTH 432, Surface Water Resources; ERTH 449, Hydrogeology; F&WL 301, Principles of Fish & Wildlife Management; GPHY 411, Biogeography; ERTH 303, Weather & Climate; GPHY 441, Mountain Geography; GEO 103, Intro to Envirntal Geol; GEO 211, Early History and Evolution; ENSC 110, Land Resources & Environmental Sciences; ENSC 245, Soils; ENSC 272, Water Resources; ENSC 370, Water Quality; ENSC 351, Nutrient Cycling; ENSC 345, Soil & Environmental Chemistry; GPHY 426, Remote Sensing; ENSC 444, Watershed Hydrology; ENSC 453, Soil & Environmental Physics; ENSC 454, Landscape Pedology; ENSC 460, Soil Remediation; ENSC 461, Restoration Ecology; BIOM 210, Principles of Environmental Health Science; BIOM 110CS, Introduction to Plant Biology; HORT 103, Miracle Growing; BIOE 424, Ecology of Fungi; UNIV 125, Microbes & the Environment.

***Public policy electives to be selected from: AGBE 210, Economics of Agricultural Business; AGBE 337, Agricultural Law; SOT 425, Water Management; BREN 330, Water Resources Law; ECNS 101, Economic Way of Thinking; ECNS 132, Econ & the Environment; ECNS 317, Economic Development; ECNS 392, Econ of Natural Resources; LIT 414, Lit of Place; GPHY 141, Geography of World Regions; GPHY 284 Intro to GIS Science & Cartog; GPHY 365, Geographical Planning; GPHY 321, Urban Geography; GPHY 322, Economic Geography; GPHY 461, Tourism Planning; HSTA 468, History of Yellowstone; HSTA 470, American Environmental History; HSTR 484, World Environmental History; LRES 421, Holistic Thought & Management; BMGT 406, Negotiation & Decision Resolution; BMGT 473, Modern Management of Western Resources; PSCI 210, Intro to American Government; PSCI 269, Intro to State and Local Govt; PSCI 306, Legislative Process; PSCI 365, Pub Policy Issues and Analysis; PSCI 441, Montana Local Politics; PSCI 436, Politics of Food and Hunger; RSLT 223, Nature & Culture; SOCI 355, Population & Society; SOCI 470, Environmental Sociology; SOCI 352, Society & Consumption. Up to 12 credits required in a minor or in a second degree program may be applied toward the Natural Science and Public Policy electives.

GLOBAL AND MULTICULTURAL STUDIES OPTION

In addition to selecting 27 credits from an approved list of global/multicultural courses spanning a wide range of disciplines, students in this option select a specific area studies focus in which they take 12 additional credits to provide deeper understanding of that region or field of study. In addition, students are required to achieve competence, at an intermediate level, in a foreign language appropriate to their field of area studies. Students in this option are encouraged to study abroad in a region appropriate to their field of area studies. Credits earned abroad may, with the approval of the Program Director, be substituted for global/multicultural or area studies courses as appropriate.

Freshman Year  
F S  
LS 101 .......................................................... 3  
WRIT 101W* ................................................. 5  
Modern Language ........................................... 4  4  
University Core ............................................ 3  3  
Electives ..................................................... 2  5  
15 15

Sophomore Year  
F S  
LS 102 .......................................................... 1  
Modern Language ........................................... 3  3  
Integrative Studies ........................................... 6  6  
University Core ............................................ 3  3  
Electives ..................................................... 3  2  
15 15

Junior Year  
F S  
LS 301 .......................................................... 1  
Global & Multicultural Electives* ....................... 6  6  9  
Area Studies Electives** ..................................... 6  6  3  
Electives ..................................................... 2  3  
15 15

Senior Year  
F S  
LS 301 .......................................................... 1  
Global & Multicultural Electives* ....................... 4  4  3  
Area Studies Electives** ..................................... 6  6  3  
Electives ..................................................... 5  5  
15 15

A minimum of 42 credits must be in courses numbered 300 and above. In addition to LS 401, at least 9 credits must be in courses numbered 400 and above.

* Students have the option to take WRIT 101W in the spring semester and 3 additional university core electives in the fall semester.

With consent of the program director, courses in the Area Studies categories below, excluding Europe, may be applied as Global and Multicultural Electives.

***Area studies electives to be selected from courses on one of the following areas.


**Europe: ARTH 201, Art of World Civilization II ; LIT 225, British Lit I; LIT 224, British Lit II; LIT 325, Brit/Old/Middle English; LIT 324,16th/17th Century Brit Lit; LIT 325, Rest/18th Century Brit Lit; LIT 140, 19th Century British Lit; LIT 373, Studies in Shakespeare; HSTR 101, Origins of Western Civilization; HSTR 102, Western Civilization II; HSTR 339, Russia to 1917; HSTR 322,19th Century Europe; HSTR 324, 20th Century Europe; HSTR 350, Modern Britain; HSTR 355, Modern France; HSTR 362, Modern Germany; HSTR 372, The World at War: WWII; HSTR 423, European Intellectual History; FREN 306, From Reflection to Revolution; GRMN 330, Adv Gram, Conv, Compl I; GRMN 303, Issues in German Cinema; GRMN 360, The Faust Myth; MUN 211, Masterworks in Music; PHL 361, History of Philosophy: Ancient & Medieval; PHL 362, History of Philosophy: Modern; PHL 383, Reason & Revolution; PSCI 451, Ancient & Medieval Pol Phil.

**Latin America: HSTR 130, Latin American History; HSTR/RELS 272 Religion in Latin America; HSTR 330, History of Mexico; HSTR 452, Colonial Latin America; HSTR 430, Latin Amer Soc History; HSTR 431, Race in Latin America; HSTR 434, Gender, Sexuality & Social Change in Latin American; SPNS 350, Latin Amer Cult & Civ; SPNS 332, Contemporary Latin American Literature; SPNS 335, Travel in Latin American Lit & Film; SPNS 362, Hispanic Poetry; SPNS 416, Culture & Revolution; SOCI 368, Latino Immigration: Latinos in the U.S.

**Native American Studies: ANTY 332, Native North America; ART 316, Indigenous Ceramics; HSIA 450, History of American Indians; NASX 105, Introduction to Native American Studies; NASX 232, Montana Indians Cult.Hist.Current Issues; NASX 239, Survey of American Indian Art; NASX 280, NAS Research Theories & Methods; NASX 205, Native Americans in Contemporary Society; NASX 360, Native American Indians & the Cinema; NASX 394, Native American Beliefs & Philosophy ; NASX 310, Native Cultures of North America; NASX 476, American Indian Policy & Law; NASX 340, Native American Literature; NASX 405, Gender Issues in Native American Studies; NASX 415, Native Food Systems; NASX 625X, Pan-Indianism in American Society; NASX 430, American Indian Education.

**Women’s Studies: ANTY 337, Sex, Gender & Sexuality in Japan; ART 421, Women Artists; ENGL 330 Women & Literature; HIDH 240, Human Sexuality; HSTA 407, Gender in US & Canadian West; HSTA 408, Gender in America; HSTR 444, Japanese Women’s History; HSTR 410, Fam,Gend & Law in Anct Ge/ Rome; HSTR 434, Gen & Sex & Soc Chge in Lat Am; HSTR 415, Gender & Technology; HSTR 443, Gender in Asia; HUM 204, Gender & Sexuality; JPNS 325, Women in Japanese Lit & Cult; NASX 405, Gender Issues in Native American Studies; PHIL 363, Philosophy & Feminism; PSYN 235, Contemp Issues in Human Sexual; PSYN 335, Psychology of Gender; RLST 321, Gender & Religion; SOCI 326, Sociology of Gender; WS 201, Introduction to Feminist Theories & Methodologies; WS 301, Integrative Seminar in Women’s Studies.

Up to 12 credits required in a minor or in a second degree program may be applied toward the Global & Multicultural and Area Studies electives.

Mathematical Sciences
Department of Mathematical Sciences
http://www.math.montana.edu/

The Department of Mathematical Sciences has programs leading to the Bachelor of Science, the Master of Science, and the Doctor of Philosophy degrees. The B.S. options in mathematics, applied mathematics, statistics, and teaching are listed below.

Mathematics Option
The mathematics option prepares students for graduate work in mathematics. The core of the program is built around three years of analysis, as well as courses in abstract and linear algebra. The program is flexible enough to accommodate students desiring to concentrate in mathematics, applied mathematics, mathematics teaching, or statistics. Programs in these concentrations are designed with the help of faculty advisors.
a secondary emphasis in other subject matter areas will prepare a student for employment as an analyst or computational specialist in those areas.

Applied Mathematics Option

Applied mathematicians learn to describe physical phenomena using deterministic models. These models are applicable to the biological and physical sciences and the student is trained to use differential equations, mathematical analysis and computational science to draw insights into various exciting fields.

Applied mathematics is primarily designed to prepare graduates for employment in business, industry, and government. However, an appropriate choice of electives can ensure the student a solid preparation for graduate work in mathematics, statistics, or scientific computing. The program demonstrates the utility of mathematics to solve problems arising in real industrial applications. Graduates will be qualified for professional careers in computational applications of mathematics, statistics, and other related fields.

Mathematics Teaching Option

The teaching option in the mathematics curriculum is designed specifically to prepare students to teach mathematics at the middle school or high school levels. The program includes the mathematics courses for a teaching major and the necessary courses in education which qualify the student for teacher's certification.

Students must consult with an advisor before selecting single or multiple endorsement. Most students opt for multiple subject endorsement, in which case they will complete a teaching minor in an area of their choice. When approved by an advisor, students may opt for a single endorsement in mathematics, in which case they take advanced coursework in mathematics instead of a minor.

Statistics Option

Statisticians are trained in principles of quantitative reasoning. They learn how to discover patterns in data, how to display data, how to construct mathematical models for data, and how to detect biases and uncertainties in data summaries or models. They are trained to design and analyze observational studies, surveys, and scientific experiments. The computer is an essential tool for statistical work.

Statisticians are in demand; successful students should find that job opportunities are excellent. Although positions are available nationwide, the best employment opportunities are found in urban areas, industrial sites, and centers of government. The statistics option prepares students for such positions or for entry into a graduate program in statistics.

Curricula in Mathematics

MATHEMATICS OPTION

M 171 (or M 181), 172 (or M 182), 221, 273 (or M 283), 274 (or M 284), 242, 333, 383, 384, 451 and STAT 352 are required.

In addition, 15 credits from the following math or stat electives list are required: M 390, 348, 349, 386, 430, 441, 442, 450, 451, 454, 455, 472, STAT 421 and STAT 422. Six of these fifteen credits must be from M 430, 441, 442, 450, 451, 454, 455, and 472.

PHSX 220 and 222 are required. However, with the agreement of the student's advisor, PHSX 222 may be replaced with a course in another mathematical application area.

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Core 2.0 must be completed for graduation.

Freshman Year

F S
CLS 101US-Knowledge and Community ....... 3
WRIT 101W-College Writing I ................. 3
Choose one of the following:
  M 171Q-Calculus I ......................... 4
  M 181Q-Honors Calculus I ............... 4
Choose one of the following:
  M 172Q-Calculus II ....................... 4
  M 182Q-Honors Calculus II .............. 4
PHSX 220-Physics I ....................... 4
PHSX 222-Physics II ...................... 4
University Core and Electives .............. 4

Sophomore Year

F S
M 221-Introduction to Linear Algebra ....... 3
Choose one of the following:
  M 279Q-Multivariable Calculus ......... 4
  M 283Q-Honors Multivariable Calculus .... 4
Choose one of the following:
  M 274Q-Intro to Differential Equations .... 4
  M 284-Q-Honors Intro to Diff Equations .... 4
M 242-Methods of Proof .................... 3
STAT 332-Stat for Scientists & Engineers ... 3
University Core and Electives .............. 8

Junior Year

F S
M 333-Lineal Algebra ...................... 3
M 383-Intro to Analysis I ............... 3
M 384-Intro to Analysis II .............. 3
Math or Stat Elect (See List Above) ..... 3
University Core and Electives .............. 6

Senior Year

M 451-Abstract Algebra I .................. 3
Math or Stat Elect (See List Above) ..... 6
University Core and Electives .............. 9

APPLIED MATHEMATICS OPTION

M 171 (or M 181), 172 (or M 182), 221, 273 (or M 283), 274 (or M 284), 242, 348, 349, 386, 411, 442 and STAT 352 are required.

In addition, 12 credits from the following math or stats electives list are required M 330, 333, 383, 384, 430, 451, 455, 454, 455, 472, STAT 421 and STAT 422. Six of these 12 credits must be from M 430, 450, 451, 454, 455.

PHSX 220, 222, and 224 are required. However, with the agreement of the student's advisor, PHSX 224 may be replaced by PHSX 301, or both PHSX 222 and PHSX 224 may be replaced by a two-course sequence in another mathematical application area.

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Core 2.0 must be completed for graduation.

Freshman Year

F S
Choose one of the following two:
  CLS 101US-Knowledge and Community ... 3
  COM 110US-Public Communication ....... 3
WRIT 101W-College Writing I ............... 3
Choose one of the following two:
  M 171Q-Calculus I ............................ 4
  M 181Q-Honors Calculus I ................. 4
Choose one of the following two:
  M 172Q-Calculus II .......................... 4
  M 182Q-Honors Calculus II ............... 4
PHSX 220-Physics I ....................... 4
PHSX 222-Physics II ...................... 4
University Core and Electives .............. 4

Sophomore Year

F S
M 221-Introduction to Linear Algebra ....... 3
Choose one of the following two:
  M 279Q-Multivariable Calculus ......... 4
  M 283Q-Honors Multivariable Calculus .... 4
Choose one of the following two:
  M 274Q-Intro to Differential Equations .... 4
  M 284-Q-Honors Intro to Diff Equations .... 4
M 242-Methods of Proof .................... 3
PHSX 222-Physics III ..................... 4
University Core and Electives .............. 4

Junior Year

F S
M 348-Q-Techniques of Applied Math I ... 3
M 349-Q-Techniques of Applied Math II ... 3
M 365R-Software Applications in Math ... 3
STAT 332-Stat for Scientists & Engineers ... 3
Math or Stat Elect (See List Above) ..... 5
University Core and Electives .............. 6

Senior Year

F S
M 441-Numerical Linear Algebra and Optimization ............ 3
M 442-Numerical Solution of Differential Equations .... 3
Math or Stat Elect (See List Above) ..... 3
University Core and Electives .............. 9
### STATISTICS OPTION

M 171, 172, 221, 273, 242, and either 335 or 441 are required. STAT 408, 410, 412, 421, 422, 446, and either STAT 332 or STAT 217 are required (STAT 217 requires STAT 216 or equivalent as a prerequisite).

In addition, 15 credits of statistics and other quantitative electives are required. Statistics courses include: STAT 431, 436, 437, 449, 490, or 491. Other courses approved by an advisor may be substituted. At least one science must have a lab.

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Core 2.0 must be completed for graduation.

#### Freshman Year

<table>
<thead>
<tr>
<th>Credits</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>M 172Q--Calculus II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 171Q--Calculus I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>WRIT 101W--College Writing I</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

#### Sophomore Year

<table>
<thead>
<tr>
<th>Credits</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>M 221--Intro to Linear Algebra</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>M 273Q--Multivariable Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Choose one of the following two:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAT 217Q-Intermediate Stat Concept</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT 352-Stat Scientist &amp; Engineers</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT 408--Stat Computing &amp; Graph Analysis</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 242-Methods of Proof</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Science Electives</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

#### Junior Year

<table>
<thead>
<tr>
<th>Credits</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Choose one of the two:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 333--Linear Algebra</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 411--Num Linear Alg &amp; Optimization</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT 410-Data Analysis I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT 412-Data Analysis II</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT 446-Sampling</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Math or Stat Elect (See List Above)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Science Electives</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Senior Year

<table>
<thead>
<tr>
<th>Credits</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>STAT 421-Probability Theory</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT 422-Mathematical Stat</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Math or Stat Elect (See List Above)</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

#### Actuary Profession Bound Students

Actuary profession-bound students are advised to take STAT 421 and STAT 422 during the junior year in order to be prepared for the actuarial exams given during the senior year. For further guidance, see the Actuary Advisor in the Dept. of Mathematical Sciences, 2-214 Wilson Hall.

### MATHEMATICS TEACHING OPTION

M 171, 172, 273, 274, 242, 328, 329, 428 and STAT 332 are required. PHSX 205 is required as a science course.

For a multiple subject endorsement, six additional credits of electives in mathematics are required. These credits may be chosen from any mathematics or statistics course numbered 300 or above. A teaching minor is required.

For a single subject endorsement in mathematics, M 221 and either M 383 or M 431 are required. In addition, nine credits of electives are required. These credits may be chosen from any mathematics or statistics course numbered 300 or above.

#### Multiple Subject Endorsement

<table>
<thead>
<tr>
<th>Credits</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Choose one of the two:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDCF 150IS--Lifespan Human Dev</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 223-Ed Psy &amp; Adolescent Dev</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 211D-Multicultural Education</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 370-Integrating Tech into Education</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>M 221--Intro to Linear Algebra</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 273Q-Multivariable Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 274--Intro to Differential Equations</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 242-Methods of Proof</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT 352-Stat Scientist &amp; Engineers</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

#### Single Subject Endorsement

**Freshman Year**

<table>
<thead>
<tr>
<th>Credits</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Choose one of the following two:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLS 101US-Knowledge and Community</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>COM 110US-Public Communication</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>WRIT 101W-College Writing I</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Choose one of the following two:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDCF 150IS-Lifespan Human Dev</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDEC 160-Early Childhood through Adolescent Development</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 172Q--Calculus I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 172Q--Calculus II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PHSX 205-College Physics I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Credits</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>EDU 223-Ed Psy &amp; Adolescent Dev</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 211D-Multicultural Education</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 370-Integrating Tech into Education</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>M 221--Intro to Linear Algebra</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 273Q-Multivariable Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 274--Intro to Differential Equations</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 242-Methods of Proof</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT 352-Stat Scientist &amp; Engineers</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>5</td>
<td>3</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Credits</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>EDU 382-Assessment, Curric, Instruction</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 497-Methods: 5-8 Mathematics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>HDCF 356-Exceptional Children</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 328-Higher Math for Sec Teachers</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 329-Modern Geometry</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Choose one of the following two:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M 385-Intro to Analysis I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 431-Abstract Algebra I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Math/Stat(300+)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

**Senior Year**

<table>
<thead>
<tr>
<th>Credits</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>EDU 385-Practicum: 5-12</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>M 428-Math Modeling for Teachers</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 497-Methods: 9-12 Mathematics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 408-Professional Issues: 5-12</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>EDU 495-Student Teaching: 5-12</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Math/Stat(300+)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### MATHEMATICS MINOR (NON-TEACHING)

<table>
<thead>
<tr>
<th>Credits</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>EDU 395-Practicum: 5-12</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>EDU 495-Student Teaching: 5-12</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Math/Stat(300+)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

M 172Q--Calculus I | 4 |
M 172Q--Calculus II | 4 |
M 221--Intro to Linear Algebra | 3 |
M 273Q-Multivariable Calculus | 4 |
M 274--Intro to Differential Equations | 4 |
M 242-Methods of Proof | 3 |
M 328-Math Modeling for Teachers | 3 |
M 329-Modern Geometry | 3 |
M 385-Intro to Analysis I | 3 |
M 431-Abstract Algebra I | 3 |
Microbiology

Department of Microbiology
http://www.montana.edu/wwwmb/

Note: MSU’s programs in the biological sciences are distributed across multiple departments. MSU does not have a single Department of Biology. For additional options see pages 78 and 155.

The department participates in MSU’s Genetics Minor and recommends this minor to students particularly interested in genetics.

Programs are designed to prepare students for careers in microbiology with emphasis in medical microbiology, immunology, molecular biology, virology, microbial physiology, microbial ecology, microbial genetics, and environmental microbiology. The microbiology curriculum has three options: Microbiology, Environmental Health, and Medical Laboratory Science. Some courses in these options require additional course fees.

Microbiology Option

In this option, students obtain a thorough education in the fields of medical, ecological, physiological and environmental microbiology, immunology, virology, and molecular biology. This curriculum is excellent preparation for:

- medical, dental, and other professional schools; and
- careers in industry, university, institute, and government laboratories.

There are several tracks a student can choose within this option to tailor their studies to their interests. These include the Microbiology Track, the Pre-Medical Track, the Environmental Track and the Environmental Health Track.

Medical Laboratory Science Option

This option is designed to prepare students for careers in Clinical Laboratory Science. Students develop competence in a range of medically-oriented fields including immunology, medical bacteriology, virology parasitology, immunology, mycology, and chemistry. Foundations in molecular biology and statistics are also emphasized.

The Department of Microbiology has two plans for students seeking a career in Medical Laboratory Science (MLS). Plan A allows students to attend classes at MSU for three years and apply for an internship the fourth year with an affiliated MLS program. The Montana Medical Laboratory Science Training Program is located at MSU. MSU also has an affiliation agreement with the University of North Dakota (UND), Sacred Heart School of Medical Technology in Spokane and Health One Alliance School of Medical Technology, Denver. Students with a 2.5 GPA or greater who are accepted will spend their fourth year in this program. Upon completion of the one-year internship, students receive a BS degree in Microbiology from MSU and take a national examination through the American Society for Clinical Pathologists or the National Certification Agency. They will then be qualified to practice as a Medical Laboratory Scientist. Plan B is for students who wish to attend four complete years at MSU and then independently seek an approved hospital training program in MLS for a one-year internship. Once training is complete, they will also be qualified to take a national registry exam and become certified as an MLS. This certification qualifies them for graduate education and careers in:

- clinical analysis (microbiology, hematology, chemistry, and immunohematology);

- medical research;
- industry (product development, sales, maintenance of equipment, etc.);
- public health laboratories; and
- health care administration.

Microbiology Minor (Non-Teaching)

A Microbiology minor is available to provide interested students with an understanding of the microbial basis of health and disease and environmental microbiology. Eligibility for a minor in Microbiology requires 29 credits in Microbiology and supporting subjects. This minor will complement other majors for those pursuing graduate school and professional programs in medical, dental, veterinary, ecological, industrial, pharmaceutical and related areas. The minor will also strengthen the background of science majors who wish to become more competitive in the job market.

Undergraduate Research Participation

An undergraduate research program, available to students who demonstrate an interest and ability, is open to non-majors as well as majors in Microbiology. The aim of this program is to foster increased creativity, imagination, inquisitiveness, and independence.

Departmental Honors in Microbiology

When appropriate, majors should consider the opportunities afforded by the departmental honors program. This program has the following components:

- A minimum 3.5 grade-point average (GPA) in Microbiology, 3.0 GPA overall.

- A minimum of four credits of undergraduate research credit.


Participation in a Microbiology seminar (BIOM 494) during the senior year is the required capstone course for graduation. As many as two BIOM 494 seminars (1 credit each) may be applied toward graduation when taken in the junior or senior years. A detailed description of the microbiology program is available from the department.
Curricula in Microbiology

MICROBIOLOGY OPTION: Microbiology Track

Freshman Year
- BIOL 160-Pinciples of Living Systems..............4
- CHMY 141-College Chemistry I (or) CHMY 151........4
- CHMY 145-College Chemistry II (or) CHMY 155.....4
- Math Requirements*.........................................6
- University Core and Electives..........................12

Sophomore Year
- CHMY 321-Organic Chemistry I (or) CHMY 331........4
- CHMY 323-Organic Chemistry II (or) CHMY 333....4
- BIOM 360-General Microbiology........................4
- PHSX 205-College Physics I (or) PHSX 220.........4
- PHSX 297-College Physics II (or) PHSX 222........4
- Microbiology Electives*.................................10
- University Core and Electives........................11

Junior Year
- BIOL 380-Biochemistry..................................5
- Take one of the following two choices:
  - BIOM 149-Advanced Genomics and Microbiology.4
  - BIOM 413-Microbial Diversity, Ecol & Evol....4
- Microbiology Electives*.................................10
- University Core and Electives........................11-12

Senior Year
- BIOM 494-Seminar/Workshop (two semesters)......2
- BIOM 450-Microbial Physiology..........................3
- BIOM 419-Microbial Genetics............................3
- Microbiology Electives*..................................10
- University Core and Electives........................11

*MATH REQUIREMENTS
- Take one of the following two courses:
  - M 161Q-Survey of Calculus..............................4
  - BIOL 318-Biometry......................................5
- M 162Q-181Q-191Q-Survey of Calc II.................4
- M 164Q-182Q-192Q-Cal of Techng II.................3-4

**MICROBIOLOGY ELECTIVES
- A minimum of 25 credits of additional Microbiology courses, some of which are listed below.
  - BIOL 101-Careers in Microbiology.....................1
  - BIOL 410-Immunology (5 cr)............................5
  - BIOL 411-Immunology Laboratory......................1
  - BIOM 435-Virology......................................4
  - BIOL 405-Hematology....................................4
  - BIOL 406-Hematology Laboratory......................1
  - BIOM 497-Educational Methods-Microbiology......2
  - BIOM 451-Medical Bacteriology.......................3
  - BIOM 432-Medical Bacteriology Lab..................2
  - BIOL 428-Molecular Evolution.........................3
  - BIOL 441-Eukaryotic Pathogens.......................4
  - BIOM 455-Microbial Diversity in Microbiology..4
  - BIOM 499-Independent Research.......................4
- University Core and Electives........................5

A minimum of 120 credits is required for graduation; 42 of those credits must be in courses numbered 500 and above.

MICROBIOLOGY OPTION: Pre-Medical Track

Freshman Year
- BIOL 160-Principles of Living Systems.............4
- CHMY 141-College Chemistry I (or) CHMY 151....4
- CHMY 145-College Chemistry II (or) CHMY 155...4
- Math Requirements*........................................6
- University Core and Electives.........................12

Sophomore Year
- CHMY 321-Organic Chemistry I (or) CHMY 331....4
- CHMY 323-Organic Chemistry II (or) CHMY 333...4
- BIOM 360-General Microbiology........................4
- PHSX 205-College Physics I (or) PHSX 220.....4
- PHSX 297-College Physics II (or) PHSX 222.....4
- Microbiology Electives*.................................10
- University Core and Electives........................11

Junior Year
- BIOL 575-General Genetics; 3 cr (Fall) OR
  - BIOM 410-Microbial Genetics; 3 cr (Fall)
- BIOL 380-Biochemistry; 5 cr (Fall) OR
  - BIOL 411-Immunology Laboratory; 3 cr (Fall)
- BIOL 441-Medical Bacteriology Lab; 3 cr (Spring)
- University Core and Electives.........................5

Senior Year
- BIOM 450-Microbial Physiology; 3 cr (Fall)
- BIOL 494-Seminar Capstone; 1 cr (Fall)
- BIOM 413-Microbial Diversity, Ecol & Evol; 3 cr
- University Core and Electives.........................11-12

A minimum of 120 credits is required for graduation; 42 of those credits must be in courses numbered 500 and above.

MICROBIOLOGY OPTION: Environmental Microbiology Track

Freshman Year
- BIOL 160-Principles of Living Systems.............4
- CHMY 141-College Chemistry I (or) CHMY 151....4
- CHMY 145-College Chemistry II (or) CHMY 155...4
- Math Requirements*........................................6

For General Plan:
- M 165 (171, 181) - Calculus I (3-4 cr) (and)
- M 166 (172, 182) - Calculus II (3-4 cr)

For Other Plans:
- M 161Q-Survey of Calculus (4 cr) (and)
- BIOL 318-Biometry (3 cr)
- University Core and Electives.........................11-12

Sophomore Year
- CHMY 321-Organic Chemistry I or CHEM 314....4
- CHMY 323-Organic Chemistry II or CHEM 315...4
- BIOM 560-General Microbiology........................5

For General Plan:
- PHSX 205-College Physics I or PHSX 220.........4
- PHSX 206-College Physics II or PHSX 224......4

For Population Biol. & Ecology Plan:
- BIOL 258-Intro Biol; Organisms to Populations....4
- BIOL 375-General Genetics..............................3
- BOE 370-General Ecology................................3

For Bioinformaties Plan:
- MB 445-Selected Topics in Bioinformatics........4
- For Ag & Bioremediation Plan:
  - LRES 201-Intro Soil Resources.......................3
  - University Core and Electives.......................9-17

Sophomore Year
- BIOL 380-Biochemistry..................................5
- BIOL 450-Microbial Physiology.........................5
- BIOM 450-Microbial Genetics............................5
- BIOM 439-Env. Microbiology..............................4
- BIOL 442-Microbial Regulation..........................3

For General Plan:
- PHSX 205-College Physics I or PHSX 220.........4
- PHSX 206-College Physics II or PHSX 224......4

For Population Biol. & Ecology Plan:
- BIOL 258-Intro Biol; Organisms to Populations....4
- BIOL 375-General Genetics..............................3
- BOE 370-General Ecology................................3

For Bioinformaties Plan:
- MB 445-Selected Topics in Bioinformatics........4

For Ag & Bioremediation Plan:
  - LRES 201-Intro Soil Resources.......................3
  - University Core and Electives.......................9-17

Junior Year
- BIOL 380-Biochemistry..................................5

For General Plan:
- BIOL 380-Biochemistry..................................5

For Population Biol. & Ecology Plan:
- BIOL 380-Biochemistry; General Genetics........4

For Bioinformatics Track:
- MB 445-Selected Topics in Bioinformatics........4

For Ag & Bioremediation Plan:
  - LRES 201-Intro Soil Resources.......................3
  - University Core and Electives.......................9-17

Senior Year
- BIOL 494-Seminar, Capstone (take twice).........1

For General Plan:
- BIOL 494-Seminar, Capstone (take twice).........1

For Population Biol. & Ecology Plan:
- BIOL 494-Seminar, Capstone (take twice).........1

For Bioinformatics Track:
- MB 445-Selected Topics in Bioinformatics........4

For Ag & Bioremediation Plan:
  - LRES 201-Intro Soil Resources.......................3
  - University Core and Electives.......................9-17

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 500 and above.

**Microbiology Electives
- A minimum of 120 credits is required for graduation; 42 of those credits must be in courses numbered 500 and above.

Other suggested courses
- BIOL 291-Human Anatomy & Physiology I...........5
- BIOL 211-Human Anatomy & Physiology II..........5
- BIOL 378-General Genetics..............................3
- BIOL 340-Principles of Histology....................3
- WRIT 221-Intermediate Tech Writing................3
- BIOL 424-Ethical Pract of Science..................3

A minimum of 120 credits is required for graduation; 42 of those credits must be in courses numbered 500 and above.
**Environmental Health Track**

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 160-Principles of Living Systems (or)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BIOB 260-Cellular &amp; Molecular Biology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 161Q-Survey of Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BIOM 101-Careers in Microbiology</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PSYX 100Intro to Psychology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SOCI 101HS-Intro to Sociology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 321-Organic Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 323-Organic Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 210RN-Prin of Envrn Hlth Science</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BIOM 431-Medical Bacteriology</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>BIOM 432-Medical Bacteriology Lab</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>PSX 205-College Phys I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PSX 207-College Phys II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM 494-Seminar/Workshop</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>BIOM 411-Immunology Lab</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Take one of the following two choices:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOM 430-Applied &amp; Environ Microbiology</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>BIOM 415-Microbial Diversity, Ecol &amp; Evol</td>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td>BIOM 450-Micro Physiology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOM 410-Microbial Genetics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Take one of the following two choices:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOM 441-Enzyme Microbiology Pathogen</td>
<td>(4)</td>
<td></td>
</tr>
<tr>
<td>BIOM 427-General Parasitology</td>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td>BIOM 452-Soil &amp; Environmental Microbiology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>7</td>
<td>92</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

**Suggested Electives**

An elective course may be a substitute for a required course following discussion with an advisor and if prerequisites are met or can be waived.

<table>
<thead>
<tr>
<th>Course</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM 435-Virology</td>
<td></td>
</tr>
<tr>
<td>BIOM 428-Molecular Evolution</td>
<td></td>
</tr>
<tr>
<td>BIOM 455-Rich Mtsh in Microbiology</td>
<td></td>
</tr>
<tr>
<td>SFRS 451-Sustainable Food Systems</td>
<td></td>
</tr>
<tr>
<td>NUTR 227-Food Fundamentals Lab</td>
<td>2</td>
</tr>
<tr>
<td>HDFN 545-Exploration of Food Biotechnology</td>
<td></td>
</tr>
<tr>
<td>ENVE 444-Hazardous Waste Management</td>
<td></td>
</tr>
<tr>
<td>ENSC 351-Nutrient Cycling</td>
<td></td>
</tr>
<tr>
<td>ENSC 454-Soil &amp; Environmental Chem</td>
<td></td>
</tr>
<tr>
<td>ENSC 461-Restoration Ecology</td>
<td></td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

**Medical Laboratory Science Option (5+1 Program)**

**Plan A**

**Freshman Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOB 160-Principles of Living Systems (or)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BIOB 260-Cellular &amp; Molecular Biology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>M 161Q-Survey of Calculus</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BIOM 101-Careers in Microbiology</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>PSYX 100Intro to Psychology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SOCI 101HS-Intro to Sociology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

**Sophomore Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 320-Biochemistry</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>BCHO 262-Introduction to Entomology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOM 211-Human Anatomy &amp; Phys II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BIOM 431-Medical Bacteriology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOM 432-Medical Bacteriology Lab</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>PSX 205-College Phys I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>PSX 207-College Phys II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

**Junior Year**

<table>
<thead>
<tr>
<th>Course</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM 410-Immunology</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>BIOM 411-Immunology Laboratory</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BIOM 435-Virology</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BIOM 402-Hematology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOM 406-Hematology Laboratory</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BIOM 497-Educational Methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microbiology</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Take one of the following two courses:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOM 450-Microbial Physiology (or)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOM 410-Microbial Genetics</td>
<td>(3)</td>
<td></td>
</tr>
<tr>
<td>BIOM 431-Medical Bacteriology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BIOM 452-Medical Bacteriology Lab</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>BIOM 441-Enzyme Microbiology Pathogen</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>1</td>
<td>4, 1 or 3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>16</td>
<td>14</td>
</tr>
</tbody>
</table>

**Suggested Electives**

(some taught alternating years)

<table>
<thead>
<tr>
<th>Course</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM 415-Microbial Diversity, Ecol &amp; Evol</td>
<td></td>
</tr>
<tr>
<td>BIOM 450-Applied &amp; Environ Microbiology</td>
<td></td>
</tr>
<tr>
<td>BIOM 428-Molecular Evolution</td>
<td></td>
</tr>
<tr>
<td>BIOM 455-Rich Mtsh in Microbiology</td>
<td></td>
</tr>
<tr>
<td>BIOM 540-Principles of Histology</td>
<td></td>
</tr>
</tbody>
</table>

**Senior Professional Year**

**Montana Medical Laboratory Science Training Program**

Students with a 2.5 GPA or higher can apply for a senior year of professional training. They will obtain a degree in Microbiology/Medical Laboratory Science option from MSU-Bozeman. The following courses are required in the program:

- **BIOH 470 - Summer Clinical Practicum** - 12 credits Clinical Immunohematology I; Clinical Chemistry Theory; Clinical Laboratory I; Clinical Hemostasis; Clinical Microscopy and Urinalysis; Clinical Body Fluids; Clinical Immunohematology Theory; Clinical Microbiology Theory and Laboratory

**Courses for Montana Medical Laboratory Science Training Program**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Summer Semester</strong></td>
<td></td>
</tr>
<tr>
<td>BIOH 468-CLImmunohematology I</td>
<td>2</td>
</tr>
<tr>
<td>BIOH 464-Clin Hem &amp; Body Fluids</td>
<td>2</td>
</tr>
<tr>
<td>BIOH 466-Clin Microbiology I</td>
<td>3</td>
</tr>
<tr>
<td>BIOH 467-Clinical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>BIOH 469-Essentials of Clinical Laboratory</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall Semester</strong></td>
<td></td>
</tr>
<tr>
<td>BIOH 473-Laboratory Practice II</td>
<td>1</td>
</tr>
<tr>
<td>BIOH 474-Clinical Hematology II</td>
<td>2</td>
</tr>
<tr>
<td>BIOH 475-Clinical Hemostasis</td>
<td>1</td>
</tr>
<tr>
<td>BIOH 476-Clinical Microbiology II</td>
<td>3</td>
</tr>
<tr>
<td>BIOH 477-Chemistry and Urinalysis II</td>
<td>3</td>
</tr>
<tr>
<td>BIOH 478-Clinical Immunohematology II</td>
<td>2</td>
</tr>
<tr>
<td>BIOH 479-Clinical Immunology/Serology</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spring Semester</strong></td>
<td></td>
</tr>
<tr>
<td>BIOH 484-Clinical Hematology III</td>
<td>2</td>
</tr>
<tr>
<td>BIOH 487-Clinical Chemistry III</td>
<td>2</td>
</tr>
<tr>
<td>BIOH 488-Clinical Immunohematology II</td>
<td>2</td>
</tr>
<tr>
<td>BIOH 486-Clinical Microbiology and Molecular Diagnostics</td>
<td>3</td>
</tr>
<tr>
<td>BIOH 482-Laboratory Practice III</td>
<td>2</td>
</tr>
<tr>
<td>BIOH 489-Laboratory Management</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12</td>
</tr>
</tbody>
</table>
**Modern Languages and Literatures**

*Department of Modern Languages*

http://www.montana.edu/mll/

The Department of Modern Languages and Literatures offers a full range of courses for students interested in language, culture, and literature. Non-majors interested in the literature and culture of French-, German-, Japanese-, and Spanish-speaking peoples may choose elective credits from a variety of courses taught in English. The study of foreign cultures, languages, and literature is an integral part of a basic education and an essential component of one’s university training. It provides students with the knowledge to better understand their own language and culture and to function intelligently as members of a multicultural society.

In addition to providing opportunities for students to participate in MSU-sponsored study abroad programs, the department offers advice concerning the role of language study in career planning. Foreign languages are used by interpreters, translators, and teachers. Language proficiency also enhances employment opportunities. With almost any “marketable” skill plus a foreign language, the chances of finding an interesting job are improved considerably. Foreign language training is a critically important skill for careers in business and commerce, administrative/clerical positions, health care, government service, social services, and agriculture.

The department offers undergraduate options in French, German, Japanese, and Spanish. Lower division courses are designed to teach the five language skills: speaking, listening, understanding culture, reading, and writing. Advanced courses provide students with comprehensive knowledge of the important writers and movements of each language. Other advanced courses concentrate on history and contemporary culture. For students interested in teaching, K-12 teaching options are offered in French, German, and Spanish.

The Department, in conjunction with the Department of History & Philosophy, offers both a non-teaching minor in Japan Studies and a Japan Studies option, as well as a minor in Latin American and Latino Studies. We now offer Chinese language and culture classes. These will be part of a planned Asian Studies minor, in conjunction with the Department of History & Philosophy and the Department of Sociology & Anthropology.

For students planning careers in international business/management, the department offers a commerce option to provide students with the training necessary to enter master’s degree programs in business. In conjunction with the College of Business, we also offer an International Business minor. This program also prepares students to compete for jobs in businesses where foreign language skills are desirable.

### Curricula in Modern Languages and Literatures

This curriculum leads to the baccalaureate degree in Modern Languages—French, German, Japan Studies, and Spanish—with additional options in teaching. Students with previous language training will take a CLEP exam to place at the appropriate level. Courses taught in English may count toward the language major or minor with the consent of the advisor.

To be certified for graduation in a major option or a minor in the Department of Modern Languages and Literatures, students must take one-half of the required MLL upper division credits in the department. Students who have already completed a degree at another university and are seeking teaching certification from MSU may be required to take some additional course work in the language as determined by the language advisor. In addition, the department will not accept grades lower than “C” (2.0) or P in any of the upper division courses required for the degree. (Note: Department-approved study-abroad credits are considered to be the equivalent of resident credits.)

Students with native or near-native ability in a given language may only enroll in courses for credit which have been approved by the appropriate language section.

### MICROBIOLOGY MINOR (NON-TEACHING)

**Credits**

Take one of the following two choices:
- BIOM 103N—Unseen Universe: Microbes
- BIOM 250N—Micro Bllh Sci:Infect Disease

Take one of the following two choices:
- CHMY 211—Elements of Organic Chemistry
- CHMY 321—Organic Chemistry

Take one of the following two choices:
- BIOM 169—Principles of Living Systems
- CHMY 143-College Chemistry II

Microbiology electives must be numbered 280 and above. A minimum of 9 credits total must be in courses numbered 300 and above. A maximum of 2 Undergraduate Research credits can be applied to the minor.

---

**Plan B**

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>F</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOM 169—Principles of Living Systems</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 141-College Chemistry I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>CHMY 143-College Chemistry II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BIOM 101—Careers in Microbiology</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>STAT 216Q—Introduction to Statistics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

**Sophomore Year**

| BIOM 360—General Microbiology | 5 | |
| PHSX 205—College Physics I | 4 | |
| PHSX 207—College Physics II | 4 | |
| University Core and Electives | 6 | 6-9 |
| **Total** | **15** | **15** |

**Junior Year**

| BCH 390—Biochemistry | 5 | |
| BCHO 211—Human Anatomy & Phys II | 4 | |
| BCHO 410—Immunology | 3 | |
| BCHO 411—Immunology Laboratory | 1 | |
| BCHO 405—Hematology | 3 | |
| BCHO 406—Hematology Laboratory | 1 | |
| BCHO 451—Medical Bacteriology | 3 | |
| BCHO 452—Medical Bacteriology Laboratory | 2 | |
| University Core and Electives | 3 | 5 |
| **Total** | **15** | **15** |

**Senior Year**

| BIOM 494—Seminar/Workshop | 1 | 1 |
| BIOM 497—Educational Methods: Microbiology | 2 | |
| Take one of the following two choices: BIOM 430—Applied & Environ Microbiology | 4 | |
| BIOM 453—Microbial Diversity | 3 | |
| BIOM 441—Eukaryotic Pathogens | 4 | |
| BIOM 410—Microbial Genetics | 3 | |
| University Core and Electives | 11 | 92 |
| **Total** | **15** | **15** |

**Suggested Electives:**

| BIOM 435—Virology | 4 | |
| BIOM 428—Molecular Evolution | 3 | |
| BIOM 455—Reich Milh in Microbiology | 4 | |
| BIOM 500—Principles of Histology | 3 | |
### FRENCH AND FRANCOPHONE STUDIES OPTION

#### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRMN 101</td>
<td>Elementary German I</td>
<td>4</td>
</tr>
<tr>
<td>GRMN 102D</td>
<td>Elementary German II</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRCH 201D</td>
<td>Intermediate French I</td>
<td>4</td>
</tr>
<tr>
<td>FRCH 220D</td>
<td>French Language &amp; Culture</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Junior And Senior Years

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRMN 350</td>
<td>German Cult &amp; Civ</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 351</td>
<td>German Myths:</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 360IH</td>
<td>German Myths:</td>
<td>6</td>
</tr>
<tr>
<td>Select seven credits from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCH 305H</td>
<td>Histoire Civilisation</td>
<td>5</td>
</tr>
<tr>
<td>FRCH 230--La France Aujourd'hui</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>FRCH 325--Adv Grammar &amp; Comp</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>FRCH 401--French Text &amp; Cinema</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ARTH 432-Art in the Age of Revolution</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>60</td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

### GERMAN STUDIES OPTION

#### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRMN 101</td>
<td>Elementary German I</td>
<td>4</td>
</tr>
<tr>
<td>GRMN 102D</td>
<td>Elementary German II</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRMN 201D</td>
<td>Intermediate German I</td>
<td>4</td>
</tr>
<tr>
<td>GRMN 220D</td>
<td>German Language &amp; Culture</td>
<td>4</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Junior And Senior Years

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRMN 350</td>
<td>German Cult &amp; Civ</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 351</td>
<td>German Myths:</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 360IH</td>
<td>German Myths:</td>
<td>6</td>
</tr>
<tr>
<td>Select six credits from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRMN 355</td>
<td>German Language &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 360IH</td>
<td>German Myths:</td>
<td>3</td>
</tr>
<tr>
<td>Select six credits from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRCH 305H</td>
<td>Histoire Civilisation</td>
<td>5</td>
</tr>
<tr>
<td>HSTR 324--20th Century Europe</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ML 492-Individual Problems</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ARTH 432-Art in the Age of Revolution</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>60</td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Majors are encouraged to take more than the minimum 36 credits in the department.

### HISPANIC STUDIES OPTION

#### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPNS 101</td>
<td>Elementary Spanish I</td>
<td>4</td>
</tr>
<tr>
<td>SPNS 102--Elementary Spanish II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

#### Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPNS 201D</td>
<td>Intermediate Spanish I</td>
<td>4</td>
</tr>
<tr>
<td>SPNS 220D-Spanish Language &amp; Culture</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 450H--From Reflection to Rev</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>HSTR 322-19th Century Europe</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Select seven credits from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPNS 320--Spanish Culture &amp; Civilization</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 329--Early Cultures of Latin America</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 330--Modern Cultures of Latin America</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 350-US Latin Cultures</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 325--Adv Grammar &amp; Phonetics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 324--Adv Conversation &amp; Comp</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 325--Survey of Spanish Lit</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 450R--SemModern Hispanic Literature (Sr Capstone)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Select one course from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPNS 332-Contemp Latin Amer Literature</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 351-US Latino Literature</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Select two courses from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPNS 361-Hispanic Texts &amp; Cinema</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 362-Hispanic Poetry</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 335H--Travel in Latin American</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>American Lit &amp; Film (Summer, in English)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Select one course from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPNS 430--Latin Amer Perspectives</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SPNS 460--Contemp Spain &amp; Nations</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Select one course from the following for three optional credits:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSTR 330-History of Mexico</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>HSTR 431-Race in Latin America</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>HSTR 434-Gen, Sex &amp; Soc Change in Lat Am</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>HSTR 430-Latin Amer Soc History</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>HSTR 432-Colonial Latin America</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>SOCI 368-Latin Immigration</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>University Core and Electives:</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>60</td>
</tr>
</tbody>
</table>

It is highly recommended to take SPNS 325 Advanced Grammar and Phonetics and SPNS 324 Oral and Written Composition prior to taking 300 and 400 courses.

Requirements for the major comprise 57 credits. A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

### FRENCH K-12 TEACHING OPTION

Students with a teaching option should file with Education Certification in the sophomore year to establish their program of study. These students will be required to pass a language proficiency test approved by the Modern Languages department in order to qualify for practice teaching.

#### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDCF 150</td>
<td>French K-12 Teaching Option</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Majors are encouraged to take more than the minimum 36 credits in the department.

### GERMAN K-12 TEACHING OPTION

Students with a teaching option should file with Education Certification in the sophomore year to establish their program of study. These students will be required to pass a language proficiency test approved by the Modern Languages department in order to qualify for practice teaching.

#### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDCF 150</td>
<td>German K-12 Teaching Option</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Majors are encouraged to take more than the minimum 36 credits in the department.

### FRANCOPHONE K-12 TEACHING OPTION

Students with a teaching option should file with Education Certification in the sophomore year to establish their program of study. These students will be required to pass a language proficiency test approved by the Modern Languages department in order to qualify for practice teaching.

#### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDCF 150</td>
<td>Francophone K-12 Teaching Option</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Majors are encouraged to take more than the minimum 36 credits in the department.
### SPANISH K-12 TEACHING OPTION

Students with a teaching option should file with Education Certification in the sophomore year to establish their program of study. These students will be required to pass a language proficiency test approved by the Modern Languages department in order to qualify for practice teaching.

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPNS 101—Elementary Spanish I ..............</td>
<td>4</td>
</tr>
<tr>
<td>SPNS 102D—Elementary Spanish II .............</td>
<td>4</td>
</tr>
<tr>
<td>EDU 202—Early Field Experience .............</td>
<td>3</td>
</tr>
<tr>
<td>HDFC 150—Lifespan Human Development .........</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives ..............</td>
<td>18</td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. Majors are encouraged to take more than the minimum of 36 credits required in the department.

### FRENCH MINOR (NON-TEACHING)

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRCH 101—Elementary French I ..............</td>
<td>4</td>
</tr>
<tr>
<td>FRCH 102—Elementary French II .............</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRCH 201—Intermediate French I ............</td>
<td>3</td>
</tr>
<tr>
<td>FRCH 220—French Language &amp; Culture .......</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Junior And Senior Years</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRCH 305—Histoire Civilisation ..........</td>
<td>3</td>
</tr>
<tr>
<td>FRCH 320—La France Aujourd’hui ...........</td>
<td>3</td>
</tr>
<tr>
<td>FRCH 323—Adv Grammar &amp; Comp .............</td>
<td>3</td>
</tr>
<tr>
<td>FRCH 324—Adv Conv &amp; Phonetics ..........</td>
<td>3</td>
</tr>
<tr>
<td>Select three credits from the following ...</td>
<td>...</td>
</tr>
<tr>
<td>FRCH 401—French Literature I ..........</td>
<td>12</td>
</tr>
<tr>
<td>FRCH 402—French Literature II ..........</td>
<td>29</td>
</tr>
</tbody>
</table>

### GERMAN STUDES MINOR (NON-TEACHING)

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRMN 101—Elementary German I .............</td>
<td>4</td>
</tr>
<tr>
<td>GRMN 102D—Elementary German II ..........</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sophomore Year</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRMN 201D—Intermediate German I ..........</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 220D—German Language &amp; Cult ..........</td>
<td>3</td>
</tr>
</tbody>
</table>

### JAPAN STUDIES MINOR (NON-TEACHING)

The Japan Studies Program offers a non-teaching, interdisciplinary minor in Japan Studies through the Department on History and Philosophy and the Department of Modern Languages and Literatures. The Program's mission is to provide students with the skills and understanding they need to succeed in Japanese contexts. The minor requires basic Japanese language proficiency and a broad knowledge of Japanese history, literature, and civilization. It includes 8 credits in Japanese language training, 12 credits in elective coursework, and a 3-credit capstone course, for a total of 25 credits.

Those wishing to declare a minor in Japan Studies must submit an "Application for a Non-teaching Minor" to the Registrar's Office by the end of the semester one year prior to the semester of completion. In order to receive the minor, students must successfully complete the following course work:

<table>
<thead>
<tr>
<th>Junior And Senior Years</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRMN 330—Adv Gram Conv Comp I ........</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 331—Adv Gram Conv Comp II ........</td>
<td>3</td>
</tr>
<tr>
<td>Select Three (Nine credits) from the following ...</td>
<td>...</td>
</tr>
<tr>
<td>GRMN 350—German Cult &amp; Civ ........ .....</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 350IH—Issues of German Cinema ....</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 315—Survey German Lit ........ ...</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 360D—German Myths ................</td>
<td>3</td>
</tr>
<tr>
<td>The Lorelei; Faust; Vampires ............</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 422—Text &amp; Cinema ...............</td>
<td>3</td>
</tr>
<tr>
<td>GRMN 450—Sen: Grmn Lit &amp; Cult ..........</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>JPNS 101—Elementary Japanese .................</td>
</tr>
<tr>
<td>JPNS 102D—Elementary Japanese II ............</td>
</tr>
<tr>
<td>Take four of the following: ...</td>
</tr>
<tr>
<td>HSTR 143D—History of Japan ........</td>
</tr>
<tr>
<td>JPNS 201D—Intermediate Japanese I ..........</td>
</tr>
<tr>
<td>JPNS 202D—Intermediate Japanese II ..........</td>
</tr>
<tr>
<td>ANTY 242D—Contemporary Japan ...............</td>
</tr>
<tr>
<td>JPNS 305—Japanese: Adv Conversation .......</td>
</tr>
<tr>
<td>JPNS 340—Adv Readings &amp; Grammar ............</td>
</tr>
<tr>
<td>ANTY 357—Gender and Sexuality-Japan .......</td>
</tr>
<tr>
<td>ANTY 343—Popular Culture-Japan ............</td>
</tr>
<tr>
<td>HSTR 340—Age of the Shoguns ...............</td>
</tr>
<tr>
<td>HSTR 342—Japan’s Long 19TH Century ..........</td>
</tr>
<tr>
<td>HSTR 444—Japanese Women’s History ..........</td>
</tr>
<tr>
<td>HSTR 445—Sci, Tech, and Environment in Japan ....</td>
</tr>
<tr>
<td>JPNS 150—Japanese Cult &amp; Civ ...............</td>
</tr>
<tr>
<td>JPNS 220—Classical Japanese Literature ....</td>
</tr>
<tr>
<td>JPNS 321—Modern Japanese Literature ........</td>
</tr>
<tr>
<td>JPNS 325—Women in Japanese Lit &amp; Culture ...</td>
</tr>
<tr>
<td>JPNS 361—Japanese Text &amp; Cinema ............</td>
</tr>
<tr>
<td>JPNS 400—Modernity &amp; Modernism in Japan ...</td>
</tr>
</tbody>
</table>
Take one of the following Capstone Courses:

- JPNS 450R-Sem: Japanese Literature & Culture
- ML 490R-Undergraduate Research
- HSTA/HSTR 490R-Undergraduate Research
- HSTA/HSTR 497-Independent Study
- HSTA/HSTR 499R-Independent Study
- ANTH 490R-Undergraduate Research
- ANTH 497-Independent Study

Not all courses may be taken in the same department. At least six credits must be upper division (numbered 300 or above). Other appropriate courses, including those taken abroad, may be substituted with the approval of the Director of Japan Studies.

**HISPANIC STUDIES MINOR (NON-TEACHING)**

- **Freshman Year**
  - SPNS 101–Elementary Spanish I.................4
  - SPNS 102D–Elementary Spanish II ..............4

- **Sophomore Year**
  - SPNS 201D–Intermediate Spanish I ..............3
  - SPNS 220D–Spanish Language & Culture .......3

- **Junior And Senior Years**
  - SPNS 323–Spanish Adv Grammar & Phonetics ....
  - SPNS 324–Adv Conversation & Comp ............3
  - Select THREE COURSES from the following...9
  - SPNS 361–Hispanic Texts & Cinema
  - SPNS 362–Hispanic Poetry
  - SPNS 335H–Travel in Latin Am Lit & Film
  - SPNS 320–Spanish Culture & Civilization
  - SPNS 329–Early Cultures of Latin America
  - SPNS 330–Modern Cultures of Latin America
  - SPNS 350–US Latino Cultures
  - SPNS 320–Survey of Spanish Literature
  - SPNS 352–Contemp Lat Amer Literature
  - SPNS 416–Spanish Culture and Revolution
  - SPNS 450–Latin American Perspectives
  - SPNS 460–Contemp Spain & Nations

**LATIN AMERICAN AND LATINO STUDIES MINOR (NON-TEACHING)**

A Latin American and Latino Studies minor (LALS) is available to provide students interested in Latin American and Latino history and language with valuable interdisciplinary skills. Because this is an interdisciplinary program, students will enroll in courses in History and Philosophy and Modern Languages and Literatures. Courses in Sociology and Anthropology, as well as other departments with relevant course content, will also be allowed for credit subject to approval by the program coordinator. This minor will complement majors for students pursuing graduate school and professional programs in agriculture, engineering, history, literature, political science, sociology, international business, and more. The minor will also strengthen the skill-sets of students who wish to become more competitive in the Spanish speaking job market, either abroad or in the United States. A minor in LALS will prepare students for the close relationship developing between Latin American and the United States in trade agreements, the growing immigrant laborers, and the expansion of Latin American and Latino communities in the United States with significant political and economic power.

Those wishing to declare a minor in Latin American and Latino Studies must submit an “Application for a Non-teaching Minor” to the Registrar’s Office by the end of the semester one year prior to the semester of completion.

The equivalent of four semesters of Spanish language is required. Students with prior experience in Spanish language may have some requirements waived. Students interested in the LALS minor should consult with the Modern Languages Department immediately upon their decision to fulfill the minor so that they can ascertain the language requirements that are appropriate for them.

**Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPNS 101–Elementary Spanish I</td>
<td>4</td>
</tr>
<tr>
<td>SPNS 102D–Elementary Spanish II</td>
<td>4</td>
</tr>
<tr>
<td>SPNS 201D–Intermediate Spanish I</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 220D–Spanish Language &amp; Culture</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 330–Modern Cultures of Latin America</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 350–US Latino Cultures</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 320–Survey of Spanish Literature</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 352–Contemp Lat Amer Literature</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 416–Spanish Culture and Revolution</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 450–Latin American Perspectives</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 460–Contemp Spain &amp; Nations</td>
<td>3</td>
</tr>
</tbody>
</table>

**Elective Courses**

Select 12 credits from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSTR 330–History of Mexico</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 434–Gen, Sex &amp; Soc Chge in Lat Am</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 430–Latin Amer Soc History</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 431–Race in Latin America</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 435–Latin American Perspectives</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 368–Immigration</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 370–Sociology of Globalization</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 416–Spanish: Culture and Revolution</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 329–Early Cultures of Latin America</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 330–Modern Cultures of Latin America</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 332–Contemp Latin American Literature</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 335H–Travel in Latin American Lit &amp; Film</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 350–US Latino Cultures</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 351–US Latino Literature</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 361–Hispanic Texts &amp; Cinema</td>
<td>3</td>
</tr>
<tr>
<td>SPNS 430–Latin American Perspectives</td>
<td>3</td>
</tr>
</tbody>
</table>

Not all elective courses may be taken in the same department. A total of 9 credits must be at the 300 or 400 level. This list may expand as other disciplines develop courses that contain a substantial Latin American or Latino component.

**CHINA STUDIES MINOR (Non-Teaching)**

The Department of Modern Languages and Literatures offers a non-teaching minor in China Studies (Chinese language and culture). The program’s mission is to provide students with the language skill and cultural understanding they need to succeed in Chinese contexts. The minor requires basic Chinese language proficiency and a broad knowledge of Chinese history, literature, and culture.

A total of 28 credits of coursework is required, including 16 credits in Chinese language, and 12 credits of non-language China-related courses, 9 credits of which are at the upper division level. In addition, as many as 9 credits may be taken from courses on China in other departments. In order to receive the minor, students must successfully complete the following coursework:

**Language Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHIN 101–Elementary Chinese I</td>
<td>4</td>
</tr>
<tr>
<td>CHIN 102D–Elementary Chinese II</td>
<td>4</td>
</tr>
<tr>
<td>CHIN 201–Intermediate Chinese I</td>
<td>4</td>
</tr>
<tr>
<td>CHIN 220–Intermediate Chinese II</td>
<td>4</td>
</tr>
<tr>
<td>CHIN 221–Advanced Chinese I</td>
<td>4</td>
</tr>
<tr>
<td>CHIN 222–Advanced Chinese II</td>
<td>4</td>
</tr>
<tr>
<td>CHIN 223–Advanced Chinese III</td>
<td>4</td>
</tr>
<tr>
<td>CHIN 329–Contemporary Chinese</td>
<td>4</td>
</tr>
<tr>
<td>RELS 203–Asian Religions: From Daoism to Zen</td>
<td>3</td>
</tr>
<tr>
<td>ANTY 225–Culture, Language and Society</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 140–Modern China</td>
<td>3</td>
</tr>
</tbody>
</table>

**Select 5 credits from the following:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHIN 130D–Historical &amp; Literary Journey to Modern China</td>
<td>3</td>
</tr>
<tr>
<td>CHIN 211D–Chinese Culture &amp; Civilization</td>
<td>3</td>
</tr>
<tr>
<td>RELS 203–Asian Religions: From Daoism to Zen</td>
<td>3</td>
</tr>
<tr>
<td>ANTY 225–Culture, Language and Society</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 140–Modern China</td>
<td>3</td>
</tr>
</tbody>
</table>

**Select 9 credits from the following:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHIN 329H–History of Chinese Cinema</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 345–Modern China</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 445–Gender in Asia</td>
<td>3</td>
</tr>
<tr>
<td>HSTR 446–Science and Medicine in China</td>
<td>3</td>
</tr>
<tr>
<td>ML 490R–Undergraduate Research/ML 492–Independent Study</td>
<td>3</td>
</tr>
</tbody>
</table>

**Students who are on the Chinese Government Scholarship or other scholarship to study in China will receive 3 credits of ML 490R or ML 492. We highly recommend students who are pursuing a China Studies minor to spend a short period of time in China.**
Philosophy

Department of History and Philosophy
http://www.montana.edu/history/

Philosophy is concerned with the underlying assumptions and broad implications of human knowledge and values. The curriculum in philosophy contains a wide range of courses that explore these topics by studying philosophical problems through the writings of important philosophers of the past and present. Emphasis is placed on understanding different solutions to these problems and on analyzing and critiquing them.

The Bachelor of Art in Philosophy has traditionally served as a basis for further study in philosophy, law, religion, or related fields. It may also be used as background training for government, business, or any field that depends upon a strong liberal arts education. The department has traditionally encouraged taking a double major and has restricted the number of required courses in philosophy so that this may be possible.

Students may elect to major in philosophy through either the philosophy option or the philosophy and religion option. The department also encourages students to engage in independent study through the departmental honors option. This option has the following requirements:

1. Students must have a minimum 3.5 grade-point average in their major and a 3.0 GPA overall.
2. Students must present an acceptable, bound senior thesis, and an oral defense of the thesis.

Students may attain 3-6 undergraduate independent study credits while working for the thesis. Qualified students may enroll in the honors option working for the thesis. Qualified students may elect to major in philosophy so that this may be possible.

Students may attain 3-6 undergraduate independent study credits while working for the thesis. Qualified students may enroll in the honors option working for the thesis. Qualified students may elect to major in philosophy so that this may be possible.

A minimum of 120 credits is required for graduation: 42 of these credits must be in courses numbered 300 and above. Students must receive a grade of C or better in all required courses.

PHILOSOPHY AND RELIGION OPTION

The Philosophy and Religion option is being withdrawn from the curriculum effective Fall 2012. Students already enrolled in the option will be able to take all courses that are required to complete it. For additional information, contact the Department of History and Philosophy, 2-155 Wilson Hall; 406-994-4395; www.montana.edu/wwwhi/.

Curricula in Philosophy

PHILOSOPHY OPTION

Freshman Year  Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLS 101US—University Seminar</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 101W—College Writing I</td>
<td>3</td>
</tr>
<tr>
<td>Philosophy Electives (Any PHL course)</td>
<td>6</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>18</td>
</tr>
</tbody>
</table>

Sophomore Year  Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHL 256Q—Logic</td>
<td>3</td>
</tr>
<tr>
<td>One Year Modern Lang</td>
<td>8</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>RLIST 202H—Hindu Traditions</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 203D—Buddhist Traditions</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following:</td>
<td></td>
</tr>
<tr>
<td>RLIST 204H—Intro to the Hebrew Bible</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 205H—Introduction to the New Testament</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 206H—Origins of God</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 207H—Myth and Metaphor</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>13</td>
</tr>
</tbody>
</table>

Junior Year  Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHL 361RH—History of Phil: Anc &amp; Mediev</td>
<td>3</td>
</tr>
<tr>
<td>PHL 362—History of Phil: Modern</td>
<td>3</td>
</tr>
<tr>
<td>PHL 379—Philosophy of Religion</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following in ethics:</td>
<td></td>
</tr>
<tr>
<td>PHL 312—Ethics</td>
<td>3</td>
</tr>
<tr>
<td>PHL 310—Moral Theory</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 321—Philosophy &amp; Biomedical Ethics</td>
<td>3</td>
</tr>
<tr>
<td>PHL 322—Philosophy &amp; Environmental Ethics</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following 300-level or 400-level Religious Studies:</td>
<td></td>
</tr>
<tr>
<td>RLIST 321—Gender and Religion</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 325—Literature and Religion</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 326—Mystics, Founders, Reformers</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 330—Religion of Ancient Egypt</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 332—Biblical Archaeology</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 402—Natural, Unnatural, and Supernatural</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 403—Text and Image</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 407—Ism, Religion, and Categories</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 410—Psyche and the Sacred World</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>18</td>
</tr>
</tbody>
</table>

Senior Year  Credits

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHL 494—Seminar</td>
<td>3</td>
</tr>
<tr>
<td>PHL 494—Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following in metaphysics/epistemology:</td>
<td></td>
</tr>
<tr>
<td>PHL 305—Approaches to Epistemology</td>
<td>3</td>
</tr>
<tr>
<td>PHL 304—Metaphysics</td>
<td>3</td>
</tr>
<tr>
<td>PHL 305—Contemporary Philosophy</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>30</td>
</tr>
</tbody>
</table>

PHILOSOPHY MINOR (NON-TEACHING)

The minimum number of credits required for a non-teaching minor is twenty-one, with nine of those being upper-division credits.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHL 256Q—Logic</td>
<td>3</td>
</tr>
<tr>
<td>PHL 361RH—History of Phil: Anc &amp; Mediev</td>
<td>3</td>
</tr>
<tr>
<td>PHL 362—History of Phil: Modern</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td>PHL 312—Ethics</td>
<td>3</td>
</tr>
<tr>
<td>PHL 310—Moral Theory</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 321—Philosophy &amp; Biomedical Ethics</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 322—Philosophy &amp; Environmental Ethics</td>
<td>3</td>
</tr>
<tr>
<td>Take one of the following 300-level or 400-level Religious Studies:</td>
<td></td>
</tr>
<tr>
<td>RLIST 321—Gender and Religion</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 325—Literature and Religion</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 326—Mystics, Founders, Reformers</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 330—Religion of Ancient Egypt</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 332—Biblical Archaeology</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 402—Natural, Unnatural, and Supernatural</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 403—Text and Image</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 407—Ism, Religion, and Categories</td>
<td>3</td>
</tr>
<tr>
<td>RLIST 410—Psyche and the Sacred</td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td>18</td>
</tr>
</tbody>
</table>

A minimum of 120 credits is required for graduation: 42 of these credits must be in courses numbered 300 and above. Students must receive a grade of C or better in all required courses.
**Physics**

*Department of Physics*

[http://www.physics.montana.edu/](http://www.physics.montana.edu/)

The physics curriculum is designed with considerable flexibility in order to accommodate the variety of interests, plans, and needs of majors. At the same time, it provides a broad and thorough understanding of the fundamental ideas and concepts related to the physical world surrounding us. Using this broad base, which stresses fundamentals, undergraduates may enter graduate work in one of the pure or applied sciences or one of the non-sciences such as education, business administration, law, journalism, or philosophy. They may also choose to go directly into jobs in education, industry, government, or business.

The Department of Physics offers graduate work leading to the Master of Science and Doctor of Philosophy degrees. Furthermore, the faculty in all research groups are strongly committed to enriching the undergraduate experience by providing opportunities for undergraduates to fully participate in cutting-edge research projects working alongside faculty and graduate students.

**Professional Option**

Intended primarily as preparation for graduate work in one of the physical sciences or for those who desire a career in the physical sciences, the professional option provides a sound background in the fundamentals of physics and mathematics.

**Interdisciplinary Option**

This option requires a minimum of 16 credits in the declared area and is designed for those who desire a firm background in mathematics and physics coupled with a concentration in another discipline such as chemistry, biology, computer science, engineering, or technical writing. Each student choosing this option will work out a specific program with an advisor and the participating department in the declared area.

**Teaching Option**

This option is intended primarily as preparation for secondary school teachers. Teaching options require a teaching minor from the list under the Department of Education. However, the only teaching minor that can be completed within 128 credits is Mathematics. Please contact the department advisor for specifics on other options.

**Undergraduate Research Participation**

An integral component of all undergraduate major programs in physics is participation in undergraduate research. Based on student interest, the faculty work closely with students in identifying and addressing important problems in particular sub-fields. Completion of a minimum of 2 credits of undergraduate research/creative activity (PHSX 490R) is required prior to taking the Capstone course (PHSX 499). Some students extend this experience beyond the minimum and work in research labs throughout their undergraduate program, including summers. Students from other majors who demonstrate interest and ability are also welcome to participate in undergraduate research in physics.

**Senior Project**

Students in the professional and interdisciplinary options will complete senior projects that integrate their physics knowledge and problem solving skills with research/creative activities. The senior project is designed to give students the opportunity to develop skills that are necessary for work in a professional scientific environment by integrating their physics knowledge and problem solving skills with research/creative activities. For this activity, the student must enroll in a minimum of 2 credits of undergraduate research/creative activity (PHSX 490R). The results of this senior project are generally the basis for the presentation given in the Capstone course (PHSX 499).

The senior project will be based on a collaboration of a student with a mentor on a project that: is of interest to the student, is either experimental or theoretical in nature, has a defined objective and is primarily based on the student’s own work. Usually these senior projects are based on research guided by one of the faculty in the Physics Department. However, there are several other options available to the student for these senior projects. Other options include, but are not limited to, research projects done by the student at other institutions which may occur during a student exchange program or on a summer intern program, and independent research/creative activity done by the student under the guidance of the student’s faculty advisor.

**Capstone Experience**

Students in the professional and interdisciplinary options will present the results of their senior project in oral and written forms in the Capstone course (PHSX 499).

The capstone experience for those in the Physics Teaching Option is EDU 495 - Student Teaching: 5-12. Each student will submit a written report from the supervising teacher and a written self-assessment.

**Departmental Honors in Physics**

When appropriate, majors should consider the opportunities afforded by the departmental honors program. This program has the following requirements:

1. A minimum 3.5 grade-point average (GPA) in physics; 3.0 GPA overall.
2. A minimum of four credits of undergraduate research credit.
4. Participation in a physics seminar for one semester in either the junior or senior year.

A detailed description of the program is available from the department.

**Curricula in Physics**

**PROFESSIONAL OPTION**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 240</td>
<td>Honors Gen &amp; Mod Phys I*</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 241</td>
<td>Honors Gen &amp; Mod Phys II*</td>
<td>4</td>
</tr>
<tr>
<td>M 171</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>M 172</td>
<td>Calculus II</td>
<td>4</td>
</tr>
</tbody>
</table>

*See note below on substitutions*
**PROGRAMS OF INSTRUCTION — LETTERS AND SCIENCE**

### Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 200</td>
<td>Research Programs in Physics</td>
<td>1</td>
</tr>
<tr>
<td>PHSX 224</td>
<td>Physics III</td>
<td>4</td>
</tr>
</tbody>
</table>

Choose one of the two:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 283</td>
<td>Honors Multivar Calc (Recommended)</td>
<td>4</td>
</tr>
<tr>
<td>M 273</td>
<td>Multivariable Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

### University Core and Electives

- Biology, Chemistry, or Earth Science Electives: 4
- Math Electives: 3

### Physics Electives

- PHSX 282: Laboratory Electronics II | 2
- PHSX 301: Intro Theoretical Physics | 3

Choose one of the two:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 284</td>
<td>Honors Intro Diff Eq (Recommended)</td>
<td>4</td>
</tr>
<tr>
<td>M 274</td>
<td>Intro to Different Equations</td>
<td>4</td>
</tr>
</tbody>
</table>

University Core and Electives: 15

### Junior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 320</td>
<td>Classical Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 461</td>
<td>Quantum Mech I</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 444</td>
<td>Advanced Physics Lab (Fall and/or Spring)</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 490</td>
<td>Undergrad Research Activity</td>
<td>1</td>
</tr>
<tr>
<td>Math Electives</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Physics Electives</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 461</td>
<td>Quantum Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 490</td>
<td>Undergrad Research Activity</td>
<td>1</td>
</tr>
<tr>
<td>PHSX 499</td>
<td>Senior Capstone Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Physics Electives</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

The physics electives are to be selected from PHSX 253 and PHSX and ASTR courses numbered 300 and above. The mathematics electives are to be selected from M 221 and MATH and STAT courses numbered 300 and above. A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. A student changing majors or with unusual circumstances can substitute PHSX 220 for PHSX 240 or PHSX 222 for PHSX 242 with academic advisor’s approval.

## PHYSICS TEACHING OPTION

### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 202</td>
<td>Early Field Experience</td>
<td>1</td>
</tr>
<tr>
<td>HDCF 105B</td>
<td>Lifespan Human Devpnt</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 106</td>
<td>Drug Health Issue for Ed</td>
<td>1</td>
</tr>
</tbody>
</table>

EDU 211D: Multicultural Education | 3
EDU 408: Professional Issues: 5-12 | 2
Math Electives | 3
University Core and Electives | 16

### Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 200</td>
<td>Research Programs in Physics</td>
<td>1</td>
</tr>
<tr>
<td>PHSX 224</td>
<td>Physics III</td>
<td>4</td>
</tr>
</tbody>
</table>

Choose one of the two:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 283</td>
<td>Honors Multivar Calc (Recommended)</td>
<td>4</td>
</tr>
<tr>
<td>M 273</td>
<td>Multivariable Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

### University Core and Electives

- Biology, Chemistry, or Earth Science Electives: 4
- Math Electives: 3

### Physics Electives

- PHSX 282: Laboratory Electronics II | 2
- PHSX 301: Intro Theoretical Physics | 3

Choose one of the two:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 284</td>
<td>Honors Intro Diff Eq (Recommended)</td>
<td>4</td>
</tr>
<tr>
<td>M 274</td>
<td>Intro to Different Equations</td>
<td>4</td>
</tr>
</tbody>
</table>

University Core and Electives: 15

### Junior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 320</td>
<td>Classical Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 322</td>
<td>Intermediate Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 461</td>
<td>Quantum Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 490</td>
<td>Undergrad Research Activity</td>
<td>1</td>
</tr>
<tr>
<td>Math Electives</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Physics Electives</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 461</td>
<td>Quantum Mechanics I</td>
<td>3</td>
</tr>
<tr>
<td>PHSX 490</td>
<td>Undergrad Research Activity</td>
<td>1</td>
</tr>
<tr>
<td>PHSX 499</td>
<td>Senior Capstone Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Physics Electives</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>University Core and Electives</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

The physics electives are to be selected from PHSX courses numbered 200 and above. A minimum of 128 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. A student changing majors or with unusual circumstances can substitute PHSX 220 for PHSX 240 or PHSX 222 for PHSX 242 with academic advisor’s approval.

## PHYSICS MINOR (NON-TEACHING)

### Freshman Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDU 202</td>
<td>Early Field Experience</td>
<td>1</td>
</tr>
<tr>
<td>HDCF 105B</td>
<td>Lifespan Human Devpnt</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 106</td>
<td>Drug Health Issue for Ed</td>
<td>1</td>
</tr>
</tbody>
</table>

EDU 211D: Multicultural Education | 3
EDU 408: Professional Issues: 5-12 | 2
Math Electives | 3
University Core and Electives | 16

### Sophomore Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 200</td>
<td>Research Programs in Physics</td>
<td>1</td>
</tr>
<tr>
<td>PHSX 224</td>
<td>Physics III</td>
<td>4</td>
</tr>
</tbody>
</table>

Choose one of the two:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 283</td>
<td>Honors Multivar Calc (Recommended)</td>
<td>4</td>
</tr>
<tr>
<td>M 273</td>
<td>Multivariable Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

### University Core and Electives

- Biology, Chemistry, or Earth Science Electives: 4
- Math Electives: 3

### Physics Electives

- PHSX 282: Laboratory Electronics II | 2
- PHSX 301: Intro Theoretical Physics | 3

Choose one of the two:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 284</td>
<td>Honors Intro Diff Eq (Recommended)</td>
<td>4</td>
</tr>
<tr>
<td>M 274</td>
<td>Intro to Different Equations</td>
<td>4</td>
</tr>
</tbody>
</table>

University Core and Electives: 16

### Junior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 320</td>
<td>Classical Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 322</td>
<td>Intermediate Physics</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose one of the two:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 182</td>
<td>Honors Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>M 172</td>
<td>Calculus II</td>
<td>4</td>
</tr>
</tbody>
</table>
| Biol.Chem, or Earth Science Electives | | 3
| University Core and Electives | | 15

### Senior Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHSX 320</td>
<td>Classical Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>PHSX 322</td>
<td>Intermediate Physics</td>
<td>3</td>
</tr>
</tbody>
</table>

Choose one of the two:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 284</td>
<td>Honors Intro Diff Eq (Recommended)</td>
<td>4</td>
</tr>
<tr>
<td>M 274</td>
<td>Intro to Different Equations</td>
<td>4</td>
</tr>
</tbody>
</table>

University Core and Electives: 16

### Credits

- PHSX 200: Gen & Mod Phys I | 4
- PHSX 240: Gen & Mod Phys II | 4
- PHSX 222: Physics II | 4
- PHSX 242: Gen & Mod Phys II | 4
- PHSX 224: Physics III | 4
- PHSX 301: Intro Theoretical Phys | 3

Physics electives

- (261 or 300 level or above) | 8
PHSX 240 and 242 are recommended choices. Students who complete PHSX 320 require 7 additional physics elective credits. Students who complete PHSX 322 require 8 additional physics elective credits.

Political Science
Department of Political Science
http://www.montana.edu/wwwpso/

The study of political science gives the student an understanding of politics, government, and public affairs. Political science graduates develop a coherent and reasoned knowledge respecting government, law, governance, political behavior, and public administration. In addition, they are prepared to be part of an informed national and global citizenry. Political science provides an excellent academic background for students preparing for careers in law, the public service, journalism, and teaching, as well as many private sector jobs. Advising within the department is conducted in groups and by individually assigned advisors. In addition to classroom work, the political science program encourages students to gain practical experience through legislative and public affairs intern programs. The intern program gives students the opportunity to earn university credit for on-the-job experience with government agencies, law firms, the Congress, state legislatures, and with public policy groups. In order to graduate, all students are expected to successfully complete the five political science foundation courses (PSCI 210IS, 214IS, 230D, 200 & ECNS 101IS). The student must also complete a senior thesis project.

The department offers a Bachelor of Arts degree with four options. All options require the completion of 120 credits, which must include MSU’s CORE requirements, and the successful completion of a minimum of 42 upper-division (300 and 400 level) credit hours.

Analysis & Policy Option
This option develops skills in the analysis of public policies and knowledge of public policy processes. In addition to the required foundational courses and advanced political science courses, students will also complete two (6 credits) upper division political science courses in the policy and analysis subfield and PSCI 310 to fulfill their skills requirement.

International Relations Option
This option is for students who wish to acquire a sound background in the fundamentals of international relations theory, international institutions, policy and political economy. In addition to the required foundational courses and advanced political science courses, students will also complete two (6 credits) upper division political science courses in the international relations subfield and demonstrate competency in a foreign language to fulfill their skills requirement.

Political Theory Option
This option is for students who wish to pursue upper level coursework addressing key questions of political theory, including questions about rights, identity, power, virtue, gender, knowledge, and justice, among others. In addition to the required foundational courses and advanced political science courses, students will also complete two upper level courses (6 credits) in the political theory subfield and take Introduction to Logic (PHL 256) to fulfill their skills requirement.

Political Institutions Option
This option is for students with an interest in political institutions, such as legislatures, executives, or the courts, who wish to acquire a sound background in the fundamentals of how political systems operate. This option includes courses on the American political system, as well as the governing institutions of other nation-states. In addition to the required foundational courses and advanced political science courses, students will also complete two upper level courses (6 credits) in the institutions subfield and take PSCI 310 to fulfill their skills requirement.

Curriculum in Political Science
Before a political science major may enroll in any upper division political science course, the student is expected to have achieved a grade of “C” or better in the five political science foundation courses (PSCI 210IS, 214IS, 230D, 200 & ECNS 101IS). It is suggested that students complete these courses during their freshman year.

POLITICAL SCIENCE
The following PSCI Foundation courses are required prerequisites for upper division PSCI courses.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSCI 210IS--Intro to American Govt</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 290-Conducting Pol Inq</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 214-Prim of Science</td>
<td>3</td>
</tr>
<tr>
<td>or PSCI 240 Intro to Pub. Admin.</td>
<td>3</td>
</tr>
<tr>
<td>PSCI 250D--Intro to Int’l Relations</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 101IS--Econ Way of Thinking</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Skills
Take one of the following corresponding to the option:

Political Institutions
PSCI 305--Applied Political Analysis
International Relations
Moderate Proficiency in Foreign Language.
Analysis/Policy
PSCI 310--Applied Political Analysis
Theory
PHL 256--Introduction to Logic

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>

Political Science Core
Take one course from each of the options, plus two additional classes from your declared option to satisfy the requirements of the major:

Political Institutions
PSCI 302--Media & Politics 
PSCI 306--Legislative Process
PSCI 341--Political Parties and Election
PSCI 546--American Presidency
PSCI 471--American Constitutional Law
PSCI 488--Environmental Politics
PSCI 444--Congressional Campaigns

International Relations
PSCI 351--International Relations Theory
PSCI 418--War and Peace
PSCI 434--International Law
PSCI 435--Globalization and Politics
PSCI 436--Politics of Food and Hunger
PSCI 437--International Political Economy
PSCI 439--International Human Rights

Analysis/Policy
PSCI 310--Statistical Tech in Pol Sci
PSCI 365--Pub Policy Issues and Analysis
PSCI 362--National Resource Policy
PSCI 407--Public Policy Analysis
PSCI 465--Public Admin and Policy
PSCI 461--Administrative Law

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

Theory
PSCI 451--Ancient & Medieval Pol Phil
PSCI 323--Modern Political Thought
PSCI 352--National Resource Policy
PSCI 353--Classical Political Thought
PSCI 354--Contemporary Theory
PSCI 454--Cinema and Political Theory

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>3</strong></td>
</tr>
</tbody>
</table>

ANALYSIS AND POLICY OPTION

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>
INTERNATIONAL RELATIONS OPTION

Choose two courses from the following:
- PSCH 351—International Relations Theory ..........................3
- PSCH 406—Political Economy of Energy ...........................3
- PSCH 418—War and Peace ...........................................3
- PSCH 434—International Law ..........................................3
- PSCH 455—Globalization and Politics ..............................3
- PSCH 456—Politics of Food and Hunger ............................3
- PSCH 477—International Political Economy .....................3
- PSCH 499—International Human Rights ..........................3

Total credits required 6

POLITICAL SCIENCE MINOR

(Non-Teaching)

Take 4 of the following:
- PSCH 210IS—Introduction to American Government ..........................3
- PSCH 214IS—Principles of Political Science ..........................3
- PSCH 250D—Introduction to International Relations .................3
- ECNS 101IS—Economic Way of Thinking ...........................3
- PSCH 240—Introduction to Public Administration ..................3

Plus three upper division courses selected from the four political science subfields ............................................9

Total credits required 21

POLITICAL THEOREY OPTION

Take two courses from the following:
- PSCH 323—Modern Political Thought ..................................3
- PSCH 352—American Political Thought .................................3
- PSCH 354—Classical Political Thought .................................3
- PSCH 451—Ancient & Medieval Pol Phil ................................3
- PSCH 454—Cinema and Political Theory ..............................3
- PSCH 455—Politics and Virtue .........................................3

Total credits required 6

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above. No political science course may be counted in more than one upper division subfield requirement except for PSCH 499R (as core). Political science majors must fulfill Diversity University Core requirements outside of the PSCH rubric. ECNS 101IS or ECNS 202 is a requirement for political science majors; the University Core requirement for Inquiry Social Science (IS) is satisfied by ECNS 101IS. Before a political science major may enroll in any upper division political science course, the student is expected to have achieved a grade of "C" or better in the five political science foundation courses (PSCH 210IS, 214IS, 230D, 200). To be credited toward graduation, a student must not earn less than a "C" in any upper division political science course being counted toward graduation requirements in the discipline. In addition to being required for the major, PSCH 499R may also be used to fulfill the Research and Creative Experience core requirement.

POLITICAL INSTITUTIONS OPTION

Choose two courses from the following:
- PSCH 302—Media & Politics ............................................3
- PSCH 306—Legislative Process .........................................3
- PSCH 341—Political Parties and Election ............................3
- PSCH 346—American Constitutional Law ............................3
- PSCH 408—Environmental Politics .................................3
- PSCH 444—Congressional Campaign .................................3

Total credits required 6

PSYCHOLOGICAL SCIENCE and APPLIED PSYCHOLOGY OPTIONS

Psychology

Department of Psychology
http://www.montana.edu/wwpy/

Psychology is the scientific study and application of knowledge concerning the behavioral and cognitive processes of humans and other animals. The Department offers a Bachelor of Science (B.S.) degree in Psychology. This degree prepares students for employment in applied settings or for graduate study in psychology and related fields. Students who choose not to continue toward a graduate degree may find employment in a wide variety of organizations and agencies as well as in research settings where knowledge of behavior and cognition is useful. For such students, a B.S. in psychology offers a broad liberal arts background. Those students who obtain an advanced degree (typically an M.S. or a Ph.D.) may find employment in research settings, academic settings, or private practice, although individuals with advanced degrees also work in a wide variety of other organizations.

The psychology curriculum introduces students to the basic scientific and applied areas of the discipline. It emphasizes theories, methods, and terminology, as well as research findings in each of psychology’s major subareas. Students learn about various research methods used to study psychological phenomena, as well as the strengths and limitations of each. Students conduct psychological research or perform fieldwork in a setting related to psychology, gaining experience that forms the basis for the Senior Thesis Capstone course.

Prerequisite Requirements

Any student who enrolls in a psychology course without having passed all prerequisite(s) with a "C" or better grade will be required to withdraw from the course.

Curricula in Psychology

The program leading to a B.S. degree offers psychological science and applied psychology options. Within these options, students select the appropriate psychology electives and career electives in consultation with their advisors based on the student’s career goals and interests. Options and electives are described below. Psychology majors cannot have a grade less than “C” in a PSYX course used to satisfy graduation requirements.

Freshman Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYX 100IS—Intro to Psychology</td>
<td>4</td>
</tr>
<tr>
<td>M 145Q or higher</td>
<td>3</td>
</tr>
<tr>
<td>STAT 216Q</td>
<td>3</td>
</tr>
<tr>
<td>University Core, PSYX, and Career Elects</td>
<td>23-24</td>
</tr>
</tbody>
</table>

Sophomore Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYX 223—Research Design &amp; Analysis I</td>
<td>4</td>
</tr>
<tr>
<td>PSYX 225—Research Design &amp; Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>University Core, PSYX, and Career Elects</td>
<td>23</td>
</tr>
</tbody>
</table>

Sophomore, Junior & Senior Years

Take at least 24 credits in other Psychology classes which includes at least one course from each of the following four groups:

- Biological/Emotion/Motivation/Learning
  - PSYX 291—Drugs and Behavior
  - PSYX 270—Fundamental Psychology of Learning
  - PSYX 350—Physiological Psychology

- Cognitive Psychology
  - PSYX 354—Sensation & Perception
  - PSYX 390—Memory & Cognition
  - PSYX 481—Judgment & Decision Making

- Social/Personality
  - PSYX 360—Social Psychology
  - PSYX 385—Psychology of Personality
  - PSYX 462—Psychology of Prejudice

- Developmental/Psychopathology
  - PSYX 230—Developmental Psychology
  - PSYX 333—Psychology of Aging
  - PSYX 340—Abnormal Psychology
Take at least one of the following prior to taking PSYX 499R:
- PSYX 490R Undergraduate Research
- PSYX 495 Field Practicum in Applied Psychology

Electives 12

A minimum of 120 credits is required for graduation; 42 of these credits must be in courses numbered 300 and above.

Applied Psychology Option
Students interested in areas of applied psychology such as industrial/ organizational psychology, human resource management, or organizational behavior, may consider the Applied Psychology Option and may choose career elective courses in such disciplines as business management, industrial and management engineering and statistics.

Psychological Science Option
Students interested in areas of psychological science may choose elective courses in disciplines such as biology, computer science, sociology and statistics.

Students interested in advanced study in clinical psychology or counseling psychology may follow either the Psychological Science Option or the Applied Psychology Option and should choose elective courses in such disciplines as biology, or human development. Students in either option should consider taking elective courses in other social science areas such as sociology or political science.

PSYCHOLOGY MINOR
(NON-TEACHING)

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYX 463-Social Cognition</td>
<td></td>
</tr>
<tr>
<td>PSYX 475-Advanced Behavior Analysis</td>
<td></td>
</tr>
<tr>
<td>PSYX 477-Scientific of Psychological Well-Being</td>
<td></td>
</tr>
<tr>
<td>PSYX 482-Psycholinguistics</td>
<td></td>
</tr>
<tr>
<td>PSYX 491-Special Topics</td>
<td></td>
</tr>
<tr>
<td>Take at least one of the following prior to taking PSYX 499R:</td>
<td></td>
</tr>
<tr>
<td>PSYX 490R Undergraduate Research</td>
<td></td>
</tr>
<tr>
<td>PSYX 495 Field Practicum in Applied Psychology</td>
<td></td>
</tr>
</tbody>
</table>

Take the following:
- PSYX 499R Senior Thesis Capstone (Note: University Scholars Program and McNair Scholars participants who complete a project with a Psychology Department faculty member may petition to be exempt from PSYX 499R.)
- Electives 12

Religious Studies
Department of History, Philosophy, and Religious Studies

Religious studies is an area of academic inquiry combining several disciplines in the critical and comparative study of religion as a basic constituent of human culture. Its purpose is to examine religion by means of historical, literary and philosophical criticism, and the behavioral and social sciences. Courses in religious studies seek to acquaint the students with the results of such an approach to religion; they are based on methods intentionally devoid of advocacy of particular theological views.

The academic study of religion contributes to the student’s general understanding of human history, literature, thought, and behavior. Religious studies offers a BA and a minor and its courses can be used as humanities electives in almost any curriculum.

Curriculum for Religious Studies

RECOMMENDED STUDY MAJOR

<table>
<thead>
<tr>
<th>I. Degree Requirements</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Curriculum</td>
<td>27-30</td>
</tr>
<tr>
<td>Religious Studies courses</td>
<td>39-20</td>
</tr>
<tr>
<td>Foreign Language requirement</td>
<td>8</td>
</tr>
<tr>
<td>Methodologies requirement</td>
<td>6</td>
</tr>
<tr>
<td>Capstone course RLST 499R</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>120-124</td>
</tr>
</tbody>
</table>

II. Four-Year Plan

Freshman Year
- CLS 101U-Freshman Seminar ...............3
- WRIT 101W-College Writing I ...............5
- Take one of the following:
  - RLST 100D-Introduction to the Study of Religion ..........3
  - RLST 110D-Religion, Conflict, & Politics ..........4
  - RLST 220D-Interpretations of American Religion ..........4

One Year Foreign Language ....................8
Other University Core and Electives ........12-15

Sophomore Year
- Take one of the following: ..................3
  - RLST 202D-Hindu Traditions ...............3
  - RLST 203D-Buddhist Traditions .............3
- Take one of the following: ..................3
  - RLST 201H-Islam ................................3
  - RLST 204H-Introduction to the Hebrew Bible....3
  - RLST 205H-Introduction to the New Testament ........3

Take two of the following (that have not been used to fulfill a requirement): .................6
- RLST 201H-Islam ................................3
- RLST 202D-Hindu Traditions ...............3
- RLST 203D-Buddhist Traditions .............3
- RLST 204H-Introduction to the Hebrew Bible....3
- RLST 205H-Introduction to the New Testament ........3
- RLST 206H-Origins of God ....................3
- RLST 207H-Myth and Metaphor ...............3
- RLST 217H-Religion and Science .............3
- RLST 220H-Interpretation of American Religion ..........3
- RLST 223H-Nature and Culture ..............3
- RLST 229R-Undergraduate Research ..........3
- RLST 291-Special Topics .....................3
- University Core and Electives ............18

Junior Year
- Take three of the following: .................9
  - RLST 321-Religion and Gender ...............3
  - RLST 325-Religion and Literature ..........3
  - RLST 326-Mystics, Founders, and Reformers ....3
  - RLST 330-Ascent Egypt .....................3
  - RLST 332-Religion and Archaeology ..........3
  - RLST 370-Philosophy of Religion ..........3

Methodologies requirement:
in consultation with their advisor, students will take two courses outside the major that focus on any of the following methodologies: historical, archaeological, sociological, philosophical, literary, visual, etc. ........6
- University Core and Electives ............15

Senior Year
- RLST 499R-Capstone Seminar ...............3
- Take two of the following: ..................6-7
  - RLST 492-Natural/Unnatural/Supernatural ....4
  - RLST 495-Text and Image ....................3
  - RLST 497-Isms: Religion & Categories ..........3
  - RLST 410-Psyche and the Sacred .............3
  - RLST 490R-Undergraduate Research ..........3
  - RLST 491-Special Topics .....................3
  - RLST 492-Independent Study ...............3
Take three of the following, excluding any course already completed: .............................................9
RLST 201IH–Islam .............................................3
RLST 202D–Hindu Traditions ...............................3
RLST 203D–Buddhist Traditions .............................3
RLST 204IH–Introduction to the Hebrew Bible .........3
RLST 205IH–Introduction to the New Testament .......3
RLST 206IH–Origins of God .....................................3
RLST 207H–Myth and Metaphor ............................3
RLST 217IH–Religion and Science ............................3
RLST 220IH–Interpretation of American Religion ...3
RLST 225H–Nature and Culture .............................3
RLST 290R–Undergraduate Research ........................3
RLST 291–Special Topics ........................................3
RLST 321–Religion and Gender ...............................3
RLST 490R–Undergraduate Research .......................3
RLST 526–Mystics, Founders, and Reformers .........3
RLST 530–Ancient Egypt .........................................3
RLST 532–Religion and Archaeology .......................3
RLST 570–Philosophy of Religion ............................3
RLST 492–Natural, Unnatural, Supernatural ..........3
RLST 405–Text and Image ......................................3
RLST 407–Isms: Religion & Categories .....................3
RLST 410–Psyche and the Sacred World ..................3
RLST 490R–Undergraduate Research .......................3
RLST 491–Special Topics ........................................3
RLST 492–Independent Study ..................................3

Electives ...............................................................11-12

30

RELIGIOUS STUDIES MINOR (NON-TEACHING)

The minimum number of credits required for a non-teaching minor is twenty-one, with nine of those being upper-division credits.

Credits
Select one of the following:
RLST 100D–Intro to Study of Religion ...................5
RLST 110D–Religion, Conflict & Politics ...............5
Select one of the following:
RLST 202D–Hindu Traditions ...............................3
RLST 203D–Buddhist Traditions .............................3
Select two of the following:
RLST 201IH–Islam .............................................5
RLST 204IH–Introduction to the Hebrew Bible .........5
RLST 205IH–Introduction to the New Testament .......5
RLST 206IH–Origins of God .....................................5
RLST 207H–Myth and Metaphor ............................5
RLST 217IH–Religion and Science ............................5
RLST 220IH–Interpretation of American Religion ...5
RLST 225H–Nature and Culture .............................5
Select three of the following:
RLST 321–Gender and Religion .............................3
RLST 325–Religion and Literature ............................3
RLST 526–Mystics, Founders, Reformers ...............3
RLST 330–Religion and Ancient Egypt .....................3
RLST 332–Archaeology and Religion .......................3
RLST 370–Philosophy of Religion ............................3
RLST 492–Natural, Unnatural, Supernatural ..........3
RLST 405–Text and Image ......................................3
RLST 407–Isms: Religion & Categories .....................3
RLST 410–Psyche and the Sacred World ..................3
RLST 490R–Undergraduate Research .......................3
RLST 491–Special Topics ........................................3
RLST 492–Independent Study ..................................3

Sociology

Department of Sociology & Anthropology
http://socanth.msu.montana.edu/~dept/

The Bachelor of Science in Sociology provides the student the opportunity to combine a liberal arts education with a unique focus on the empirical study of human societies including social dynamics, institutions, and inequality. Students are permitted a large number of elective courses.

A Bachelor’s degree in Sociology prepares students for employment in a number of arenas, including governmental agencies, nonprofit organizations, for-profit businesses, agricultural organizations, and academic institutions. The fields of law enforcement, probation & corrections, labor relations, business management, personnel administration, market analysis, and various types of industrial research employ students who major in sociology. Many graduates enter social services. Sociology also provides excellent preparation for graduate school and other educational and career opportunities.

The Department offers a Bachelor of Science degree with two options: (a) General Sociology, or (b) Criminology. Both options require 39 credits in Sociology courses.

General Sociology Option

This option is for the student who desires a broad and general foundation in Sociology with the ability to fully customize their major and substantive focus. For this option, the student is required to take SOCI101IS, SOCI 202, SOCI 318R, SOCI 455, and SOCI 499. The remaining 24 credits in Sociology will be comprised of eight courses of the student’s choosing, of which seven must be at the 300-level or above. Students that choose the General Sociology Option often take a set of courses that lead to a specific area of emphasis, such as Social Inequality, Family Relations and Children, Business and Management, Marketing and Public Relations, Social Services, Health and Medicine, and Pre-Law.

Criminology Option

This option is for the student who desires a strong foundation in Sociology with a specific focus on laws, the legal system, the social structure of criminal behavior, and society’s efforts to understand and control crime. This option allows students to pursue a sociology degree that integrates core coursework in sociology with sociology courses that focus on law, crime, and the criminal justice system. To achieve this integration, the student is required to take SOCI101IS, SOCI202, SOCI318R, SOCI311, and SOCI499. The remaining 24 credits in Sociology will be comprised of 15 credits in Criminology and Context courses and 9 credits in Criminology and Sociology elective courses.

We strongly recommend that prior to enrolling in any upper division courses in Sociology students complete their core in Writing, Quantitative Reasoning, Diversity and Inquiry - Social Sciences with a grade of “C” or better. We also recommend students take SOCI 202 in their sophomore year and SOCI 318R in their junior year.

Prerequisite Requirements

Any student who enrols in a course offered by the Department of Sociology and Anthropology without the required prerequisite(s) will be required to withdraw from the course.

Curricula in Sociology

GENERAL SOCIOLOGY AND CRIMINOLOGY OPTIONS

Freshman Year

Credits
WRIT 101W–College Writing I ................................3
SOCI 101IS–Introduction to Sociology ..................3
Diversity Core .......................................................3
Quantitative Reasoning Core ................................3
University Core and Electives ............................15

Sophomore Year

Credits
SOCI 202–Social Statistics ....................................3
SOCI Electives .......................................................6
University Core and Electives ............................15
Additional required science, natural science & humanities courses ...........6

Junior Year

Credits
SOCI 455–Classical Sociological Theory (General Sociology Option) ...........3
(or) SOCI 511–Criminology (Criminology Option)
SOCI 318R–Sociological Research Methods ............3
SOCI Electives .......................................................9
Additional required science, natural science & humanities courses ...........6
University Core and Electives ............................15

SOCI 101IS–Introduction to Sociology ........................3
SOCI 202–Social Statistics ....................................3
SOCI Electives .......................................................6
University Core and Electives ............................15
Additional required science, natural science & humanities courses ...........6
University Core and Electives ............................15
### SOCIOLOGY MINOR (NON-TEACHING)

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociology Electives</td>
<td>3</td>
</tr>
<tr>
<td>SOCIO 201--Introduction to Sociology</td>
<td>3</td>
</tr>
<tr>
<td>SOCIO 455--Classical Sociological Theory</td>
<td>3</td>
</tr>
<tr>
<td>Sociology Electives</td>
<td>15</td>
</tr>
</tbody>
</table>

12 of 21 hours must be from upper division courses numbered 300 and above.

---

### University Studies Program

University Studies (www.montana.edu/wwus) is the initial academic program for approximately 30% of first-year students at MSU. Typically, freshmen choose University Studies to explore their options before declaring a major field of study. Through its programs of academic advising and first-year seminar, University Studies plays a key role in preparing MSU students for study in a chosen major.

Undergraduate students may take up to 60 semester credits (i.e., through the sophomore year) in University Studies before declaring a major, although they are encouraged to select a suitable degree plan well before the 60-credit limit.

The program also serves students who plan to pursue specialized degrees at other institutions but wish to take basic courses at MSU for one or two years before transferring.

Transfer students may enter University Studies to fulfill requirements and explore MSU degree programs before declaring a major.

### Academic Advising

University Studies is the home of the MSU Academic Advising Center. Advising professionals, well-acquainted with the curricula in all of MSU’s colleges, aid students in their exploration of courses, majors, and career objectives. Advisors work with students to match their individual interests and goals with college coursework to construct a personalized program of academic study and at the same time fulfill core requirements and electives that will apply to a wide range of curricula. Advising is available on an appointment or walk-in basis Monday through Friday.

### US 101: First-Year Seminar

To complement the advising component of University Studies, students in the program enroll in US 101, the First-Year Seminar, a 3-credit course that fulfills the University Seminar requirement of CORE 2.0.

The seminar focuses on helping students reach their academic and intellectual potential through a concentration on critical thinking, verbal and written communication. US 101 is open to all students, regardless of major.

---

### University Honors Program

The University Honors Program (see full description in Special Academic Opportunities) at Montana State University offers opportunities for students to study, conduct research, and exchange ideas in a challenging and supportive academic environment. In addition to learning from outstanding faculty members, Honors students can attend special Honors seminars, take interdisciplinary Honors courses, and engage in independent study and research opportunities.

For details about admission and graduation requirements, contact the University Honors Program Office in Quad D by calling 406-994-4110, sending e-mail to honors@montana.edu or checking www.montana.edu/honors.

### Pre-medical/pre-health Profession Programs at MSU

#### General Pre-health Professions Advising

The premedical/pre-health professions programs at Montana State University are administered through the Health Professions Advising Office. The office provides information, advising, and counseling to all students interested in becoming physicians, dentists, pharmacists, optometrists, physician assistants, etc. Students can major in nearly any curriculum within the institution. An overview of support services available through the Health Professions Advising Office is provided during orientation at the start of the academic year and via the website. The Director of the Health Professions Advising Office is available to meet with students enrolled at Montana State University, alumni and high school students considering MSU. The office provides guidance throughout the process of making application to health professional schools. Students are invited to attend meetings of the Health Professions Club, the Pre-Dental Club and the Pre-Health Professions honor society (Alpha Epsilon Delta, AED).
Native American Studies

Native American Studies offers an interdisciplinary program of study in American Indian culture and history, policy and law, community affairs, education, and other related areas through a non-teaching minor in Native American Studies, an Online Graduate Certificate in Native American Studies, a Master of Arts in Native American Studies, as well as opportunities for all MSU undergraduate students to gain a multicultural perspective in meeting the university’s Core Curriculum requirements.

Research and Creative Activity

The Department takes pride in the scholarship of its faculty. In 2000 the Department established its endowed Katz Family Chair in Native American Studies. The scholarship and service offered by the holders of the Chair enhances the Department’s efforts to provide first class scholarship on behalf of Native peoples and the university.

Over the years faculty members have consistently published in professional journals, delivered papers at national and international meetings, held symposia here at MSU, and, by invitation, chaired and participated in panels at national professional association conferences.

Consistent with its service commitment to Montana’s tribal communities, much of the faculty’s research and creative activity responds to the educational, cultural, and economic development needs of Native Americans. In addition to scholarly research, faculty members have devoted much time and energy to developing new programs and finding external funding sources for those programs. During the past decade, the Department has received more than $5 million in federal, state, and private grants for programs which include graduate fellowships, tribal college development projects, international student exchanges, pre-college engineering and business programs, and national and international cultural development programs.

Service

The Department firmly maintains that Montana State University must be responsive to Indian communities in addressing tribally-identified educational, cultural, and economic development needs. Accordingly, the Department has directed much of its public service activity to Montana’s Indian communities. In doing so, Department faculty members have established close working relationships with tribal and intertribal groups as well as with national Indian offices and organizations.

Upon request, faculty members have also provided technical assistance in the areas of adult, vocational, and community college development, needs assessments, proposal writing, and program evaluations.

Utilizing the resources of the university to assist in the development of Montana’s seven tribally-controlled community colleges has been a major goal of the Department. For example, the Department has administered projects to provide graduate-level training to tribal college faculty, to provide in-service training and technical assistance, and to conduct significant research in areas of importance to the tribal colleges.

In addition, faculty members have presented continuing education workshops on Montana reservations, evaluated reservation cultural and education programs, and provided other public service. Faculty members have also, by invitation, read proposals for the U.S. Office of Education, the National Endowment for the Humanities, the National Institute of Education, and the National Science Foundation.

American Indian Student Programs and Services

In addition to the traditional functions of an academic department, Native American Studies places a high priority on providing student support programs and services, reflecting a strong commitment to Indian student retention and success. The student who decides to attend MSU will find a University-wide commitment manifested by a varied and extensive support system which is unequaled in the Great Plains region.

NATIVE AMERICAN STUDIES
MINOR (NON-TEACHING)

The minor in Native American Studies is designed to enhance the student’s major area of study, offering an interdisciplinary program for Indian and non-Indian students who wish to concentrate in the study of Native American life or who are preparing for careers in tribal affairs.

Students who declare a minor in Native American Studies must complete 21 credits as outlined below:

Credits
NASX 105--Intro Native Am Studies ...................... 3
NASX 252D--Montana Indians .................................. 3
Cult, Hist, Current Issues ......................................... 3
NASX 476--Amer Ind Policy & Law .............................. 3
NASX Electives ......................................................... 12

Total: 21 credits

At least 9 credits must be in upper division courses, and at least 10 credits must be earned at Montana State University. Electives are to be selected in consultation with the minor advisor. NASX 290/490 (Undergraduate Research), NASX 492 (Individual Problems) and/or NASX 498 (Internship) may be included among the electives. No more than four (4) semester credits (equivalent quarter hours or combination of semester and quarter hours) of NASX 492 and/or NASX 290/490 and no more than four (4) semester credits of NASX 498 may be included in the minor program. Transfer credits or credits earned in related courses offered in other departments may be included in the student’s program, upon approval of NAS departmental certifying officer.

Any student wishing a minor in Native American Studies must file an “Application for a Non-teaching Minor” with the Registrar’s Office a minimum of two terms prior to graduation.

From “Core 2.0”

Graduates of Montana State University face an ever changing and increasingly complex world. An understanding of and sensitivity to other cultural perspectives prepares them to function in the global community and creates a campus climate that is conducive to academic growth for all students. Diversity courses address the study of identities (e.g., race, class, gender, sexual orientation, ability, etc.), societies, nations, or national languages and cultures.

Contact Information
Health Professions Advising
Montana State University
317 Leon Johnson Hall
Bozeman, MT 59717
hpa@montana.edu
Phone 406-994-1670
Fax 406-994-4398
Students in the minor will examine issues and theories of gender inequity and gender identity, and will engage in feminist analysis within their disciplines. Students find the minor a stimulating challenge to traditional assumptions in their academic programs. Because of its interdisciplinary nature, the minor is individually shaped in consultation with a Women’s and Gender Studies advisor. Students who declare a minor in Women’s and Gender Studies must complete 21 semester credits as outlined below. Contact the CLS Dean’s Office for additional information and view the Women’s and Gender Studies Minor site at www.montana.edu/lettersandscience/WGS/index.html.

**OPTION A - SENIOR CAPSTONE OPTION**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective Course Work</td>
<td>9</td>
</tr>
</tbody>
</table>

Select three of the following:

- ANTY 337 - Sex, Gender and Sexuality in Japan
- LIT 330 - Women & Literature
- LIT 431 - Studies in a Major Author/s (when applicable)
- HDLC 425 - Family Law and Public Policy
- HDLC 464 - Gender, Race, Class, and Family Diversity
- HSTR 408 - Gender in America
- HSTR 415 - Gender and Technology
- HSTR 434 - Gender in Latin America
- HSTA 408 - Gender in America
- HDHL 240 - Human Sexuality
- Class, and Family Diversity
- HDHL 249 - Human Sexuality
- HSTA 407 - Gender in US & Canadian West
- HSTA 408 - Gender in America
- HSTR 444 - Japanese Women’s History
- HSTR 451 - Gender in Latin America
- HSTR 452 - Gender in Asia
- HUM 204 - Gender & Sexuality
- WS 501 - Seminar in Women’s Studies
- Elective Course Work

Capstone senior project: 6

**OPTION B - COURSEWORK OPTION**

<table>
<thead>
<tr>
<th>Course Work</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective Course Work</td>
<td>15</td>
</tr>
</tbody>
</table>

Select five of the following:

- ANTY 337 - Sex, Gender and Sexuality in Japan
- LIT 330 - Women & Literature
- LIT 431 - Studies in a Major Author/s (when applicable)
- HDLC 425 - Family Law and Public Policy
- HDLC 464 - Gender, Race, Class, and Family Diversity
- HSTR 408 - Gender in America
- HSTR 415 - Gender and Technology
- HSTR 434 - Gender in Latin America
- HSTA 408 - Gender in America
- HDHL 240 - Human Sexuality
- Class, and Family Diversity
- HDHL 249 - Human Sexuality
- HSTA 407 - Gender in US & Canadian West
- HSTA 408 - Gender in America

**COLLEGE OF NURSING**

Helen I. Melland, Dean
A. Gretchen McNeely, Associate Dean for Undergraduate Programs
Donna A. Williams, Associate Dean for Research and Graduate Education

**Vision**

MSU College of Nursing will be internationally recognized for innovation, discovery, excellence and leadership in education, research and practice.

**Mission**

Our mission is to enhance the health of the people of Montana, our nation, and the global community by providing leadership for professional nursing through excellence in education, research, practice and service.

**Goals**

1. To inspire baccalaureate and graduate students, within a diverse, challenging, and engaging learning environment, to become leaders in the practice of professional nursing.
2. To create an interactive environment in which faculty and students discover, learn, and integrate knowledge into nursing practice.
3. To serve as leaders in nursing by generating, translating, and disseminating knowledge through research and scholarly activities.
4. To promote health and wellness through professional practice, collaboration, consultation, civic engagement, education, and leadership.
Philosophy

Introduction
We believe in excellence in nursing education through a teaching learning process that is the responsibility of both faculty and student. We promote the development of lifelong self-directed learning that fosters leadership in education, research, practice, and service. We believe in a learning environment that supports diversity of people and ideas. Our efforts are directed toward achieving higher levels of education for all nurses, and transforming healthcare in the United States and the world. We believe that nursing education is framed within the context of nursing’s metaparadigm: person, environment, health, and nursing.

Person
A person is any individual, family, group, community or population. Each person is unique and is entitled to treatment with dignity and respect.

Environment
Environment includes all factors influencing a person’s health perceptions, behaviors and responses. The human experience is contextually defined by the interrelationship of spiritual, cultural, developmental, physical, psycho-social, political, and economic subsystems. The appropriate arena for nursing action extends beyond the person and includes promotion of healthy environments through social action.

Health
Health is a state of physical, mental, social, and spiritual well-being defined by the person. It is not merely the absence of disease or disability. Health is multi-factorial and is influenced by many factors such as behaviors, environments, genetics, and resources. There are diverse cultural definitions of health. Health activities include those directed at maintenance, enhancement, prevention and promotion.

Nursing
Nursing is a discipline of science and art requiring synthesis of evidence based knowledge, professional skills, ethical values, and human caring. Nurses assist persons to achieve optimal health. Nurses generate a unique body of knowledge to meet the complex needs of persons in a variety of health care settings from rural to urban.

Nursing education
Nursing education focuses on the knowledge, skills, and attitudes needed by nurses to practice effectively within a complex and changing environment. It “intentionally fosters use of multiple fields of study, use of wide-ranging knowledge of science, cultures, and society; high level intellectual and practical skills; an active commitment to personal and social responsibility; demonstrated ability to apply learning to complex problems and challenges; and personal engagement as a responsible citizen in a global society” (Association of American Colleges and Universities, College Learning for the New Global Century, 2007, p. 4). The education of nursing students is based on professional, regulatory and organizational standards.

Programs
The undergraduate professional nursing program is approved by the Montana State Board of Nursing and is nationally accredited by the Commission on Collegiate Nursing Education (CCNE). The traditional program includes two years of lower division study and two years of upper division study. It is possible for a student to complete all of the required prerequisite coursework at institutions other than Montana State University. All transfer credits are carefully evaluated to ensure equivalent content when students transfer to MSU and the College of Nursing curriculum. While it is possible to complete the program in four years, this requires careful planning and uninterrupted progression through the curriculum. Delays in progression related to reduced credit loads, repeated coursework, securing upper division placement, or change of curriculum commonly result in the student taking longer than four years to complete the program. Lower division nursing courses may be completed on the Bozeman campus, or on the outreach campuses at specified times and with an additional distance access fee of $500 per course. All upper division coursework is taken at one of five upper division campus sites: Bozeman, Billings, Great Falls, Kalispell, and Missoula. Completing the entire nursing program in Bozeman is possible, but highly competitive due to limited upper division placements.

The College of Nursing at Montana State University offers an accelerated second degree option for students to earn a baccalaureate degree in nursing. This option is available only to students who already have earned a baccalaureate degree in a discipline other than nursing. Applications to the option will not be processed for individuals who do not have a degree in another discipline at the time they submit the application (by June 1 annually). Students are required to have completed the same pre-requisite courses as the traditional students EXCEPT for WRIT 101, CLS 101, and the art, humanities, and diversity Core 2.0 requirements (see required courses below). Once admitted to the nursing major, they complete the BSN degree in approximately 15 months, as opposed to the 29 months it takes the traditional student.

Undergraduate Program Objectives for Both Traditional and Accelerated Options
Graduates of the BSN program will be able to:

• Utilize a foundation of community-based nursing to provide client-centered health care.
• Synthesize theoretical and empirical knowledge from nursing, the sciences, the arts and the humanities to practice safe and effective professional nursing.
• Apply principles of critical thinking in professional decision making.
• Evaluate the applicability of research findings for evidence based nursing practice.
• Utilize evidence-based clinical judgments to assist clients with the promotion, maintenance and restoration of health; prevention of disease and death with dignity.
• Incorporate professional values of altruism, autonomy, human dignity, integrity and social justice and value-based behaviors into nursing practice.
• Employ legal and ethical principles in the practice of professional nursing.
• Assume responsibility for career development and participation in life-long learning.
• Utilize effective communication in professional relationships with clients in order to influence health and healing over time.
• Utilize progressive technology and information systems to support nursing practice and deliver client care.
• Collaborate with communities to design, implement, and evaluate population-based approaches to care.
• Provide culturally sensitive direct and indirect care for clients across a variety of settings.
• Participate as a member of the nursing profession.

Admission to the Pre-Nursing Major
Enrollment in the pre-nursing major is available for students admitted to Montana State University-Bozeman provided they have met the University admission requirements (are not admitted on probation or into pre-university studies) and, if transferring from another institution, have at least a 3.0 cumulative grade point average. Montana State University students in another curriculum may process a change of curriculum request into nursing provided their Montana State University-Bozeman cumulative GPA is 3.0 or better. Pre-nursing majors are assigned to advisors in the College of Nursing and encouraged to meet with their advisor at least once each semester.

Admission to the Nursing Major
Admission to the College of Nursing as a nursing major is achieved through a competitive application process. Acceptance into the nursing major (placement on a specific upper division campus site) is based on a combination of the student’s grades in the required prerequisite courses for the nursing major and the student’s ranked campus choices. Pre-nursing majors (at both Montana State University-Bozeman and transfer institutions) apply for admission to the nursing major during spring or fall one year before beginning upper division study (see Application for Nursing Major and Upper Division Placement). Admission to the nursing major permits students to be enrolled in sophomore, junior, and senior restricted entry nursing courses.

Progression through the Nursing Curriculum
Lower division courses must be completed prior to upper division courses. Nursing courses are generally offered every fall and spring semester. Some summer courses may be offered. Not all required non-nursing courses are offered every semester.
1. All required courses must be completed with a grade of “C” or better (C- grades are not acceptable).
2. Required courses may not be repeated more than once, regardless of when or where taken.
3. Effective Spring 2002, the College of Nursing considers a “W” grade on a transcript the same as C, D, or F grade. “W” grades indicate an unsuccessful attempt to achieve a grade of C or better in a course.
4. Prerequisite courses for any nursing course must be completed with a grade of “C” or better (C- grades are not acceptable) before enrolling in the nursing course for which the prerequisite course is required.
5. Restricted entry lower division nursing courses are first offered to students in the nursing major. Students in the pre-nursing major may be enrolled pending space availability and placement high (usually the top ten students) on the wait list.
6. A student’s MSU-Bozeman cumulative GPA must be at least 2.75 prior to beginning upper division study.
7. Unsatisfactory grades in required clinical nursing course(s) in two different semesters prohibit continuation in the nursing curriculum.
8. Exceptions to any requirements or readmission to the nursing major after removal, withdrawal or failure from the nursing curriculum in which there were documented extraordinary circumstances (e.g., death in family, etc) are dependent upon a successful appeal to the College of Nursing Scholastic Committee. Placement of students who have failed, have been removed, or have withdrawn from coursework is dependent upon space availability and may be in competition with other students.

Application for Upper Division Placement in the Traditional Bachelor of Science Degree in Nursing (BSN) Program
In order to ensure the quality of education, the number of students admitted to the nursing major and offered placement on one of the upper division campus sites each semester is regulated to provide the best utilization of financial, clinical, and faculty resources. The application procedure for admission to the nursing major has been developed in order to: 1) provide the most highly qualified students a place in upper division coursework (pending successful completion of required lower division courses), 2) achieve maximum utilization of limited resources, and 3) increase the supply of professional registered nurses.
1. Applications are submitted during two specified periods each year: January 1st for spring upper division placement and August 1st for fall upper division placement. These periods are publicly announced six weeks in advance on the College of Nursing Web site. The first opportunity for students to submit an application will be August 1st or following spring semester of their freshman year as pre-nursing students (or depending on when the applicant will be ready to begin upper division).
2. At least 5 of the 5 required natural science courses must be completed with a grade of “C” or better to apply to the nursing program. Those five courses are: BIOH 201, BIOH 211, BIOM 250, CHMY 121 and CHMY 123.
3. All required prerequisite courses must be completed with a grade of “C” or better (C- grades are not acceptable) and no more than 2 of the required prerequisite courses may be repeated 1 time to earn a grade of “C” or better. Those courses are: BIOH 201, BIOH 211, BIOM 250, CHMY 121, CHMY 123, CLS 101, HDCF 150, NUTR 221, PSYX 100, SOCI 101, STAT 216 and WRIT 101.
4. Students enrolled (or previously enrolled) at MSU-Bozeman, other units of the Montana University System, or other institutions of higher learning may apply for placement.
5. An application may be obtained from the College of Nursing Web site by November 15th for January 1st deadline or June 15th for August 1st deadline.

6. On the application form, students indicate the campus of their choice for upper division placement. Upper division placement is dependent upon the grade point average in required lower division courses. (Note: In semesters with excessive numbers of applicants, the grade point average in required lower division courses will most likely need to be considerably higher than 3.0 to be admitted into the nursing major through an upper division placement offer.)

7. Assignment to a specific campus is determined by the grade point average in required lower division courses and the student’s ranked campus choices.

8. When there are more students than places available for upper division courses for the time period cited in the application, students wishing to be considered for admission in later semesters must reapply.

9. A wait list of students with 2.75 or higher grade point averages in required lower division courses will be maintained in order to fill unexpected openings for placement at upper division campus sites. Students with grade point averages lower than 2.75 are not eligible to be placed.

10. Students need to carefully plan their course of study with their advisor in order to complete all required lower division courses prior to upper division placement. Students who have not completed required lower division courses forfeit their upper division placement.

11. A $200 deposit must accompany an application for upper division placement. This deposit will be applied toward fees for first semester junior nursing courses taught at upper division. (The $200 deposit will be forfeited unless students notify the Undergraduate Associate Dean’s office in writing at least a month in advance of placement that they will not be ready to use their placement.)

Application for Accelerated Bachelor of Science Option

Applicants will be selected for the BSN accelerated option based on a calculated grade point average of 3.0 or higher in required prerequisite courses for the accelerated option; evidence of completion of a bachelor’s degree in a discipline other than nursing from a regionally accredited institution with at least a cum GPA of 3.0 or higher; signature on affidavit for “Abilities Required for Success in the BSN degree program”; letter of interest in the accelerated option (e.g., “What motivates me to pursue a career in nursing by enrolling in the BSN accelerated option”); two professional references (as opposed to personal references) on the reference forms provided; and an interview with faculty. Prospective students who would be eligible to begin the BSN accelerated option will have completed all 10 required prerequisite courses with a grade of “C” or better by the end of the spring semester prior to the mid-May start date. They are required to file an application packet including: official transcripts from every college/university attended; two completed reference forms; and the letter of interest before the June 1 deadline.

Application Deadline: June 1 for students who desire to begin the accelerated option in the following summer. No applications will be processed if received after the deadline or are submitted without all of the required components of the application packet.

Transfer Students

The above criteria and procedures for progression through the nursing curriculum apply to transfer students as well as MSU-Bozeman students. Students do not have to be enrolled at Montana State University-Bozeman to submit an application for admission to the nursing major and upper division placement. However, students who have been enrolled as nursing students at any other institution (have nursing courses on their transcripts) must provide a letter from their Dean or Director regarding their status at the time they left the previous nursing program prior to enrolling in any nursing courses at MSU.

In order to facilitate transcript evaluation, all transfer students must provide a copy of the original transcript(s) from all institutions of higher education they have attended to the College of Nursing Undergraduate Student Services Coordinator. Out-of-state transfer students must also provide a catalog or course descriptions from their former institution(s), if possible, to facilitate the course evaluation process.

Standards of the Nursing Profession

The primary aim of the College of Nursing is the education of persons for professional nursing practice. Graduates of the program are recommended for admission to the national licensing examination for registered nurses (NCLEX-RN). As educators, faculty members have the responsibility to provide students with appropriate educational opportunities and with reasonable guidance and supervision. As professional practitioners, faculty members also have the obligation to patients to ensure that nursing students who care for them are competent to do so without lowering standards. This responsibility also extends to the health agency administrator, to all licensed personnel providing care within that agency, and, in fact, to the nursing students themselves—all in the interest of safeguarding patient safety.

The 2001 ANA Code of Ethics for Nurses, Provision 3.4 states, “Nursing is responsible and accountable for assuring that only those individuals demonstrating the knowledge, skill, practice experiences, commitments, and integrity essential to professional practice are allowed to enter into and continue to practice within the profession. Nurse educators have a responsibility to ensure that basic competencies are achieved and to promote a commitment to professional practice prior to entry of an individual into practice.”

The student, upon admission to the nursing curriculum, assumes the obligations of performing and behaving according to the standards set by the College of Nursing. Mere satisfactory academic performance does not in and of itself constitute the basis for progression through the nursing major.

In keeping with the standards of the profession, the College of Nursing expects nursing students to demonstrate...
ethica behavior. Expected behaviors include but are not limited to abiding by guidelines for academic integrity; respecting the privacy rights of patients, students, and faculty members; placing priority on the health, safety, and welfare of patients; and avoiding prejudicial or discriminatory behavior in relationships with patients, students, and faculty members.

Some examples of misconduct are sharing confidential information, fabrication or falsification of information in the classroom or clinical area, any form of cheating including plagiarism, and aiding or facilitating dishonesty or unethical behavior in others. Breaches in professional standards will result in disciplinary action, including the possibility of removal from the nursing curriculum. Students are responsible for reviewing the following publications which are available on each College of Nursing campus:

- Conduct Guidelines and Grievance Procedures for Students (MSU-Bozeman)
- Essentials of Baccalaureate Education for Professional Nursing Practice (AACN, 2008)
- Code of Ethics for Nurses (ANA, 2001)

Where there is failure on the part of the student to meet reasonable standards of performance or behavior or when, in the judgment of the faculty member, reasonable supervision is inadequate to ensure patient safety, the faculty member has the authority to remove a student from the clinical setting (see College of Nursing Policy C-6).

The criteria which will be considered in denying the student access to patients are: demonstrated emotional instability, indifference or insensitivity to patient safety and comfort, lack of professional judgment, disregard for professional ethics and standards, any health condition which makes it impossible for the student to carry out her/his work without jeopardizing patient safety and comfort, or any other condition or circumstance which constitutes an unreasonable risk to the safety and well being of the patient. A nursing student may be referred to appropriate resources for assistance with problems which are non-academic in nature but which might impair the student’s effectiveness as a professional nurse.

Whenever, pursuant to the foregoing, denial of student access to a clinical agency will result in the student being dismissed from the nursing program, the student shall be fully informed of the decision and its consequences and shall be afforded the right to appeal. Appeals are submitted to the College of Nursing Scholastic Committee (See Policy A-8).

Unique Requirements:

Transportation: Access to an automobile is necessary, particularly for clinical work in the community including home visits, as well as in rural areas. Public transportation is not adequate in the cities with upper division campuses. Students are responsible for providing their own transportation.

Varied Schedules: Students are expected to participate in clinical experiences in a variety of community and rural agencies and at variously scheduled times. Therefore, students must make arrangements to accommodate an irregular academic schedule that may include evening and weekend hours.

Expenses: Nursing students have additional expenses beyond those normally required in other curricula. They include, but are not limited to uniforms, immunizations, background checks, and current professional healthcare provider CPR certification (including infants, children and adults) before beginning clinical coursework. Special purchases include, but are not limited to stethoscope and other clinical equipment. In addition, there is a $200 placement deposit (see section on Application Procedure for Placement in Nursing Curriculum) and a nursing program fee for each semester which covers such costs as pre-NCLEX testing fees, specialized equipment and distance delivery support when enrolled in clinical nursing courses. Students wishing to take lower division nursing courses on upper division campuses other than Bozeman pay an extra $500 per course.

Abilities and Skills: College of Nursing Policy A-19 Abilities required for success in the BSN degree program, requires that students read the policy and complete a form indicating their agreement that they have the ability to perform certain skills and tasks to successfully complete the BSN degree program.

Computer Access and Skills

Access to and skills in using computer hardware and software: Because many of the courses in the nursing program are Web-based or Web-enhanced, students must have access to and skills in using a computer and a printer. They must also have a reliable connection to the Internet with a current Internet browser.

Word processing skills are required. Microsoft Word is recommended.

Questions about these requirements can be directed to the College of Nursing, Computer Specialist, at (406) 994-6846.

Curriculum in Nursing

REQUIRED LOWER DIVISION COURSES*

The following courses must be completed prior to progression to upper division courses. Students are advised to consult appropriate sections of the MSU bulletin regarding required prerequisites for these courses.

CORE 2.0: Foundation Courses

Credits

University Seminar (US) 3
CLS 101US-College Seminar or CLS 201 .......... 3
College Writing (W) WRIT 101W-College Writing I ................. 3
Quantitative Reasoning (Q) STAT 216Q-Introduction to Statistics ............... 3
Contemporary Issues in Science (CS) NUTR 221CS-Basic Human Nutrition ............ 3

Expenses:

Computer and Printer:

Students must have access to and skills in using a computer and a printer. They must also have a reliable connection to the Internet with a current Internet browser.

Research and Creative Experience (R)

NRSG 387R-Research in Health Care ............ 3

Other Required Courses

BIOM 201-Human Anatomy & Physiology I w/Lab .................................... 5
BIO13-Human Anatomy & Physiology II w/Lab .................................... 4
CHMY 123-Introduction to Organic & Biochemistry w/Lab ............................... 4
CHMY 250-Microbiology for Health Sciences ............... 3

The following core courses must be completed prior to graduation:

ARTS (A)
Course of your choice

DIVERSITY (D)
Course of your choice

HUMANITIES (H)
Course of your choice

Unique Requirements:

Transportation: Access to an automobile is necessary, particularly for clinical work in the community including home visits, as well as in rural areas. Public transportation is not adequate in the cities with upper division campuses. Students are responsible for providing their own transportation.

Varied Schedules: Students are expected to participate in clinical experiences in a variety of community and rural agencies and at variously scheduled times. Therefore, students must make arrangements to accommodate an irregular academic schedule that may include evening and weekend hours.

Expenses: Nursing students have additional expenses beyond those normally required in other curricula. They include, but are not limited to uniforms, immunizations, background checks, and current professional healthcare provider CPR certification (including infants, children and adults) before beginning clinical coursework. Special purchases include, but are not limited to stethoscope and other clinical equipment. In addition, there is a $200 placement deposit (see section on Application Procedure for Placement in Nursing Curriculum) and a nursing program fee for each semester which covers such costs as pre-NCLEX testing fees, specialized equipment and distance delivery support when enrolled in clinical nursing courses. Students wishing to take lower division nursing courses on upper division campuses other than Bozeman pay an extra $500 per course.

Abilities and Skills: College of Nursing Policy A-19 Abilities required for success in the BSN degree program, requires that students read the policy and complete a form indicating their agreement that they have the ability to perform certain skills and tasks to successfully complete the BSN degree program.

Computer Access and Skills

Access to and skills in using computer hardware and software: Because many of the courses in the nursing program are Web-based or Web-enhanced, students must have access to and skills in using a computer and a printer. They must also have a reliable connection to the Internet with a current Internet browser.

Word processing skills are required. Microsoft Word is recommended.

Questions about these requirements can be directed to the College of Nursing, Computer Specialist, at (406) 994-6846.

Curriculum in Nursing

REQUIRED LOWER DIVISION COURSES*

The following courses must be completed prior to progression to upper division courses. Students are advised to consult appropriate sections of the MSU bulletin regarding required prerequisites for these courses.

CORE 2.0: Foundation Courses

Credits

University Seminar (US) 3
CLS 101US-College Seminar or CLS 201 .......... 3
College Writing (W) WRIT 101W-College Writing I ................. 3
Quantitative Reasoning (Q) STAT 216Q-Introduction to Statistics ............... 3
Contemporary Issues in Science (CS) NUTR 221CS-Basic Human Nutrition ............ 3

Expenses:

Computer and Printer:

Students must have access to and skills in using a computer and a printer. They must also have a reliable connection to the Internet with a current Internet browser.

Research and Creative Experience (R)

NRSG 387R-Research in Health Care ............ 3

Other Required Courses

BIOM 201-Human Anatomy & Physiology I w/Lab .................................... 5
BIO13-Human Anatomy & Physiology II w/Lab .................................... 4
CHMY 123-Introduction to Organic & Biochemistry w/Lab ............................... 4
CHMY 250-Microbiology for Health Sciences ............... 3

The following core courses must be completed prior to graduation:

ARTS (A)
Course of your choice

DIVERSITY (D)
Course of your choice

HUMANITIES (H)
Course of your choice
PROGRAMS OF INSTRUCTION — ACADEMIC ENRICHMENT

Lower Division Nursing - the following courses must be completed prior to progression to upper division courses:
NRSG 115-Nursing as a Profession..............2
NRSG 250-Foundations of Ethical Nursing.......2
NRSG 245-Foundations for Planning and Providing Clinical Nursing Care.........................4
NRSG 218-Health Assessment Across the Lifespan4
NRSG 258-Principles of Pathophysiology.........15

Required Upper Division Courses
The University requires that 42 of these credits be in courses numbered 300 and above.

Junior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRSG 356-Nursing Pharmacotherapeutics</td>
<td>3</td>
</tr>
<tr>
<td>NRSG 314-Psychosocial Nursing Concepts</td>
<td>3</td>
</tr>
<tr>
<td>NRSG 346-Nursing Care of Childbearing Family</td>
<td>5</td>
</tr>
<tr>
<td>NRSG 348-Nursing Care of Children and Families</td>
<td>5</td>
</tr>
<tr>
<td>NRSG 352-Acute &amp; Chronic Illness</td>
<td>5</td>
</tr>
<tr>
<td>NRSG 377-Introduction to Community-Based Nursing</td>
<td>2</td>
</tr>
<tr>
<td>NRSG 387R-Research in Health Care</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>26</td>
</tr>
</tbody>
</table>

Senior Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRSG 418-Issues in Health Policy &amp; Health Care Economics</td>
<td>2</td>
</tr>
<tr>
<td>NRSG 457-Psychiatric Nursing</td>
<td>3</td>
</tr>
<tr>
<td>NRSG 444-Care Management</td>
<td>3</td>
</tr>
<tr>
<td>NRSG 454-Urgent and Palliative Care</td>
<td>3</td>
</tr>
<tr>
<td>NRSG 477-Population Based Nursing Care in the Community</td>
<td>6</td>
</tr>
<tr>
<td>NRSG 487C-Nursing Leadership &amp; Management Development</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>29</td>
</tr>
</tbody>
</table>

*NOTE: Required nursing curriculum courses must be completed with a grade of C or better and no more than one repeat of a course is permitted regardless of when or where taken. The College of Nursing does not accept C- as a passing grade in required courses.

Elective credits as required to meet the minimum of 120 required credits for graduation.

ACADEMIC ENRICHMENT

Montana State University offers several important academic programs to students, regardless of major. Undergraduate research and creative activity, interdisciplinary study, thematic research seminars, and major/career exploration are just a few more of the many opportunities available. Special programs for academic enrichment include the University Honors Program, the Undergraduate Scholars Program, and University Studies.

Undergraduate Scholars Program

The Undergraduate Scholars Program (USP) continues in its campus leadership role of facilitating and supporting undergraduate research in collaboration with MSU faculty. This program has grown substantially since its inception and now supports approximately 200 students annually by awarding grants and/or providing academic credit to students who undertake an investigative or creative project in collaboration with a faculty mentor. For details about the application process, current scholars, funding opportunities, and deadline requirements, contact the Undergraduate Scholars Program Office by calling 406-994-3561, sending email to usp@montana.edu or checking www.montana.edu/usp.

The mission of the Undergraduate Scholars Program (USP) is to encourage, facilitate, and support undergraduate research in collaboration with faculty. “Research” in the USP context is interpreted as any scholarly or creative activity ranging from traditional scientific experimentation to the creation of new artistic works.

MSU Leadership Fellows Program

The MSU Leadership Fellows Program, administered by University College in cooperation with the MSU Leadership Institute, challenges students to discover their true potential by developing ethical and critical thinking skills as they relate to leadership. Students completing the requirements will receive certificates of completion and have “Leadership Fellow” noted on their academic transcripts.

Academic Advising Center

At MSU, advising is a dynamic process by which advisors serve not only as sources of information but also as mentors. Advising is an integral part of teaching; it provides the opportunity to encourage students to engage in a systematic, strategic planning process, and to take responsibility for their personal and professional development.

The Academic Advising Center (AAC) is available to all undergraduate students. The AAC provides professional advising to help students 1) explore their academic strengths and interests, 2) choose a degree program suited to their personal and career goals, and 3) achieve success in their academic pursuits. The AAC also provides services to faculty and staff across campus to support and complement the advising specific to their departments and programs.

Services for Students

The AAC offers students advising that addresses their individual needs and interests. The AAC’s advising services focuses on students who are in any of the following situations:

- Exploring major options.
- Transitioning between majors.
- Completing CORE 2.0 requirements.
- Transferring from other institutions.
- Interested in majors not offered at MSU.
- Experiencing limited access to departmental advising.
- Provisionally admitted to MSU.
- Seeking (or have been denied) admission to competitive degree programs.
- Interested in programs for academic enhancement (National Student Exchange, Undergraduate Scholars, etc.).
- Enrolled in University Studies.

Services for Faculty and Staff

AAC services in support of advising across campus consist of the following:

- Informational materials about the AAC for use in referring students
- General academic advising for all freshmen and sophomores, regardless of declared major
- Information and updates on curricula, CORE 2.0, advising scheduling, and deadlines
- Professional development and training for advisors

National Student Exchange

University Studies coordinates the National Student Exchange (NSE), a consortium of over 190 state-supported colleges and universities offering students the opportunity to study for up to one year at a university in another part of the United States.

By bringing together students from different areas of the country, NSE encourages participants to broaden their academic, social, and cultural awareness. Through a straightforward
admissions process, students are able to enroll at a host institution with the same financial benefits enjoyed by in-state residents. Credits and grades are recorded at MSU-Bozeman as a part of the student’s regular transcript.

University Honors Program

University life serves many ends, but an essential component of higher education is to prepare students to better understand themselves, others and the increasingly complex world around them. Undergraduate education in particular has the goal of helping students become, in time, their own best teachers. At Montana State University, the University Honors Program addresses this goal by providing academically motivated students with unique opportunities to undertake interdisciplinary course work and undergraduate research leading to a university honors degree. Such studies, in addition to courses within their chosen discipline, provide extraordinary preparation for professional and technical careers, or graduate and advanced studies.

Entering students have the opportunity to undertake innovative studies during their freshman year. Texts and Critics: Knowledge and Imagination are both semester-long seminars that address fundamental issues in the humanities, social sciences, natural sciences, and the fine arts through critical reading and analysis of seminal texts which serve as a foundation for advanced studies in major disciplinary fields. Instructed by faculty representing every college at the University, Texts and Critics earns University Seminar and Inquiry-Humanities core credits. In addition, the Honors Program annually offers a variety of upper-division interdisciplinary seminars. These seminars employ Socratic methodology through which faculty and students engage in critical discussion of issues spanning a diverse range of academic interests. Such engagement also fosters the development of analytic and critical communication skills. These seminars, typically taught by the most respected and stimulating professors on campus, carry university core credit in each of the major discipline categories.

Special Honors sections of departmental courses in Chemistry, Physics, Math, Music, Biology, Sociology, Spanish, Psychology, Earth Science, Engineering, Computer Science, and Economics are also offered. Limited enrollment in seminars and classes permits lively discussion and interactive study among faculty and students.

Great Expeditions is an annual Honors course that involves two-weeks of international travel following a semester of study pertinent to the expedition theme. After travel is completed, students present a public symposium highlighting the results of their journey.

Mentoring Gifted Children, a service-learning course, enables students to work with gifted and talented students in public schools.

Additional opportunities for independent study are available through Honors contracts, which are offered primarily at the upper-division level. Contracts often prepare students to accept the special challenges and benefits of an Honors thesis. Upper-class students may also qualify to undertake supervised tutorial study.

Honors students have been remarkably successful in earning other scholarships for further study, both in the United States and abroad. Special attention is given to preparation for professional and graduate schools. Extracurricular, outdoor, and social activities are an important feature of the daily life of the program.

Enrollment in University Honors Program courses is restricted to students officially admitted to the program. Admission is normally limited to students in the upper ten percent of their high school class and who have high ACT or SAT scores, or to those already enrolled in the University who have demonstrated academic achievement and personal initiative.

To maintain good standing in the program, students must demonstrate significant and continuing progress toward their specific degree in addition to satisfying the particular standards of Honors course work or research. Graduation in the program requires the accumulation of a specific number of Honors credits as determined by the category of Honors degree the student pursues. All such credits may be acquired through successful completion of Honors courses; a minimum 3.5 overall grade-point average; and one-year (or its equivalent) of a foreign language. To graduate with Highest Distinction, a thesis and a minimum cumulative 3.7 GPA are required. Students with energy, self-reliance, and imagination should discuss their interest with the Director. For details about admission and graduation requirements, contact the University Honors Program Office in Quad F by calling 406-994-1110, sending e-mail to honors@montana.edu or checking the Honors web site at www.montana.edu/honors.

MSU Leadership Fellows Certificate

University College

The MSU Leadership Fellows Certificate, www.montana.edu/lf, administered by University College, challenges students to discover their true potential by developing ethical and critical thinking skills, leadership skills and leadership effectiveness. It is intended that these students will become effective agents of positive change in society.

16 total credits of leadership course work are required for the certificate. Four credits are the foundational and capstone courses: Leadership Foundations (UC 202, 3 credits) and Leadership Capstone (UC 502, 1 credit). Within both courses, students will practice leadership skills by engaging in 10 hours of community/campus service and participating in MSU leadership events.

The remaining 12 credits are fulfilled from the approved list of Leadership Electives. Students may take a maximum of 6 credits in their Major/Minor toward the Leadership Electives. This list of electives does change, so please ensure you have the most recent version by emailing Carmen McSpadden, Director of the MSU Leadership Fellows Certificate Program cmcspadden@montana.edu. Additional courses may be petitioned for approval by the program committee.

Students interested in pursuing the MSU Leadership Fellows Certificate will be asked to declare their interest prior to or at the start of UC 202. This declaration can be made by emailing cmcspadden@montana.edu. During UC 502, students will complete an applica-
tion to receive their certificate upon graduation. Also, MSU Leadership Fellow will be noted on their academic transcripts and may also be listed on the student’s resume.

Other requirements:
1. Earn a grade of “C” (2.0) or better in each course used to satisfy the certificate
2. No “credit by exam” may be used.

Credits

UC 202-Leadership Foundations ..........3
UC 302-Leadership Capstone ..............1
Leadership Electives ......................12
  16

GALLATIN COLLEGE PROGRAMS

Bob Hietala, Dean
Janet Heiss Arms, Director of Developmental Education
Ryan Haskins, Director of Workforce Development

Programs Available:
• AA Associate of Arts degree
• AAS in Aviation
• AAS in Design Drafting Technology
• AAS in Interior Design
• CAS in Bookkeeping
• CAS in Medical Assistant
• CAS in Welding Technology

Associate of Arts Degree
Gallatin College Programs

The Associate of Arts (A.A.) provides a foundation of general education studies with a concentration of coursework in the arts, humanities, and social sciences. Focusing on increasing content knowledge and skills while increasing a student’s professional potential, the A.A. focuses on transferability to a Bachelor degree program.

To receive the A.A. degree, the following requirements must be completed:
• Total of 60 credits of 100 and 200 level courses to include:
  - Montana State University Core 2.0 (30 credit hours);
  - Coursework in the Arts, Humanities, or Social Sciences (9 credit hours);
  - General Education Electives (21 credit hours);
  - A final cumulative grade point average of at least 2.0 in all graded courses;
  - A grade of C- or better in all courses taken toward the A.A. degree.

Courses taken to fulfill one specific requirement may not be used to fulfill another requirement.

Many students need preliminary math and/or writing courses before enrolling in the program requirements. These courses may increase the total number of program credits. Students should review their math and English placement with an academic advisor before planning out their full program schedules.

Outcomes
Graduates are prepared to:
• Demonstrate the Montana State University Core 2.0 outcomes;
• Think critically about concepts and applications from multiple disciplines;
• Transfer and apply knowledge and skills learned into a Bachelor degree program

I. MONTANA STATE UNIVERSITY CORE 2.0 – 30 CREDIT HOURS

Foundation Courses
Seminar (US) (1 course) credit
COLS 101US First Year Seminar...............3
Diversity (D) (1 course)
NASX 210D American Indians in Montana...3
AMST 101D Intro, to American Studies ......3
Writing (W) (1 course)
WRIT 101W College Writing....................3
Quantitative Reasoning (Q) (1 course)
M 145Q Math for Liberal Arts ..................3
M 121Q College Algebra .........................4
Contemporary Issues In Science (CS) (1 course)
NUTR 214CS Basic Human Nutrition..........3

Ways Of Knowing: Inquiry and Research & Creative Experience
Arts (IA or RA) (1 course)
ART 145RA Web Design.......................3
DANC 230RA Dance Appreciation...............3
Humanities (III or RH) (1 course)
LIT 1101H Introduction to Literature ........3
HSTA 101H American History I ...............3
Social Science (IS or RS) (1 course)
SOCI 101IS Intro. to Sociology ..............3
NATURAL SCIENCE (IN or RN) (1 course)
CHMY 121IN Intro. to General Chemistry ....4
BIOB 100IN Organism Function ..............3
Research And Creative Experience
(R, RA, RH, RN, or RS) (1 course)
Courses designated RA, RH, RN, or RS satisfy both the Inquiry and Research and Creative Experience requirements in that discipline.
ART 145RA Web Design.......................3

II. CONCENTRATION IN ARTS, HUMANITIES, OR SOCIAL SCIENCES—9 CREDITS

In addition to the MSU Core 2.0 requirements, students must complete 9 credits of coursework numbered 100 or above in one concentration area: arts, humanities, or social sciences.

III. ELECTIVES—21 CREDITS

Students may choose coursework numbered 100 or above from any discipline area to complete the required 21 credits of electives.

TOTAL PROGRAM CREDITS—60

Associate Of Science Degree
Gallatin College Program

The Associate of Science (A.S.) degree provides a foundation of general education studies with a concentration of coursework in mathematics and natural sciences. Focusing on increasing content knowledge and skills while increasing a student’s professional potential, the A.S. focuses on transferability to a Bachelor degree program.

To receive the A.S. degree, the following requirements must be completed:
• Total of 60 credits of 100 and 200 level courses to include:
  - Montana State University Core 2.0 (30 credit hours);
  - Coursework in Mathematics and Natural Sciences (9 credit hours);
  - General Education Electives (21 credit hours);
  - A final cumulative grade point average of at least 2.0 in all graded courses;
  - A grade of C- or better in all courses taken toward the A.S. degree.

Courses taken to fulfill one specific requirement may not be used to fulfill another requirement.

Many students need preliminary math and/or writing courses before enrolling in the program requirements. These courses may increase the total number of program credits. Students should review their math and English placement with an academic advisor before planning out their full program schedules.

Outcomes
Graduates are prepared to:
• Demonstrate the Montana State University Core 2.0 outcomes;

...
• Think critically about concepts and applications from multiple disciplines;
• Transfer and apply knowledge and skills learned into a Bachelor degree program

I. MONTANA STATE UNIVERSITY CORE 2.0 – 30 CREDIT HOURS

Foundation Courses
Seminar (US) (1 Course)
COLS 101US First Year Seminar ...............3
Diversity (D) (1 Course)
NAX 201D American Indians In Montana ...3
AMST 101D Intro. To American Studies ....3
Writing (W) (1 Course)
Write 101W College Writing .................3
Quantitative Reasoning (Q) (1 Course)
M 145Q Math For Liberal Arts ..............3
M 121Q College Algebra ....................4
Contemporary Issues In Science (CS) (1 Course)
NUTR 221CS Basic Human Nutrition ....3

Ways Of Knowing: Inquiry And Research & Creative Experience
Arts (LA Or RA) (1 Course)
ART 145Ra Web Design .....................3
DANC 230a Dance Appreciation ..........3
Humanities (HI Or RI) (1 Course)
LIT 110H Introduction To Literature .....3
HSTA 101H American History ..............3
Social Science (IS Or RS) (1 Course)
SOCI 101H Intro. To Sociology ..........3
Natural Science (IN Or RN) (1 Course)
CHMY 121Hn Intro. To General Chemistry 4
BIOC 100Hn Organism Function ........3
Research And Creative Experience
(R, RA, RH, RN, Or Rs) (1 Course)
Courses designated RA, RH, RN, OR RS satisfy both the Inquiry and Research and Creative Experience requirements in that discipline.
Art 145Ra Web Design .....................3

II. COURSEWORK IN MATHEMATICS OR NATURAL SCIENCE—9 CREDITS
In addition to the MSU Core 2.0 requirements, students must complete 9 credits of coursework numbered 100 or above in one concentration area: mathematics or natural science.

III. ELECTIVES—21 CREDITS
Students may choose coursework numbered 100 or above from any discipline area to complete the required 21 credits of electives.

TOTAL PROGRAM CREDITS 60

Certificate of General Studies Degree

The Certificate of General Studies degree provides a foundation of general education. Focusing on increasing content knowledge and skills while increasing a student’s professional potential, the Certificate of General Studies focuses on transferability to a Bachelor degree program.

To receive the Certificate of General Studies, the following requirements must be completed:
• Total of 30 credits of 100 and 200 level courses to include:
  • Montana State University Core 2.0 (30 credit hours);
  • Coursework:
    • Seminar (1 course)
    • Diversity (1 course)
    • Writing (1 course)
    • Quantitative Reasoning (1 course)
    • Contemporary Issues in Science (1 course)
    • Arts (1 course)
    • Humanities (1 course)
    • Social Science (1 course)
    • Natural Science (1 course)
    • Research and Creative Experience (1 course)

Many students need preliminary math and/or writing courses before enrolling in the program requirements. These courses may increase the total number of program credits. Students should review their math and English placement with an academic advisor before planning out their full program schedules.

Outcomes
Graduates are prepared to:
• Demonstrate the Montana State University Core 2.0 outcomes;
• Think critically about concepts and applications from multiple disciplines;
• Transfer and apply knowledge and skills learned into a Bachelor degree program

I. MONTANA STATE UNIVERSITY CORE 2.0 – 30 CREDIT HOURS

Foundation Courses
Seminar (US) (1 Course)
COLS 101US First Year Seminar ...............3
Diversity (D) (1 Course)
NAX 201D American Indians In Montana ...3
AMST 101D Intro. To American Studies ....3
Writing (W) (1 Course)
Write 101W College Writing .................3
Quantitative Reasoning (Q) (1 Course)
M 145Q Math For Liberal Arts ..............3
M 121Q College Algebra ....................4
Contemporary Issues In Science (CS) (1 Course)
NUTR 221CS Basic Human Nutrition ....3

Ways Of Knowing: Inquiry And Research & Creative Experience
Arts (LA Or RA) (1 Course)
ART 145Ra Web Design .....................3
DANC 230a Dance Appreciation ..........3
Humanities (HI Or RI) (1 Course)
LIT 110H Introduction To Literature .....3
HSTA 101H American History ..............3
Social Science (IS Or RS) (1 Course)
SOCI 101H Intro. To Sociology ..........3
Natural Science (IN Or RN) (1 Course)
CHMY 121Hn Intro. To General Chemistry 4
BIOC 100Hn Organism Function ........3
Research And Creative Experience (R, RA, RH, RN, Or RS) (1 Course)
Courses designated RA, RH, RN, OR RS satisfy both the Inquiry and Research and Creative Experience requirements in that discipline.
ART 145Ra Web Design .....................3

TOTAL PROGRAM CREDITS 30

Bookkeeping:
Certificate of Applied Science Degree (CAS)
Gallatin College Program

Career Description
MSU-Gallatin College Programs is offering a one-year Bookkeeping Certificate of Applied Science (CAS) that will prepare students for entry level accounting-related positions that are utilized by a variety of businesses. The Bookkeeping program is designed to provide students with the knowledge and skills necessary for employment in an accounting profession. Using the language of business, Bookkeepers assemble and analyze, process, and communicate essential information about financial operations. Upon completion of the Bookkeeping degree, students will be prepared to work in public, private, or governmental agencies as accounting clerks, accounting technicians, bookkeepers, accounting support personnel, or payroll assistants.

Job Opportunities
The Bookkeeping program has been designed to provide the necessary skills and experience for entry level accounting workers that every business hires. These employees manage accounts payable, accounts receivable, general bookkeeping, payroll processing, and a number of other functions in businesses of all sizes across the community. In many instances these workers function as office managers in small businesses.
## Plan of Study

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 101 Accounting Procedures I</td>
<td>4</td>
</tr>
<tr>
<td>ACTG 180 Payroll Accounting</td>
<td>4</td>
</tr>
<tr>
<td>CAPP 156 MS Excel in the Workplace</td>
<td>5</td>
</tr>
<tr>
<td>CAPP 120 Intro to Computers in the Workplace</td>
<td>2</td>
</tr>
<tr>
<td>COMM 120 Interpersonal Skills</td>
<td>3</td>
</tr>
<tr>
<td>WRIT 104 Communication Skills</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL PROGRAM CREDITS</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring Semester</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 102 Accounting Procedures II</td>
<td>4</td>
</tr>
<tr>
<td>ACTG 205 Computerized Accounting</td>
<td>5</td>
</tr>
<tr>
<td>ACTG 122 Accounting and Business Decisions</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 125 QuickBooks</td>
<td>3</td>
</tr>
<tr>
<td>TASK Business Office Procedures</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL PROGRAM CREDITS</td>
<td>17</td>
</tr>
</tbody>
</table>

| Subtotal | 33 |

*indicates prerequisites needed

## Aviation

**Gallatin College Program**

### Associate Of Applied Science Degree

Students completing the AAS in Aviation will have all credentials required to pursue a career as a professional pilot. The program offers in-depth training in all stages of pilot certification: Private Pilot, Instrument Rating, and Commercial Pilot. The program also offers classroom training in Aircraft Systems, Advanced Navigation Systems, Aviation Safety, Flight Instructor/ Aircraft Theory, and Aviation Regulations and Professional Conduct.

Outcomes: graduates are prepared to:

- Apply knowledge in aviation to adapt to emerging aviation trends.
- Conduct themselves professionally and ethically.
- Understand and analyze the role of aviation safety and human factors to the aviation industry.
- Describe meteorology as it relates to aviation.
- Independently fly and safely operate airplanes for which they are rated.
- Demonstrate an understanding and the appropriate application of aeronautical principles, design characteristics, and operational limitations, for a variety of aircraft as it relates to the student’s career goals.
- Communicate effectively using both written and verbal skills.
- Demonstrate proficiency in math computation for aviation and modern society.
- Demonstrate effective skills in the use of computers and aviation related technology.

Job opportunities range from high-profile occupations as pilots for national carriers to less well-known, but in-demand work as pilots for cargo services, air taxis, media aircraft, and corporate jets. Students who combine the AAS with a Bachelor’s degree will be especially competitive in the entry level job market.

Completion of the AAS in Aviation requires that students contract with a flight school recommended by the Aviation GCP Advisory Council to complete the flight training leading to their Private Pilot, Commercial pilot, and Instrument licenses. Upon submission of these certificates the student will receive credit for the following courses:

| AVFT 121--Private Pilot - Fundamentals | 3 |
| AVFT 122--Private Pilot Flight (45 flight hours) | 2 |
| AVFT 123--Private Pilot - Basic Air Navigation | 3 |
| AVFT 130--Meteorology for Aviation | 3 |
| AVFT 141--Advanced Navigation Systems | 3 |
| AVFT 142--Instrument Flight (40 hours) | 2 |
| AVFT 150--Aviation Operations | 3 |
| AVFT 151--Aviation Safety | 3 |
| AVFT 252--Commercial Flight (125 flight hours) | 4 |
| AVFT 260--Aviation Safety, Flight Program | 3 |
| COMM 120--Intro to Computers | 3 |
| COMM 135--Interpersonal Communication | 3 |
| WRIT 101--College Writing | 3 |
| General Ed Core | 3 |

### Estimated Costs

Please go to http://www.montana.edu/wwwwat/programs/aviat.html for detailed cost estimates for the Aviation program.

| Multi-Engine Commercial Flight Program | $45,380.00 |
| Single-Engine Commercial Flight Program | $38,167.00 |

| AVFT 122--Private Pilot Flight (50 flight hours) | 2 |
| AVFT 142--Instrument Flight (75 flight hours) | 2 |
| AVFT 252--Commercial Flight (125 flight hours) | 4 |

### Estimated Costs

Many students need preliminary math, writing, and biology courses before enrolling in the program requirements. These courses may increase the total number of program credits. Students should review their math and English placement before planning out their full program schedules.

+ A grade of “C” or above is required for graduation * Indicates prerequisites needed **Placement in course(s) is determined by placement assessment

## Design Drafting

**Gallatin College Program**

### Associate Of Applied Science Degree

In the Design Drafting Technology program students acquire the skills necessary for entry-level drafting jobs in the design/drafting industry.

Outcomes – Graduates are prepared to:

- Create Construction Documents and Shop Drawings for Architects, Engineers and Manufacturers.
- Visualize and measure 3D objects and buildings and recreate them in computer-aided design software (CAD).
• Render objects and buildings for presentation using current software.
• Create a complete set of residential plans using CAD software.
• Understand building and manufacturing materials, processes and codes.
• Create thematic maps from GIS data.
• Estimate construction material quantities and building costs.

**Fall Semester Credits**

(CAPP 120**+ Intro to Computers) 3

CSTN 101-Blueprint Reading, Codes and Estimating 4

DDSN 113-Technical Drafting 2

DDSN 118-CAD 1 4

COMM 135-Interpersonal Communication 3

CSTN 175-Architectural Construction and Materials 3

Subtotal 15 (18)

**Spring Semester Credits**

DDSN 104+ Descriptive Geometry 4

DDSN 112-Professional Practices 3

DDSN 186-CAD 2 3

DRFT 140-Professional Practices 3

WRT 101-College Writing L 3

M Business Math or Math requirement 3

Subtotal 16

**Summer Semester Credits**

DDSN 298-Internship (if qualified) 4

**Fall Semester Credits**

DDSN 116-Revit I 3

DDSN 260-Architectural Drafting 3

DDSN 275-Computer rendering: Sketchup & Photoshop 3

MFTG 205-Manufacturing Processes 3

M Business Math elective 3

Subtotal 15

**Spring Semester Credits**

ITS 280**-Computer Maintenance and repair 4

DDSN 299**+Capstone: Portfolio and Presentation (if not already taken) 3

Take at least 2 of the following electives:

- DDSN 255-Machine Drafting/Inventor 3
- DDSN 244+Mapping (Yopo/GIS/Civil) 3
- DDSN 260+Revit II 3
- DDSN 270**-Presentation & Animation: 3DS

Total Program Credits 63-72

Many students need preliminary math, writing, and biology courses before enrolling in the program requirements. These courses may increase the total number of program credits. Students should review their math and English placement before planning out their full program schedules.

* A grade of “C” or above is required for graduation. * Indicates prerequisites needed. Placement in course(s) is determined by placement assessment.

**Associate of Applied Science Degree**

**Interior Design**

**Gallatin College Programs**

The Interior Design program has been developed to prepare students with a wide variety of skills and competencies for entry into various areas of the design field, ranging from residential to commercial design. GCP is a National Kitchen and Bath Association (NKBA) Supported School and is an NKBA Accredited School. Students in the program may choose to complete 70 additional internship hours to earn a certification in the National Kitchen and Bath Association.

Outcomes – graduates are prepared:

• Understand the theory and history of design and apply design principles and elements to their projects.
• Communicate in the language of interior design using listening, verbal, and written skills to interact with clients.
• Communicate graphically according to current architectural and NKBA standards using both hand-drafting and AutoCAD techniques.
• Demonstrate research abilities and critical thinking in space planning, selection of finish materials, and application of codes for residential and commercial projects.
• Increase their body of knowledge in a wide variety of areas including construction and finish materials, color and lighting technologies, NKBA guide-lines, residential and commercial codes, sustainability, and professional practice.
• Employ creative skills to create presentations of their projects using hand- and AutoCAD drafting and rendering and professional sample boards and finish schedules.

Students are strongly advised to enter the program with good keyboarding skills.

**Fall Semester Credits**

IDSN 101-Introduction to Design 3

IDSN 130-Interior Design Graphics 3

IDSN 110-History of Interior Design I: Ancient - 1900 3

IDSN 122-Textiles & Interior Finishes 3

CAPP 120+Intro to Computers 3

Subtotal 15

**Spring Semester Credits**

IDSN 131+Presentation Drawing 3

IDSN 111+History of Interior Design II: 1900 - Contemporary 3

IDSN 135+Fundamentals of Space Planning 3

IDSN 225+Light,Color,Lighting Systems 3

IDSN 230+Interior Architectural CAD 3

Subtotal 16

**Summer Semester Credits**

COMM 135-Interpersonal Communication 3

Subtotal 6-8

**Fall Semester Credits**

IDSN 240+Studio I Residential 4

IDSN 260+Kitchen and Bath I 4

WRIT 110-College Writing L 3

ETTC 250+Architectural Construction and Materials 3

Electives 3

Subtotal 16

**Total Program Credits** 69-71

Many students need preliminary math, writing, and biology courses before enrolling in the program requirements. These courses may increase the total number of program credits. Students should review their math and English placement before planning out their full program schedules.

Medical Assistant:

**Certificate of Applied Science Degree**

**Career Description**

Medical Assistants are specially trained to work in ambulatory medical settings such as physicians’ offices, clinics, and surgical centers. Medical Assistants function as members of the health care delivery team and perform administrative duties and basic clinical procedures. This program will prepare...
students for the workforce in response to the identified need of our growing health care provider community.

The structure of the program allows students to complete the required 36-credits by attending Fall, Spring, and Summer semesters, making this a program that students can expeditiously complete and enter the workforce in the quickest time possible. A 2010 survey conducted by the American Association of Medical Assistants (AAMA) found that 62% of medical assisting practitioners hold a Certificate of Applied Science (CAS), while 11% only received on-the-job-training.

Job Opportunities
The Montana Department of Labor and Industry projects growth statewide in most medical trades sectors from 2006-2016. Specifically, it projects growth for Medical Assistants across the state from 760 positions in 2006, to 990 positions by 2016; a growth of 30%. The U.S. Bureau of Labor Statistics Occupational Employment Statistics Survey also projects a 34% growth in Medical Assistant positions at the national level.

The Montana Department of Labor and Industry reports the average wages in the local health care industry is $716.00 per week.

Plan of Study

**Fall Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHMS 144 Medical Terminology</td>
<td>3</td>
</tr>
<tr>
<td>AH 140 Pharmacology</td>
<td>2</td>
</tr>
<tr>
<td>AHMA 201 Medical Assistant Clinical</td>
<td>3</td>
</tr>
<tr>
<td>AHMA 203 Medical Assistant Clinical Procedures II</td>
<td>3</td>
</tr>
<tr>
<td>AHMS 109 Math Applications for Allied Health Professions</td>
<td>3</td>
</tr>
<tr>
<td>AHMS 158 Legal and Regulatory Aspects of Healthcare</td>
<td>2</td>
</tr>
<tr>
<td>BIOH 112 Human Form and Function I</td>
<td>3</td>
</tr>
<tr>
<td>COMM 120 Interpersonal Skills in the Workplace</td>
<td>1</td>
</tr>
<tr>
<td>WRIT 104 Workplace Communications</td>
<td>2</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

**Spring Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHMA 203 Medical Assistant Clinical Procedures II</td>
<td>3</td>
</tr>
<tr>
<td>AHMS 109 Math Applications for Allied Health Professions</td>
<td>2</td>
</tr>
<tr>
<td>AHMS 158 Legal and Regulatory Aspects of Healthcare</td>
<td>2</td>
</tr>
<tr>
<td>BIOH 112 Human Form and Function II</td>
<td>3</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

**Summer Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHMA 203 Medical Assistant Externship</td>
<td>7</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>

**TOTAL PROGRAM CREDITS** 36

**Welding Technology**

**Gallatin College Program**

**Certificate of Applied Science Degree**

Upon completion of this program, students are eligible to apply to be listed in the AWS National Registry of Welders.

Outcomes – graduates are prepared to:

- Meet safety requirements.
- Produce welds in all positions that meet industry standards using the following process(es): Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), and Flux Cored Arc Welding (FCAW).
- Make cuts that meet industry standards in the following process(es): Plasma Arc Cutting (PAC), and Air Carbon Arc Cutting (CAC-C).
- Understand the use of measuring instruments and their purpose.
- Understand power sources and current types.
- Interpret welding blueprints and weld symbols.
- Utilize basic welding metallurgy.
- Utilize oral and written communication skills in the workplace, including terminology in the welding industry.

**Fall Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 120 Interpersonal Skills in the Workplace</td>
<td>1+</td>
</tr>
<tr>
<td>WRIT 104 Communication Skills in the Workplace</td>
<td>2</td>
</tr>
<tr>
<td>WLDG 110 Welding Theory I</td>
<td>2</td>
</tr>
<tr>
<td>WLDG 111 Welding Theory I Practical</td>
<td>3+</td>
</tr>
<tr>
<td>WLDG 121 Welding Theory II Practical</td>
<td>3+</td>
</tr>
<tr>
<td>WLDG 117 Welding Theory II Practical</td>
<td>3+</td>
</tr>
<tr>
<td>WLDG 205 Applied Metallurgy</td>
<td>2+</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

**Spring Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>WLDG 104 Technical Mathematics</td>
<td>3+</td>
</tr>
<tr>
<td>WLDG 120 Welding Theory II</td>
<td>1+</td>
</tr>
<tr>
<td>WLDG 122 Welding Theory III Practical</td>
<td>1+</td>
</tr>
<tr>
<td>WLDG 145 Fabrication Basics (or)</td>
<td>3+</td>
</tr>
<tr>
<td>WLDG 106 Welding Fabrication Methods</td>
<td>3+</td>
</tr>
<tr>
<td>WLDG 130 Introduction to Structural Welding</td>
<td>3+</td>
</tr>
<tr>
<td>WLDG 185 Welding Qualification Prep</td>
<td>2+</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

**Total Program Credits** 31

Many students need preliminary math, writing, and biology courses before enrolling in the program requirements. These courses may increase the total number of program credits. Students should review their math and English placement before planning out their full program schedules.
Welcome from the Dean of The Graduate School

Carl A. Fox, Ph.D.

Dean for The Graduate School

The Graduate School welcomes you to Montana State University. We are very excited that you have chosen MSU and we invite you to learn more about our highly regarded graduate programs, the exciting and challenging opportunities afforded graduate students, and the wonderful community of Bozeman, Montana.

As a top 100 research university, Montana State continues to honor its land grant heritage by providing outstanding educational experiences to students from throughout the state, the nation, and the world. Our faculty are highly recognized for their world-class research, teaching and outreach. The opportunities to work in state-of-the-art facilities on cutting-edge research projects are virtually endless at MSU. We encourage you to visit our departments and their websites for more information about these opportunities.

The community of Bozeman offers a truly unique and quality life-style to complement the rich intellectual environment at MSU. The area is home to a large and growing number of high-technology companies, many of which have originated from the research programs at MSU. Opportunities abound for graduate students seeking employment and research opportunities in these high technology companies.
The Graduate School staff and I welcome your questions and comments about the graduate programs at MSU. Please contact us at gradstudy@montana.edu so that we can assist you in making your graduate experience at Montana State University the most rewarding time in your career development.

Graduate Programs

The master's and doctoral degree offerings at MSU are listed below, along with each academic department's website address. To find out more information about the programs you are interested in, we invite you to talk with someone from the department. For detailed information about the graduate study opportunities that await you at MSU, visit The Graduate School web pages at www.montana.edu/wwwdg.

Department of Agricultural Economics and Economics
- Master of Science in Applied Economics

Division of Agriculture Education
www.ag.montana.edu/ageducation/
- Master of Science in Agricultural Education – administered through Division of Agricultural Education/Agricultural Operations Technology

Department of Animal and Range Sciences
http://animalrange.montana.edu/degrees-grad.htm
- Master of Science in Animal and Range Sciences
- Master of Science in Entomology
- Doctor of Philosophy in Animal and Range Sciences

School of Architecture
Master of Architecture

School of Art
http://www.montana.edu/wwwart/haveflash.html
- Master of Fine Arts

College of Business
http://www.montana.edu/cob/Accounting/mpac.html
- Master of Professional Accountancy

Department of Cell Biology and Neuroscience
http://www.montana.edu/cbn/
- Master of Science in Biological Sciences
- Master of Science in Neuroscience
- Doctor of Philosophy in Biological Sciences
- Doctor of Philosophy in Neuroscience

Department of Chemical and Biological Engineering
http://www.chbe.montana.edu/
- Master of Science in Chemical Engineering
- Master of Science in Environmental Engineering (interdisciplinary)
- Doctor of Philosophy in Engineering (option in Chemical Engineering)

Department of Chemistry and Biochemistry
http://www.chemistry.montana.edu/graduate/
- Master of Science in Biochemistry
- Master of Science in Chemistry
- Doctor of Philosophy in Biochemistry
- Doctor of Philosophy in Chemistry

Department of Civil Engineering
http://www.coe.montana.edu/layer_one_docs/graduate_programs.html
- Master of Science in Civil Engineering
- Master of Science in Environmental Engineering (interdisciplinary)
- Master of Construction Engineering Management
- Doctor of Philosophy in Engineering (options in Applied Mechanics, Civil Engineering, and Environmental Engineering)

Department of Computer Science
http://www.cs.montana.edu/
- Master of Science in Computer Science
- Doctor of Philosophy in Computer Science

Department of Earth Sciences
http://www.montana.edu/wwwes/programs/graduate.htm
- Master of Science in Earth Sciences
- Doctor of Philosophy in Earth Sciences

Department of Ecology
http://www.montana.edu/ecology/current_pages/gradinfo.html
- Master of Science in Biological Sciences
- Master of Science in Ecological and Environmental Statistics
- Master of Science in Fish and Wildlife Management
- Doctor of Philosophy in Biological Sciences
- Doctor of Philosophy in Fish and Wildlife Biology
- Doctor of Philosophy in Ecology and Environmental Sciences

Department of Education
www.montana.edu/wwweduc/
- Master of Education (options in Adult and Higher Education, Curriculum and Instruction, and Education Administration)
- Education Specialist (options in Adult and Higher Education, Curriculum and Instruction, and Education Administration)
- Doctor of Education (options in Adult and Higher Education, Curriculum and Instruction, and Education Administration)

Department of Electrical and Computer Engineering
http://www.coe.montana.edu/ee/research/eegrad1.htm
- Master of Science in Electrical Engineering
- Doctor of Philosophy in Engineering (option in Electrical & Computer)
Department of English
http://www1.english.montana.edu/index.php?s=graduate
• Master of Arts in English

Graduate School Programs
http://www.montana.edu/msse
• Master of Science in Science Education (interdisciplinary)
• IGERT: Geobiological Systems

Department of Health and Human Development
• Master of Education in School Counseling
• Master of Science in Health and Human Development (options in Counseling, Exercise and Nutrition Sciences, Family and Consumer Sciences, Family Financial Planning, and Health Promotion and Education)

Department of History and Philosophy
http://www.montana.edu/wwwhi/
• Master of Arts in History
• Doctor of Philosophy in History

Department of Land Resources and Environmental Sciences
http://landresources.montana.edu/
• Master of Science in Entomology (coordinating department)
• Master of Science in Land Rehabilitation
• Master of Science in Land Resources and Environmental Sciences
• Doctor of Philosophy in Ecology and Environmental Sciences

Department of Mathematical Sciences
http://www.M.montana.edu/grad
• Master of Science in Mathematics (options in Mathematics and Mathematics Education)
• Master of Science in Statistics
• Master of Science in Ecological and Environmental Statistics
• Doctor of Philosophy in Mathematics
• Doctor of Philosophy in Statistics

Department of Mechanical and Industrial Engineering
http://www.coe.montana.edu/mie/
• Master of Science in Mechanical Engineering
• Master of Science in Industrial and Management Engineering
• Doctor of Philosophy in Engineering (options in Industrial Engineering and Mechanical Engineering)

Photography and Film
http://naturefilm.montana.edu/
• Master of Fine Arts in Science and Natural History Filmmaking

Department of Microbiology
http://www.montana.edu/wwwmb/
• Master of Science in Microbiology
• Doctor of Philosophy in Microbiology

Department of Native American Studies
http://www.montana.edu/wwwnas/index.php?page=graduate
• Master of Arts in Native American Studies

College of Nursing
http://www.montana.edu/wwwnu/academic/mn.htm
• Master of Nursing (options in Family Nurse Practitioner or Clinical Nurse Specialist)
• Post-Master’s Family Nurse Practitioner Certificate

Department of Physics
www.physics.montana.edu
• Master of Science in Physics
• Doctor of Philosophy in Physics

Department of Plant Sciences
http://plantsciences.montana.edu/studentGrad.htm
• Master of Science in Entomology (interdisciplinary)
• Master of Science in Plant Pathology
• Master of Science in Plant Science
• Doctor of Philosophy in Plant Science

Department of Political Science
http://www.montana.edu/wwwpo/mpaprogram/
• Master of Public Administration

Department of Psychology
http://www.montana.edu/wwwpy/
• Master of Science in Psychological Science

Immunology & Infectious Diseases
http://vmb.montana.edu/graduate/
• Master of Science in Veterinary Molecular Biology
• Doctor of Philosophy in Veterinary Molecular Biology

Interdisciplinary Programs
http://montana.edu/gradstudies/
• Master of Science in Ecological and Environmental Statistics
• Master of Science in Science Education
• Molecular Biosciences Program
• Doctor of Philosophy in Ecology and Environmental Sciences

Graduate Web Pages
The Graduate School web pages include an online application and instructions on how to apply for a graduate degree program. Information about research opportunities at MSU, graduate assistantships, fellowships, scholarships, degree requirements, and other policies and procedures can be found online. For further information, contact the department you are interested in, or visit the GS web pages at www.montana.edu/wwwdg. We look forward to discussing Montana State University’s graduate education possibilities with you.
COLLEGE OF AGRICULTURE

Jeff Jacobsen, Dean and Director
Nora Smith, Associate Dean and Assistant Director

Graduate Programs Available:

- M.S. in Agricultural Education
- M.S. in Animal and Range Sciences
- M.S. in Applied Economics
- M.S. in Entomology
- M.S. in Immunology and Infectious Diseases
- M.S. in Land Rehabilitation
- M.S. in Land Resources and Environmental Sciences
- M.S. in Plant Pathology
- M.S. in Plant Science
- Ph.D. in Animal and Range Sciences
- Ph.D. in Ecology and Environmental Sciences (Please see Interdisciplinary Programs)
- Ph.D. in Immunology and Infectious Diseases
- Ph.D. in Plant Science

AGRICULTURAL EDUCATION PROGRAM

Division of Agricultural Education

230 Linfield Hall
PO Box 172830
Bozeman, MT 59717-2830
Ph: 406-994-2132
Fax: 406-994-6696

ag.montana.edu/ageducation/aged@montana.edu

Professors

- Martin Frick; program planning and evaluation, curriculum, power mechanics, cooperative business education; international agriculture (406) 994-5773; mfrick@montana.edu
- Carl Igo; research methods, teacher education, leadership development; (406) 994-3693; cigo@montana.edu
- Shannon Arnold; extension education, professional development, international agricultural education, leadership education; (406) 994-6663; shannon.arnold@montana.edu

Assistant Professor

- Dennis Cash – Forage Production
- John Paterson – Ruminant Nutrition
- Rodney Kott – Extension Sheep
- Gregory Johnson – Veterinary Entomology
- Patrick Hatfield – Range Sheep Nutrition and Management
- Janice Bowman – Beef Cattle Nutrition
- Dr. Glenn Duff

Degree Offered

- M.S. in Agricultural Education

The graduate program in agricultural education at Montana State University is designed to prepare graduates for entry into or advancement in formal and non-formal teaching careers. This program also provides development of professional leadership skills for other careers in agriculture, government service, extension, or adult education.

The master’s degree program in agricultural education, with its various options, provides a program that can be tailored to meet each student’s career goals. In addition to the wide variety of professional courses in agricultural education, offerings are also available from all academic departments in the College of Agriculture, including agricultural economics, animal and range sciences, land resources and environmental sciences, plant sciences, and plant pathology, and veterinary molecular biology. Specialization areas such as adult education, educational administration, career education, and curriculum coordination are also available through cooperation with the College of Education, Health and Human Development. Plan A (thesis), Plan B (project or professional paper), and an online option are available.

Admission

To gain admission to the graduate program, contact the Agricultural Education Program, 230 Linfield Hall, Montana State University Bozeman, MT 59717, and request an application form. Completion of the Division’s pre-application is strongly recommended prior to submitting formal application to the Graduate School.

Program Requirements

- The program offers considerable flexibility to students to help them meet their professional and personal objectives. Plan A requires a thesis. A minimum of 30 credit hours must be completed, 20 credits of course work and 10 credits of thesis preparation.
- Students who choose Plan B are required to complete a professional paper based on a current research issue related to the student’s emphasis area. Students will take a minimum of 30 hours of course work (no thesis credits). The final selection of the student’s research activity will be the student’s responsibility in collaboration with the advisor and the graduate committee.
- The requirements for students in the on-line program are similar to those for students following the Plan B program. Taking a minimum of 6 credits per semester, students will take a minimum of 30 semester hours of graduate coursework. Their coursework must include: Research Methods (AGED 506), Program Planning and Evaluation (AGED 507), and International Extension Systems (AGED 562). A final written exam and a professional paper are required in lieu of a thesis.

Required Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AgEd 506 Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>AgEd 507 Program Planning and Evaluation</td>
<td>3</td>
</tr>
<tr>
<td>AgEd 562 International Extension Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

Financial Assistance

Teaching and research assistantships may be available for qualified students. Interested students should apply to: Department of Agricultural Education, 230 Linfield Hall MSU, Bozeman, MT 59717. See the Graduate Assistantship section of the Graduate School web site for detailed information on appointment criteria.

DEPARTMENT OF ANIMAL AND RANGE SCIENCES

P.O. Box 172900
Bozeman, MT 59717-2900
Tel: (406) 994-5582

Department Head

- Dr. Glenn Duff

Professors

- James Berardinelli – Reproductive Physiology
- Janice Bowman – Beef Cattle Nutrition
- Patrick Hatfield – Range Sheep Nutrition and Management
- Gregory Johnson – Veterinary Entomology
- Rodney Kott – Extension Sheep Specialist
- John Paterson – Ruminant Nutrition
- Dennis Cash – Forage Production Management
Admission

• Ph.D. in Animal and Range Sciences
  Areas of emphasis include nutrition, breeding and genetics, physiology, production systems, and meat science/muscle growth. Research problems may involve beef cattle, sheep and biochemical or other properties of agricultural products. Supporting course work may be taken from Animal Science, Range Science, Biology, Wildlife Management, Biochemistry, Statistics, Plant Sciences, Land Resources and Environmental Sciences, and Economics.

Research laboratories are available in the department and specialized equipment is also available through cooperation with other departments. The department conducts cooperative research with the U.S. Livestock and Range Research Station at Miles City, Montana, and the U.S. Sheep Experiment Station at Dubois, Idaho. Facilities for the maintenance of beef cattle and sheep are available at the Red Bluff Research Ranch, 30 miles west of Bozeman, the Fort Ellis Research Center, near Bozeman, and the Northern Agricultural Research Center at Havre. The main station has facilities for sheep, horses and beef cattle (a cattle feedlot and nutrition laboratory). A wool laboratory is located on campus.

Range Science Emphasis

Research and training opportunities in the Range Science programs are diverse, and students with a wide variety of backgrounds, goals, and educational needs are accepted. Major areas of study are range ecology, habitat management, watershed management, grazing management, monitoring, riparian ecosystems, measurements, and plant-animal (livestock and wildlife) interactions. A graduate degree in range science prepares for careers in rangeland management, wildlife management, habitat management, natural resource conservation and restoration, research, land-use planning, and consultation. Research facilities include the Red Bluff Research Ranch, several research centers of the Montana Agricultural Experiment Station, U.S. Livestock and Range Research Station at Miles City, Montana, and the U.S. Sheep Experiment Station at Dubois, Idaho. Cooperative projects with ranchers and federal and state agencies are also conducted. Supporting courses at the graduate level include botany, wildlife biology and management, soils, animal science, earth science, plant science, statistics and biochemistry.

Biology Emphasis

Graduate students in the Biology emphasis receive training directed toward the basic biological functions as they relate to animal production, meat science/meat food safety or entomology. Research projects may involve beef cattle, sheep and biochemical or other properties of agricultural products. Supporting course work may be taken from Animal Science, Range Science, Biology, Wildlife Management, Biochemistry, Statistics and Plant Sciences.

Interdisciplinary M.S.
Degree in Land Rehabilitation

Animal and Range Sciences participates with the interdisciplinary M.S. Program in Land Rehabilitation. The program offers advanced study in rehabilitation of disturbed lands. Site revegetation, soil remediation, riparian zone restoration, stream channel restoration, investigation of impacted geologic resources and remediation of contaminated sites are included in areas of study. Emphasis is placed on developing a broad understanding of soil, plant, and hydrologic processes. Students may focus in a subject area of direct importance to land rehabilitation, such as plant ecology, soil sciences, hydrology, geology, geography, biology, or range science.

The M.S. degree in Land Rehabilitation is offered through each of the following departments: Animal and Range Sciences; Biology; Civil (Bio-resource) Engineering; Earth Sciences, and Land Resources and Environmental Sciences. Please refer to the College of Agriculture, where a more detailed program description can be found.

Interested students should contact Graduate Programs Secretary, Department of Land Resources and Environmental Sciences, 334 Leon Johnson Hall, 994-7060, lresinfo@montana.edu.
Proficiency Requirements for a M.S. in Animal & Range Sciences

1. At least one upper level (400 or 500) course in statistics.
3. Students must declare either the Animal Science, Range Science or Biology Emphasis:
   a. Course requirements for students in the Animal Science Emphasis:
      - At least two courses from the Graduate Animal Science block (must be 500 level course)
   b. Course requirements for students in the Range Science Emphasis:
      - At least two courses from the Graduate Range Science block (must be 500 level course)
   c. Course requirements for students in the Biology Emphasis:
      - At least two biology-related 500-level courses in their area of emphasis

AND

- At least one course from the Graduate Animal Science block or Range Science block
- NOTE: students emphasizing meat science in the Biology Emphasis can substitute BCHM 441–Biochemistry of Macromolecules for one of the two 500-level courses.

Graduate Animal Science Block credits

ARNR 520 Nutrient Metabolism in Domestic Animals ........................................5
ARNR 521 Advanced Ruminant Nutrition .........................................................3
ARNR 525 Advanced Physiology of Reproduction .............................................3
ARNR 524 Advanced Animal Breeding ..............................................................3
ARNR 525 Muscle and Growth Biology ...............................................................3

Graduate Range Science Block credits

ARNR 541 Range Ecophysiology .................................................................3
ARNR 545 Riparian Processes and Function ...................................................3
ARNR 544 Advanced Grazing Management & Ecology ...............................3

Students must meet the Proficiency Requirements for their emphasis area (see Proficiencies below).

Proficiency Requirements for Animal Science Emphasis

By the time a student completes a M.S. or Ph.D. in Animal & Range Sciences (Animal Science Emphasis), he/she must have successfully completed undergraduate or graduate coursework in three of the four areas listed below. Examples of MSU courses that fulfill these requirements are given.

Students who have successfully completed an equivalent course may apply that course toward the proficiency requirements, subject to the approval of the student’s Graduate Committee. Undergraduate courses in these categories are not intended to comprise a substantial portion of a student’s graduate curriculum. These courses should be taken in addition to, not in lieu of, other courses in a graduate program. While some courses may apply to Requirements for the M.S. in Animal & Range Sciences and Proficiency Requirements, the student’s Graduate Committee must not allow the need to meet Proficiency Requirements detract from a student completing a rigorous graduate degree program.

- Breeding/Genetics
  (ANSC 522 – Principles of Animal Breeding/Genetics or BIOL 301 – Principles of Genetics)
- Physiology/Reproduction
  (ANSC 521 – Physiology of Reproduction)
- Nutrition
  (ANSC 520 – Animal Nutrition)
- Production/Management
  (ANSC 434 – Beef Cattle Management)

Proficiency Requirements for Range Science Emphasis

By the time a student finishes the M.S. degree in Animal & Range Sciences (Range Science Emphasis), he/she must have successfully completed a minimum of 15 credit hours in the biological sciences with at least 9 credit hours in upper division course work which may include: biological sciences, chemistry, microbiology, food science, entomology, and ecology. Examples of MSU courses that fulfill these requirements are given. Students who have successfully completed an equivalent course may apply that course toward the proficiency requirements, subject to the approval of the student’s Graduate Committee. Undergraduate courses in these categories are not intended to comprise a substantial portion of a student’s graduate curriculum. These courses should be taken in addition to, not in lieu of, other courses in a graduate program. While some courses may apply to Requirements for the M.S. in Animal & Range Sciences and Proficiency Requirements, the student’s Graduate Committee must not allow the need to meet Proficiency Requirements detract from a student completing a rigorous graduate degree program.

- Grazing Management
  (NRSM 353 – Grazing Ecology and Management)
- Plant Ecology
- Plant Identification
  (NRSM 350 – Vegetation of Western Or BIOL 434 – Agrostology)
- Plant Physiology
  (PSPP 450 – Plant Physiology Or ARNR 541 – Range Ecophysiology)
- Vegetation Measurements
  (NRSM 453 - Habitat Inventory and Analysis)

Proficiency Requirements for Biological Science Emphasis

By the time a student finishes the M.S. degree in Animal & Range Sciences (Biological Science Emphasis), he/she must have successfully completed a minimum of 15 credit hours in the biological sciences with at least 9 credit hours in upper division course work which may include: biological sciences, chemistry, microbiology, food science, entomology, and ecology. Examples of MSU courses that fulfill these requirements are given. Students who have successfully completed an equivalent course may apply that course toward the proficiency requirements, subject to the approval of the student’s Graduate Committee. Undergraduate courses in these categories are not intended to comprise a substantial portion of a student’s graduate curriculum. These courses should be taken in addition to, not in lieu of, other courses in a graduate program. While some courses may apply to Requirements for the M.S. in Animal & Range Sciences and Proficiency Requirements, the student’s Graduate Committee must not allow the need to meet Proficiency Requirements detract from a student completing a rigorous graduate degree program.

- Biology
  (BIOL 213, 214, 215 – Introductory Biology)
- Ecology
  (BIOL 303 – Principles of Ecology; BIOL 405 – Behavioral & Evolutionary Ecology)
• **Chemistry**  
(CHMY 151, 143 – College/Honors Chemistry I; CHMY 211 - Elements of Organic Chemistry; CHMY 311 –Analytical Chem-Quant Analysis; CHMY 311, 312 – Organic Chemistry)

• **Biochemistry**  
(BCHM 340 – General Biochemistry)

• **Entomology**  
(BIOL 204IN – Insect Biology)

• **Food Science / Meat Science**  
(Introductory Food Science or upper division food science or food safety course)

**Requirements for Ph.D. in Animal & Range Sciences**

PhD students in Animal and Range Sciences will be required to take 3 credits of ARNR 507 Research Methods. All PhD programs must comply with The Graduate School, including 60 credits hours (18 which must be dissertation credits) above the B.S. degree. Beyond this there are no specific minimum course requirements for the PhD program. Specific requirements are to be decided by the student’s graduate committee.

**DEPARTMENT OF AGRICULTURAL ECONOMICS AND ECONOMICS**

Montana State University  
P.O. Box 172920  
Bozeman, MT 59717-2920  

www.montana.edu/econ/agecon@montana.edu

Tel: (406) 994-3701  
Fax: (406) 994-4838  
Location: 306 Linfield Hall

**Department Head**  
Dr. Wendy Stock

**Professors**

• J.A. Atwood; production economics, agricultural finance.
• G.W. Brester; agricultural marketing.
• M.A. Goetting; personal and family finance, estate planning, financial planning.
• G. Haynes; small business finance, agricultural policy.

• R.R. Rucker; resource economics, agricultural policy, applied microeconomics.
• V.H. Smith; macroeconomics, agricultural policy analysis, international trade, applied microeconomics.
• W.A. Stock; labor economics, econometrics.
• M.J. Watts; production economics, farm management, agricultural finance.

**Associate Professors**

• C. Stoddard; labor economics, public finance, economics of education organization.

**Assistant Professors**

• D.M. Anderson; applied microeconomics, health economics, risky behavior and crime.
• A. Bekkerman; agricultural marketing, econometrics.
• E. Belasco; agricultural marketing, applied microeconometrics, health economics.
• T. Fitzgerald; natural resource & environmental economics, energy economics.
• G. Gilpin; econometrics, economics of education, macroeconomics.
• D.A. Griffith; farm management, computer assisted decisions.
• J. Pearcy; industrial organization, applied microeconomics, applied econometrics, environmental and energy economics.
• C. Urban; public economics, political economy, applied microeconomics.

**Degree Offered**

• M.S. in Applied Economics

**Program Requirements**

A core of economic theory and quantitative methods courses (or equivalent) is required. Students are required to maintain a 3.0 grade point average overall in their core courses and the courses in their graduate program. Failure to meet these requirements, as well as receipt of more than one grade less than a “B-” in the core courses will be grounds for termination. The core includes:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNS 502</td>
<td>Microeconomic Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 503</td>
<td>Advanced Microeconomic Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 504</td>
<td>Macroeconomic Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECNS 505</td>
<td>Econometrics I</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

**Admission**

To receive full consideration for assistantship awards for Fall Semester, applications should be received by January 15. Late applications will be considered as space and funding are available. With the application, students must submit General Graduate Record Examination (GRE) scores, official transcripts of all degree coursework, and three letters of recommendation. Foreign students must also include scores from (1) the Test of English as a Foreign Language (TOEFL) with a score of 550 or higher and (2) the Test of Spoken English (TSE/SPEAK) with a score of 50 or higher. To ensure timely consideration, submit all requested materials directly to the Department, as directed in the application. To apply online use the following link: http://www.applyweb.com/apply/mstug/menu.html

Core courses are taught at a level that requires entering students to have successfully completed courses in intermediate microeconomic theory, intermediate macroeconomic theory, calculus, matrix theory, and statistics. Students who have not completed the prerequisite material, but with apparent potential for graduate study, may be admitted to the program on a provisional basis. Coursework required to make up deficiencies will be in addition to graduate coursework. A two-week math review course is offered each year for all graduate students prior to Fall Semester.
In addition to theory and quantitative methods core courses, students will successfully complete ECNS 569 (Research Methodology). Supplementary coursework and research may focus on agricultural economics, natural resource economics, or general applied economics. Through continued discussions with the advisor and other faculty, students will select additional courses and either a thesis topic (Plan A) or research paper topic (Plan B) to complete a program of study consistent with their interests.

Students may choose to study special problems on an individual basis. Students desiring “Individual Problem” credit as either ECNS 570, AGEC 570, ECNS 580, or AGEC 580 should consult with a faculty member and agree upon a plan of study before the beginning of the semester in which the credits are to be undertaken. The College of Graduate Studies must approve all such plans.

Students are required to include a research paper in the program as maximum of 3 credits for Option A or 6 credits for Option B.

Under Plan A, required minimums are: 20 semester credits (including the core courses of graduate coursework), and 10 semester credits of thesis. For those who have satisfied coursework prerequisites, the required degree coursework should be completed in two semesters. The thesis must be acceptable to the student’s graduate committee and to the College of Graduate Studies, and it must demonstrate independent and original research.

Under Plan B, a thesis is not required. This option includes at least 30 semester credits of graduate coursework. Students who select Option B are required to include a research paper (ECNS 575; maximum of 4 credits in a semester and a maximum of 6 credits for the program) as part of their program. For those who have satisfied coursework prerequisites, the required degree coursework (other than the research paper) should be completed in two semesters. The paper must be original, of professional quality (meet style and format requirements set forth in the College of Graduate Studies’ Guide for Preparation of Thesis and Professional Papers), be acceptable to the student’s graduate committee, and receive final approval by the Department Head.

Two examinations complete degree requirements. Each student is required to pass a Microeconomics Theory Core Exam — a written exam administered by the Department’s Graduate Affairs Committee. The exam is offered early spring semester, and may be offered one additional time each year; it will consist of questions covering the fundamental concepts of microeconomic theory and their application. Results of the Core Exam will be reported to the Dean of the College of Graduate Studies as constituting the comprehensive examination.

In addition to the Core Exam, each student is required to pass an oral examination in defense of their thesis (Option A) or research paper (Option B). The oral examination is administered by the student’s graduate committee and is open to all members of the faculty. Students are expected to present a typed draft, in final form, of the thesis or research paper to each member of their graduate committee at least seven days prior to the scheduled date of their examination. The examination for Option A students should not be scheduled until the student’s thesis committee agrees that the thesis is essentially in a form acceptable to the University Library (that is, copies of the typed draft should be readable and have a table of contents, list of tables and figures, chapter titles, section headings, bibliography, and consecutively numbered pages). The examination for Option B students should not be scheduled until the student’s thesis committee agrees that the thesis is essentially in a form acceptable to the University Library (that is, copies of the typed draft should be readable and have a table of contents, list of tables and figures, chapter titles, section headings, bibliography, and consecutively numbered pages). The examination for Option B students should not be scheduled until the student’s thesis committee agrees that the thesis is essentially in a form acceptable to the University Library (that is, copies of the typed draft should be readable and have a table of contents, list of tables and figures, chapter titles, section headings, bibliography, and consecutively numbered pages).

Financial Assistance
A number of research and teaching assistantships are available for graduate students and are awarded on a competitive basis. Late applications will be considered as space and funding become available. For further information, refer to the Graduate Assistantships sections.

DEPARTMENT OF LAND RESOURCES
AND ENVIRONMENTAL SCIENCES

Montana State University
P.O. Box 173120
Bozeman, MT 59717-3120
Tel: (406) 994-3900
http://landresources.montana.edu
lresinfo@montana.edu

Application Deadlines:
Fall - June 15
Spring - November 1
Summer - March 1

*International students must submit their application one (1) month prior to the above deadline.

Department Head
Dr. Tracy Sterling
334 Leon Johnson Hall
(406) 994-7060

Professors
• J.W. Bauder; soil and water quality management.
• W.P. Insko; soil chemistry.
• B.D. Maxwell; agroecology and weed biology.
• T.R. McDermott; soil microbiology.
• W.L. Morrill (emeritus); field crop entomology.
• G.A. Nielsen (emeritus); soil genesis, morphology and classification.
• K.M. O’Neill; insect behavior and ecology.
• D.L. Fattal; insect behavior and ecology.
• J.C. Priscu; microbial biogeochemistry in aquatic systems.
• D.M. Ward; microbial ecology.
• J.M. Wraith; soil physics.

Associate Professors
• R.E. Engel; soil nutrient management and plant nutrition.
• R.L. Lawrence; remote sensing, GIS, spatial analysis.
• P.R. Miller; cropping systems.
• C. Montagne; soil classification and land resources.
• R.K. Peterson; agricultural and biological risk assessment.
• D.K. Weaver; chemical ecology and behavior, insect physiology.
• C.A. Zabinski; restoration ecology.

Assistant Professors
• C. M. Foreman (research); microbial ecology.
• C.A. Jones; soil fertility and nutrient management.
• R.E. Macur (research); soil and environmental chemistry.
• L.A. Marshall; watershed analysis.
• F.D. Menalled; cropland weed ecology and management.
• G.C. Poole; fluvial landscape ecology.
• L.J. Rew; plant ecology.
• S.E. Sing (research); weed ecology, biocontrol and risk assessment.
Degrees Offered
- M.S. in Entomology (coordinating department)
- M.S. in Land Rehabilitation
- M.S. in Land Resources and Environmental Sciences
- Ph.D. in Ecology and Environmental Sciences (Interdisciplinary)

M.S. DEGREE IN LAND RESOURCES AND ENVIRONMENTAL SCIENCES
The M.S. program in Land Resources and Environmental Sciences is designed to provide outstanding graduate training opportunities across a substantial breadth of disciplinary interests. Research and coursework programs are specifically adapted to each graduate student. Research projects are directed toward improving our understanding of principles and processes important to land resources and environmental sciences, with opportunities for direct ties to management in many cases. Many projects address processes at multiple scales through well-integrated, multi-disciplinary efforts. Understanding is developed through targeted advanced coursework tailored to the student and to the research project. Research projects involve topics such as hydrology, watershed analysis, integrated management of invasive plant species, soil nutrient management, bioremediation, land reclamation, restoration ecology, fluvial systems ecology and restoration, riparian ecology, microbial ecology of natural systems, chemical fate and transport, water quality, crop diversification, precision agriculture, environmental risk assessment, remote sensing applications, and climate variability.

Curriculum
30 credits minimum (10 thesis, 20 course work) required for master’s degree. 2/3 of total credits must be 500 level. 2 Credits of LRES 500 Seminar required.

Admission
Students seeking admission to graduate status must hold a B.S. degree, have a record of high scholarship, and show significant promise for success in a graduate program. For detailed information, refer to the sections on Admission Policies and Application Requirements. All applications are evaluated by a departmental review committee and the Department Head for final recommendation to the Graduate Dean. Successful applicants are accepted into both the Department and the College of Graduate Studies.

M.S. DEGREE IN LAND REHABILITATION
Course work in land rehabilitation is designed to serve students new to the rehabilitation field, as well as to experienced individuals or those already working in land rehabilitation or restoration ecology and who desire further education and training. Montana State University offers core courses in land rehabilitation and restoration ecology, and a very strong array of supporting courses in relevant disciplines. These courses are integrated with the core curriculum to add breadth and depth to the program and to make specialization possible in a given aspect of land rehabilitation. Site revegetation, soil remediation, restoration of riparian zones and stream channels, remediation of contaminated sites, and management of invasive plants are among the many potential areas of study. Emphasis is placed on developing a broad understanding of soil, plant and hydrologic processes as foundation to effective applications. With the exception of required core courses, course sequences will be designed to correspond with the specific needs, interests and educational goals of the individual student. This program emphasizes soil, vegetation and water sciences, and graduates are expected to be well versed in these areas in addition to the student’s particular area of interest.

Admission
Students seeking admission to graduate status must hold a B.S. degree, have a record of high scholarship, and show significant promise for success in a graduate program. For further information, refer to the sections on Admission Policies and Application Requirements. Successful applicants are accepted into the department and The Graduate School.

Core Curriculum
Candidates for the M.S. degree in Land Rehabilitation must complete a ten (10) credit core curriculum. Elective credits will reflect foundational courses as well as student’s special interests. A minimum of 20 credits of coursework must be taken from MSU.

Required Core Courses (4 credits)  Credits:
- LRES 500 Seminar ......................................................2
- LRES 562 Land Rehab Field Problems ..................2
- Plus, six (6) credits of the following courses:
  - ENSC 460 Soil Remediation ..................................3
  - LRES 461 Restoration Ecology .........................3
  - LRES 560 Land Rehab Reg Plan .........................3

Candidates for the M.S. degree in Land Rehabilitation are expected to be familiar with the degree requirements of both their home department and The Graduate School. For additional degree requirements, see the For Master’s Students section.

M.S. DEGREE IN ENTOMOLOGY
The graduate program in Entomology at Montana State University leads to a Master of Science degree. Students in the program are required to take formal course work and conduct independent research guided by the student’s advisory committee. Each student, during the course of her/his graduate program, will also have the opportunity to participate in activities outside their degree program that will benefit them academically and professionally. Such activities include participating in teaching and outreach programs, taking part in the entomology seminar series, and attending and presenting research results at professional meetings. Each student is strongly encouraged to take advantage of these opportunities. A student’s individual program can be designed, with approval of the graduate advisor and graduate committee, to suit the student’s individual interests and career goals.

The entomology faculty at MSU conduct research in a variety of disciplines, including behavioral ecology, biodiversity studies, biological control of insects and weeds, biosystematics, chemical ecology, ecology, integrated pest management, pollination ecology, risk assessment, stored-product entomology, thermal biology, and veterinary entomology. Entomological research at
MSU includes some of the most important pests in the western U.S., including alfalfa weevil, aphids, cutworms, grasshoppers, Hessian fly, lygus bugs, mosquito vectors of West Nile Virus, wheatstem sawfly, wireworms, and others. Beneficial insects under study include various biological control agents and pollinators. Most faculty conduct both applied and basic research.

Admission
An entering student is expected to have a solid background in the basic sciences and a B.S. or B.A. in biological or related sciences. The following general guidelines are used for regular admission: 1) combined verbal and quantitative scores on the GRE General Test of at least 1000, with a verbal score of at least 420, 2) minimum undergraduate grade point average of 3.0 on a 4.0 scale; 3) positive letters of recommendation; 4) mutual acceptance of a major advisor/student association.

Entomology Curriculum
A minimum of 20 semester hours of course work and at least 10 thesis credit hours are required for the degree. Students deficient in preliminary course work may be required to take additional courses for which they will not receive graduate credit (course numbers <400). A minimum of 24 credits of course work (Including not more than 10 thesis credits) must be taken from Montana State University. Courses taken outside of Entomology must constitute a unified program approved by the student’s graduate committee.

Current research focuses on insect pests of agricultural importance, biological control of insects and weeds, integrated pest management, and basic studies in ecology, physiology, behavior, and evolution. Fieldwork is an integral part of many state of art laboratories for soil, water, air and plant analyses. The facility supports faculty and graduate student research programs, and provides outstanding hands-on experiences and instruction with diverse analytical measurement techniques.

Spatial Sciences Center
LRES faculty and staff are key members of the MSU Spatial Sciences Center. The Global Positioning System (GPS) Laboratory provides GPS base station data for determination of accurate location coordinates for field mapping projects. The Remote Sensing Laboratory offers a state-of-the-art facility with extensive abilities to analyze both digital and analog imagery. Equipment and support for both laboratories facilitate teaching, cooperative research, and land resource inventory and management activities.

Financial Assistance
Assistantships are awarded on a competitive basis. Contact the department for more information. See the Graduate Assistantship section for detailed information on appointment criteria.

DEPARTMENT OF IMMUNOLOGY AND INFECTIOUS DISEASES
P.O. Box 173610
Bozeman, MT 59717
Tel: (406) 994-4705
Fax: (406) 994-4303
iid@montana.edu

Graduate Coordinator
J.J. Obar

Department Head
M.T. Quinn

Professors
- M.E. Hardy; virology
- A.G. Harmsen; pulmonary immunology
- M.A. Jutila; immunopathology
- M.T. Quinn; pharmacology
- D.W. Pascual; mucosal immunology

Associate Professors
- B. Lei; bacteriology
- E.E. Schmidt; molecular genetics
Degrees Offered
• M.S. in Immunology and Infectious Diseases
• Ph.D. in Immunology and Infectious Diseases

The Department of Immunology and Infectious Diseases (IMID) uniquely combines expertise in the study of pathogen biology, host defense, cell biology and use of small and large animal models. Four areas broadly encompass the scope of IMID research:
• Molecular and genetic studies of animal and pathogen biology
• Understanding molecular pathways of communication between pathogen and host
• Regulation of host immune responses in human and animal diseases
• Uncovering molecular mechanisms of pathogen virulence

IMID conducts one of the premier infectious disease research programs in the Northwest, as demonstrated by the success of our faculty in competing nationally for extramural grant funding and publishing high-impact papers. Research funding comes from a range of sources such as the National Institutes of Health, US Department of Agriculture, National Science Foundation and the Montana Agricultural Experimental Station among others. Over the past five years, IMID averaged over $10 million for annual research expenditures. IMID is also home to an NIH Center of Biomedical Research Excellence in Zoonotic and Emerging Infectious Diseases, which provides substantial core facilities and training opportunities for junior investigators. IMID is housed in a state-of-the-art facility with core laboratories for flow cytometry, cell biology, and molecular sciences, as well as pathogen containment facilities for small (BSL-3) and large animal research (ABSL-2). Instrumentation suites house equipment for DNA sequencing, genomic analysis, flow cytometry and cell sorting, and confocal microscopy.

The Department sponsors undergraduate programs in Animal Biotechnology and Pre-Veterinary training and M.S. and Ph.D. programs that emphasize training in cell biology, molecular pathogenesis, immunology, and infectious disease. Weekly seminars are offered by the department and the Frank N. Nelson Distinguished Lecture Series brings many accomplished scientists to Montana State University.

Admission
For detailed information, refer to the Admission Policies and Application Requirements sections. The IMID Core Committee will screen all applications and make recommendations to the Graduate Dean for acceptance to the IMID graduate program. Successful applicants are accepted into both the department and the College of Graduate Studies.

In addition to the documents required in the Application Requirements section, the Graduate Core Committee will consider the applicant’s research experience and the potential of the applicant to complete an appropriate program of study and an independent research project. The final disposition of each application will also take into account other factors, such as the availability of research positions (stipends).

The Graduate Core Committee, IMID faculty, and the IMID head will decide on the acceptability of all applicants. The Graduate Core Committee will serve as the “advisor” for all students accepted into the program during their first year of study.

Program Requirements
Graduate students in IMID are expected to have a basic understanding of biochemistry, molecular biology, immunology, and microbiology. The Master of Science degree requires a minimum of twenty (20) course credits and ten (10) credits of Master’s Thesis research beyond the baccalaureate degree as specified below. Students must maintain a 3.0 GPA.

1. A maximum of 3 credits of 400-level coursework may be applied to the M.S. degree.

Required 400-level coursework

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 441</td>
<td>Biochemistry (Required, or satisfactory undergrad equivalent)</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 501</td>
<td>Principles and Techniques in Animal Experimentation</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 543</td>
<td>Proteins</td>
<td>3</td>
</tr>
<tr>
<td>IMID 501</td>
<td>Advanced Immunology</td>
<td>3</td>
</tr>
<tr>
<td>IMID 525</td>
<td>Microbial Pathogenesis</td>
<td>4</td>
</tr>
</tbody>
</table>

2. There are 18 credits of required 500-level coursework for the M.S. degree.

Required 500-level coursework

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 524</td>
<td>Mass Spectrometry</td>
<td>3</td>
</tr>
<tr>
<td>BCH 544</td>
<td>Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>IMID 590</td>
<td>Master's Thesis</td>
<td>10</td>
</tr>
</tbody>
</table>

Graduate students enrolled for the Ph.D. degree are required to take at least 26 credits of coursework and 34 credits of doctoral Thesis Research credits as specified below. Students must maintain a 3.0 GPA.

1. 9 credits of 400-level coursework may be applied to the Ph.D. degree.

Required coursework

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 441</td>
<td>Biochemistry (Required, or satisfactory undergrad equivalent)</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 501</td>
<td>Principles and Techniques in Animal Experimentation</td>
<td>3</td>
</tr>
<tr>
<td>BIOM 543</td>
<td>Proteins</td>
<td>3</td>
</tr>
<tr>
<td>IMID 501</td>
<td>Advanced Immunology</td>
<td>3</td>
</tr>
<tr>
<td>IMID 525</td>
<td>Microbial Pathogenesis</td>
<td>4</td>
</tr>
<tr>
<td>STAT 401</td>
<td>Statistics (Elective)</td>
<td>3</td>
</tr>
</tbody>
</table>

2. There are 23 credits of required 500-level coursework for the Ph.D. degree.
3. A minimum of 3 credits of elective 500-level coursework is required for the Ph.D. degree.

**Elective Coursework**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCH 524 Mass Spectrometry</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BCH 543 Proteins</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BCH 544 Molecular Biology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>MEDS 525 Molecular Cell Disease</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

4. 34 credits of IMD 690 (Doctoral Thesis) is required for the Ph.D. degree.

**Doctoral Thesis Research**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMD 690 Doctoral Thesis</td>
<td>34</td>
<td></td>
</tr>
</tbody>
</table>

Candidates for either the M.S. or Ph.D. degree are required to pass qualifying examinations prepared by the members of their advisory committee. Refer to the For Master’s Students and For Doctoral Students sections for further degree requirements.

**Research**

The research problem will be chosen in consultation with the student’s thesis or dissertation advisor. Research areas include molecular biology and immunology, bacteriology, cell biology, parasitology, genetics, biochemistry, ultrastructural cytology, virology, and immunopathology, among others. Specialized equipment and facilities include large and small animal isolation units, a flow cytometry core facility, automated DNA sequencers, proteomics and genomics instrumentation, a microscopy core, numerous analytical equipment, multiple tissue-culture and histopathology laboratories.

**Financial Assistance**

Normally, all students accepted into the IMD graduate program are offered graduate stipends funded by State sources and research grants obtained by IMD faculty. Teaching assistantships are normally not available. Appointments are made on a 12-month basis. Beginning stipends are supported at a level of $22,000 per year plus tuition, health insurance, and other fees.

See the Graduate Assistantship sections for detailed information on appointment criteria.

---

**DEPARTMENT OF PLANT SCIENCES AND PLANT PATHOLOGY**

Montana State University 324 Leon Johnson Hall Bozeman, MT 59717 Tel: (406) 994-4832

plantsciences.montana.edu/studentinfo/grad/student_grad.html

psppgrad@montana.edu

**Department Head**

John Sherwood

**Professors**

- T.K. Blake; barley breeding and genetics.
- P.L. Bruckner; winter wheat breeding and genetics.
- W.E. Dyer; weed physiology, plant molecular biology.
- M.J. Giroux; molecular genetics and cereal chemistry.
- B.J. Jacobsen; biocontrol, sugar beet and potato diseases.
- M.T. Lavin; plant systematics and evolution.
- J.M. Martin; plant breeding and biometrics.
- D.E. Mre (emeritus); soil-borne diseases, biocontrol.
- J.H. Rieselman (extension); plant pathology.
- D.C. Sands; bacterial diseases, biocontrol, biotechnology.
- R.A. Sharrock; plant molecular biology, physiology of light adaptation.
- J.E. Sherwood; molecular genetics of plant disease.
- G.A. Strobel (emeritus); Biochemistry of plant diseases, biocontrol.
- L.E. Talbert; spring wheat breeding and genetics.
- Norm Weeden; genetics.
- M.A. Young; virology, thermal biology.

**Associate Professors**

- A. Fischer; plant biochemistry, tissue senescence.
- T.A.O. Dougher, horticulture.
- F.V. Dunkel; entomology.
- Mike Ivie; entomology.
- M. Johnston (research adjunct); foliar diseases of cereals.
- A.D. Richman; molecular evolution.

**Assistant Professors**

- Thamir Al-Niemi (research adjunct); physiological & molecular mechanisms of plant tolerance.
- Mary Burrows (extension); plant pathology.
- C. Cripps; mycology, mycorrhizae.
- Alan Dyer; soil-borne pathogens.
- W.E. Grey (research adjunct); soil-borne disease, seed production.
- William Hoch; horticulture.
- L. Huang; genetics.
- Robyn Klein (adjunct); medicinal plants.
- Chaofu Lu (research adjunct); genetics.
- Cheryl Moore-Gough (extension adjunct); horticulture.
- Alice Pilgeram (research adjunct); bacterial diseases.
- W.S. Pond; landscape design.
- J. Sherman (research adjunct); cytogenetics.
- K. Wanner (extension); entomology.
- Yousef Zadegan; landscape design.
- N. Zidack (research adjunct); bacteriology, biocontrol of weeds.

**Degree Offered**

- M.S. in Plant Sciences
- M.S. in Plant Pathology
- Ph.D. in Plant Sciences

The department offers advanced study leading to a Master of Science degree in plant sciences and plant pathology under either Plan A (thesis) or B (project or professional paper). In addition, a Ph.D. degree is offered in plant sciences with an option in either plant pathology or plant genetics. Supporting minors are also available in each of the degree fields. The department has major research strengths in the following areas: plant breeding and genetics, plant pathology, plant-microbe interactions, mycology, biocontrol, biotechnology, plant physiology, plant systematics, molecular evolution, and biochemistry.

**Admission**

Graduate Record Examination General Test scores are required prior to consideration for admission. Students seeking admission to graduate status must hold a BS degree and have a record of high scholarship in areas closely related to the plant sciences. All applications are reviewed by
a departmental committee for final recommendation to the Graduate College. Successful applicants are accepted by both the department and the College of Graduate Studies. Students must first submit a pre-application on our website at http://plantsciences.montana.edu.

Plant Sciences
Graduate students majoring in this field may obtain a Master of Science degree in plant science or a Ph.D. degree in plant science with a plant genetics option. Areas of concentration include plant breeding and genetics, plant molecular genetics and biotechnology, physiological genetics, plant systematics, and population genetics.

Plant Pathology
Graduate students majoring in this field may obtain a Master of Science degree in plant science or a Ph.D. degree in plant science with a plant pathology option. Areas of concentration include: biocontrol, mycology, plant-pathogen interactions, biochemistry and molecular genetics of plant disease and virology.

Required Courses
There are no set course requirements for Plant Sciences degree programs. Course requirements are set by the student’s graduate committee, however, all students are required to register for PSPP 500-01 (1 credit seminar) once a year.

Departmental Facilities
The department is housed in both Leon Johnson Hall and the Plant BioScience Facility located on the Bozeman campus. The research laboratories range in size from 600-720 sq. ft and are assigned to individual researchers. Individual laboratories are well equipped with the instruments and tools necessary to complete each research project. Researchers cooperate to purchase, share and maintain expensive pieces of specialized equipment or facilities such as the Electron Microscope Lab. Laboratories and offices are wired with high-speed computer lines for direct access to the Internet and the World Wide Web. The faculty has access to the Plant Growth Center Facility (a teaching and research facility available to the College of Agriculture staff). The current 60,000 square-foot facility houses 29 glasshouse rooms with 8,300 square feet of bench space – both temperature and lights are micro-computer controlled; 13 walk in growth rooms where all environmental variables are computer controlled; insect quarantine facilities with separate glasshouses and growth chambers; plant pathogen isolation facilities with 4 glasshouse rooms of 320 sq. ft; the Montana Potato Lab which is responsible for providing disease free seed stock to Montana potato producers. Other important accesses to the department are the Horticulture Farm, Post Research Farm, which is a 300 acre site dedicated to plant and soil research activities, and the MSU Herbarium located in Lewis Hall.

Financial Assistance
Assistantships are awarded on a competitive basis. See the Graduate Assistantship sections for detailed information on appointment criteria. Assistantships are requested through the student’s home department.

INTERDISCIPLINARY GRADUATE PROGRAMS

• Ph.D. Degree in Ecology and Environmental Sciences

This cross-college doctoral degree represents a broad collaboration among departments and faculty from across MSU. It provides the opportunity for motivated students to integrate our world-class faculty research programs in diverse aspects of ecology and environmental sciences, within the unparalleled natural laboratory that is the Greater Yellowstone Ecosystem. Particular program strengths include terrestrial and aquatic ecology, environmental biogeochemistry, evolutionary biology, hydrology and watershed analysis, quantitative ecology, invasive plant ecology and management, conservation biology, land rehabilitation/restoration ecology, environmental microbiology, remote sensing and spatial sciences. Please see our website for a more comprehensive list of EES faculty programs and research opportunities: http://eesprogram.montana.edu/index.asp

Graduates will be well-trained professionals who will compete strongly in research, teaching, and related fields nationally and internationally.

EES doctoral students will be affiliated with a home department that corresponds to that of their major faculty advisor. Some specific graduate program criteria, procedures, and processes vary among departments; students will follow those of their home department, which are also consistent with policies set forth by The Graduate School.

Admission
Prospective students should submit a pre-application or application to the graduate program online at http://eesprogram.montana.edu/index.asp. The application should specify the desired area(s) of study to facilitate its full evaluation by faculty members in the desired field(s). Applicants are expected to have appropriate preparation to undertake the doctoral degree in the area of study. Students may undertake the Ph.D. following completion of a Master’s degree, or exceptional students may apply directly following completion of a suitable bachelor degree. An appropriate faculty mentor must agree to serve as the student’s major advisor as a condition of admission. Stipend and operations funding are generally from research grants and contracts awarded to faculty members, but graduate teaching assistantships and other forms of support are also available on a limited basis.

Core Curriculum
Because of the substantial diversity in disciplinary and multidisciplinary foci within the EES doctoral program, there is no universal required core curriculum. The student’s individual coursework program will be developed in partnership with the major advisor and graduate committee, and must be consistent with the home department and GS guidelines and requirements. A minimum of 30 credits of resident coursework must be taken from MSU.

Candidates for the Ph.D. degree in Ecology and Environmental Sciences are expected to be familiar with the degree requirements of both their home department and The Graduate School.
Program Participants
The program is jointly centered in the departments of Ecology (College of Letters and Sciences) and Land Resources and Environmental Sciences (College of Agriculture), but is also specifically open to students and faculty mentors in other MSU departments and colleges who undertake relevant doctoral study.

Interested students should consult the program website at http://cesprogram.montana.edu/index.asp for additional information and to submit a graduate pre-application or application.

COLLEGE OF ARTS
AND ARCHITECTURE

Dean, TBA
Bill Rea, Assistant Dean

Graduate Programs Available:
• Master of Architecture
• M.F.A. in Art
• M.A. in Art History
• M.F.A. in Science and Natural History Filmmaking

SCHOOL OF ARCHITECTURE

Montana State University
P.O. Box 173760
Bozeman, MT 59717-3760
Tel: (406) 994-4256
arch.montana.edu

Director
Steven P. Juroszek, Interim Director

Graduate Program Coordinator
Chris Livingston

Professors
• J. Brittingham; architectural design, theory.
• R. Johnson; architectural design, history, theory.
• S. Juroszek; architectural design, graphics.
• F.A. Rifki; architectural design, environmental technology, urban planning.
• H.E. Sorenson, Jr.; delineation, architectural design.
• T.R. Wood; architectural design, environmental technology.

Associate Professors
• M. Everts; architectural design, professional practice.
• C. Livingston; architectural design, building construction.
• M.E. O’Neill; architectural design.

Assistant Professors
• M. Everts; design, professional practice.
• Z. Karczewksa; design, graphics.
• B. Wrightsman; architectural design, structures.

Emeritus Professors
• F. Johns; architectural design, urban planning.
• P.C. Kommers; architectural design, graphics, theory.
• C. Llewellyn; architectural design, theory.
• G. McClure; structures.
• R. Utzinger; architectural design, theory.

Degree Offered
• M. of Architecture

The School of Architecture professional curriculum leads to a Master of Architecture degree, a professional degree program in architecture fully accredited by the National Architectural Accrediting Board. The design studio forms the core of architectural education, and every student makes a significant design studio commitment each semester.

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture and the Doctor of Architecture. A program may be granted a 6-year, 3-year or 2-year term of accreditation, depending on the extent of its conformance with established educational standards.

Master’s degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

Montana State University School of Architecture offers the following NAAB-accredited degree program:
• Master of Architecture (pre-professional + 42 graduate credits)

The next accreditation visit for this program will take place in 2014.

Students wishing to acquire the Masters of Architecture Degree must complete three semesters of graduate study. Throughout this graduate study, students will choose from a variety of architectural studios, craft studios, architectural seminars, and non-architectural electives intended to emphasize the development of a critical position with regard to the environment and architecture. A final comprehensive studio is required that demonstrates, through the development of an architectural project, the student’s moral, ethical and aesthetic responsibility to society and the natural world.

School of Architecture Philosophy
The School seeks to prepare students for a lifelong critical engagement in the arts and science of architecture. Located in “the last best place” of the Northern Rockies we are in an extraordinary position to engage questions regarding the relationship between the natural and built environments. To that end, we teach and practice a moral, ethical and aesthetic responsibility to society and the natural world in the design of the built environment. It is in our design studios, that this philosophy is most clearly demonstrated. Each studio is conceived to build upon the previous studio in a manner that develops a student’s mastery of the science of architecture while at the same time exposing the student to the rich diversity of our faculty’s philosophical beliefs. Within a structured sequence of increasingly complex problems, emphasis is placed on teaching both an iterative design process and the visualization skills necessary to demonstrate the resultant design proposals. The science of architecture is continuously evolving and will do so over the life of every architect. We are committed to preparing our students to enter the profession with both the contemporary scientific knowledge and emerging technical
expertise to further this evolution while at the same time ensuring that our graduates are grounded in the fundamental processes, composition and drawing skills that have been central to architecture throughout its history. In addition to the science of architecture we are equally committed to ensuring that our graduates acquire a critical philosophy with which they can engage the design of the built environment.

Knowing how to build is a matter of science and technology but knowing what to build is a question of morality, ethics, and aesthetic responsibility. In this regard the faculty shares a commitment to the stewardship of our environment. This is particularly important in the Northern Rockies where our historic fabric of cities, rural communities and the natural landscape coexist in a tenuous balance. Focusing on the broad principles of creating a sustainable social, cultural, economic and physical environment we utilize the region, from its major cities to its national parks, as the canvas for our teaching, research and creative activities.

As a faculty we are committed to emphasizing the architect’s responsibility to create and maintain a sustainable environment formulated from a belief system of moral, ethical and aesthetic theories, but our philosophical beliefs with regard to how this is to be achieved are diverse. This is by intent. Each student, as she or he matriculates through the design studio sequence, is expected to develop an understanding of the various critical approaches advocated by their professors and ultimately reaches a position of their own. Thus our graduates become empowered to assume a leadership role in the synthesis of the natural environment, human activity and the built environment from a critical, responsible and mature perspective. In doing so, our students discover the commitment of our faculty to both the future of our environment and that of their students. Because of this an extraordinary sense of community emerges within the School of Architecture at Montana State University. Students develop a sense of responsibility not only to the environment and architecture but also to their peers where all share a passion for design.

Program Requirements
The Master of Architecture professional degree is a Plan B program (professional paper or project plan) that requires forty-two (42) credits of graduate coursework. A student’s program of study includes three graduate design studios (ARCH 551, ARCH 557 and ARCH 558), a required architectural research methodologies seminar (ARCH 552) and graduate electives. The Plan B Program requires that students successfully complete ARCH 558 Advanced Building Studio as their comprehensive examination. Arch 558 Advanced Building Studio is best described as a programatically complex problem with an underlying agenda or theoretical component.

Admission
Admission into the architecture graduate program is competitive. The school is able to admit approximately 70 graduate students per year, many of whom represent the best students from our own undergraduate B.A. in Environmental Design program. However, a limited number of spaces are available for highly qualified students with undergraduate degrees from other universities. Placement may vary depending upon the student’s background; students with an undergraduate degree in a field other than architecture will be considered, and must, if accepted, complete a full course of study in design studio.

Portfolio review is of primary importance to the School of Architecture’s application review committee. All applicants are required to submit a portfolio of their best work that is reviewed by the school’s faculty. For examples of student work and additional information visit the School of Architecture website at www.arch.montana.edu.

Dates to Remember
March 1:
Deadline for submittal to School of Architecture of portfolio, application forms, GRE scores for Fall or Summer admittance.

December 1:
Deadline for submittal to School of Architecture of portfolio, application forms, GRE scores for Spring admittance.

Submission Address for all Application Materials and Portfolio Graduate Placement
School of Architecture, Montana State University, PO Box 173760, 160 Cheever Hall, Bozeman, Montana 59717-3760

Application Submission Requirements
1. On-line application for the MSU Graduate School which can be found at www.montana.edu/www-wdg/.
2. Submit a portfolio of architectural work sufficient to demonstrate the student’s ability and achievement in architecture. Portfolio form and format are left to the discretion of the student, though the portfolio must be suitable for review by a committee. NOTE: For return of the portfolio, please submit a suitable mailing receptacle and sufficient postage. We cannot guarantee its return; portfolios have been lost in transit.
3. Three letters of reference Letters of reference forms can be found under the Downloads link at http://www.arch.montana.edu. It is recommended that at least 2 of the 3 letters come from faculty members.
4. Official results of the Graduate Record Examination.
5. $50.00 non-refundable application fee, payable to Montana State University.
6. Official transcript from universities attended.

Expected Placement for Students with an Undergraduate Degree in an Architecture Related Field, Environmental Design, or Architectural Studies
If you have an undergraduate 4-year degree in architectural studies or environmental design and are admitted to the Master of Architecture program, you will be placed at an appropriate point in the architecture curriculum and can expect to pursue a series of rigorous design studios, specialized courses in advanced architecture, a thesis research course and the comprehensive studio, in order to be granted the Master of Architecture degree. Students entering with excellent portfolios can expect to complete the Master of Architecture degree in three to four semesters.
Expected Placement for Students with an Undergraduate Degree in Other Fields

If you have an undergraduate degree in another field and desire to study architecture at Montana State, you will be expected to complete the full ten semesters of design studio. Advanced placement can be made depending on the quality of your portfolio, which may demonstrate equivalent achievement. You will be placed as a “Second-Degree Student” until the prerequisites for graduate study have been completed. Upon successful completion of the required prerequisites, you can be advanced to “graduate degree” status.

Required Courses*

Semester I
ARCH 557 Architectural Design Studio..................6
ARCH 552 Architectural Research Methods.................3
Graduate Electives..................................................6
Total Semester I 15 credits

Semester II
ARCH 551 Advanced Architectural Studio.................6
Graduate Electives....................................................9
Total Semester II 15 credits

Semester III
ARCH 558 Comprehensive Design Studio...............6
Graduate Electives..................................................6
Total Semester III 12 credits

Notes:
1. All graduate students in the School of Architecture are required to take one of their design studios during a Summer Semester.
2. Students must have completed a total of 45 non-architecture credits to receive their Master of Architecture degree. These credits can occur at the undergraduate or graduate level.
3. All graduate students will be required to receive a minimum grade of “B” (3.0) in any Design Studio. Failure to receive a “B” will result in the student needing to retake that design studio.
4. Per Graduate School policy, a student will have only two opportunities to pass Arch 558 Comprehensive Design Studio similar to a thesis student having only two opportunities to pass the closed door defense and the comprehensive examination.

Students may petition the Graduate Program Coordinator to take non-traditional studio classes for graduate elective credit.

All students shall continue to meet with the Graduate Program Coordinator or Administrative Support staff throughout their graduate year to track their progress toward completion of the Master program. The program study will be developed with the advisor, approved by the committee, and submitted to the Graduate School by the add deadline of the first semester of attendance. Final approval of the program and committee rests with the Graduate School. Students may change courses or committee members on the program by completing a Program Change or Change of Committee form. All Graduate School transfer credit policies apply to M Arch students.

The student is expected to be familiar with both School of Architecture and Graduate School degree requirements. Refer to the Master’s Students section for additional information.

Financial Assistance

Students should contact the director of the school for information regarding the availability of assistantships. See the Graduate Assistantship section for detailed information on appointment criteria.

School of Art

213 Haynes Hall
Montana State University
Bozeman, MT 59717-3680
406-994-4501
www.montana.edu/art/
art@montana.edu

Director
Vaughan Judge
vaughan.judge@montana.edu

Professors
• J. Conger; graphic design
• S. Newman; graphic design

Associate Professors
• G. Janzen; printmaking
• R. Gee; art history

• T. Larkin; art history
• S. Mast; foundations/painting

Assistant Professors
• D. Adams; foundations/ceramics
• R. Beamish; painting/drawing
• N. Davis; graphic design
• J. DeWeese; ceramics
• J. Hatch; ceramics
• M. Newhouse; graphic design

Adjunct Professors
• B. Petersen; metalsmithing
• D. Reibe; foundations
• D. Taylor; art history

Degrees Offered
• M. of Fine Art
• M. of Art in Art History

MASTER OF FINE ART

The School of Art, accredited by the National Association of Schools of Art and Design, offers a Master of Fine Arts (MFA) degree. The MFA degree requires 60 credits of coursework including a minimum of 15 credits of thesis. This degree is designed for the professional artist or craftsperson including those who plan to teach art at the college level, with specialization in the following areas: drawing, painting, sculpture, ceramics, printmaking and metalsmithing. The School of Art does not offer a MFA degree in either graphic design or photography. The School of Art no longer requires the GRE for entrance.

Admission

Students applying to the School of Art should submit a portfolio of 20 digital images in jpg format on a cd(preferred), application, official transcripts, artist statement, current resume and three letters of recommendation, along with a statement if you wish to apply for a teaching assistantship. Completed applications for the following academic year must be received by February 15.

Qualified students may be admitted to the College of Graduate Studies on a regular or provisional basis. Provisional acceptance is usually based on undergraduate deficiencies.
Program Requirements

<table>
<thead>
<tr>
<th>Program Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Studio area</td>
<td>9</td>
</tr>
<tr>
<td>Other Studio area(s)</td>
<td>15</td>
</tr>
<tr>
<td>Art History (to include ARTH 451)</td>
<td>9</td>
</tr>
<tr>
<td>Thesis</td>
<td>15</td>
</tr>
<tr>
<td>Seminar in Art</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
</tr>
</tbody>
</table>

Each student’s progress is reviewed by the School of Art faculty at the end of fall and spring semesters with special emphasis being given to students in their first semester of residence and students beginning their thesis work. Passing of these reviews is required for a student to be considered a degree candidate. Students registered in thesis then work with their committees.

Financial Assistance

Limited numbers of graduate teaching assistantships are usually available within the School of Art and are awarded on a competitive basis to formally admitted graduate students. See the Graduate Assistantships sections for detailed information on appointment criteria. Assistantships are requested from the student’s home department.

MASTER OF ART IN ART HISTORY

Admission

The M.A. Program welcomes applications from all those interested in seeking an advanced degree in Art History. Approximately eight students are accepted each year to a thirty-two unit program that emphasizes focused study of cultural production from ancient times to the present and interdisciplinary connections with collateral departments in the Colleges of Arts & Architecture and Letters and Sciences. Art History faculty meet twice a year to read and assess applications, with a particular sensitivity to the students’ work and professional goals.

All materials must be postmarked by March 15 (Fall deadline) and October 15 (Spring deadline) for full consideration. In addition to completing the application and paying the application fee, candidates for admission to the Art History M.A. Program must send a letter of intent, one writing sample, undergraduate transcripts, GRE scores, and three letters of recommendation. International applicants must also include an official English proficiency exam score report and a completed and signed Financial Certificate.

The faculty consider the letter of intent and the writing sample to be among the most important parts of the application. The letter should describe your preparation for the program, academic interests, and professional goals. The most useful statements are those that present an intellectual portrait of the applicant, an account of the issues the applicant now finds engaging, and the program of study the candidate envisions for him/herself at MSU. The writing sample should be a substantial essay, ideally a seminar paper or senior thesis, that demonstrates the candidate’s potential for advanced work in the discipline.

Program Requirements

<table>
<thead>
<tr>
<th>Program Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Thesis Preparation Course</td>
<td>3 credits</td>
</tr>
<tr>
<td>5 Elective Courses</td>
<td>15 credits</td>
</tr>
<tr>
<td>1 Methods &amp; Theory Course</td>
<td>6 credits</td>
</tr>
<tr>
<td>1 Foreign Language Course</td>
<td>3 credits</td>
</tr>
<tr>
<td>1 Graduate Teaching Course</td>
<td>2 credits</td>
</tr>
<tr>
<td>Minimum Total</td>
<td>32 credits</td>
</tr>
</tbody>
</table>

All graduate students must take:
- Art History 501: Graduate Teaching
- Art History 506: Methods and Theory
- Art History 590: Thesis Preparation

In addition to the courses listed above, graduate students will select 5 courses, of which 3 must be 500-level graduate art history seminars, and 2 must be 400-level upper division undergraduate art history lectures in which the student will be required to complete supplementary readings, write advanced comparative analyses of articles, and complete a rigorous research project. Students will also select 2 elective courses at the 500-level taught in other departments in the humanities (e.g. History and Philosophy, English).

After passing an exam in foreign language translation during the first semester, students must complete one additional semester of language translation appropriate to their area of concentration (offerings to be determined by the Department of Modern Languages).

Mastery of the discipline will be determined by 1. a record of excellence in all courses taken within the graduate program and 2. a well-written, well-argued thesis.

Financial Assistance

Limited numbers of graduate teaching assistantships are usually available within the School of Art and are awarded on a competitive basis to formally admitted graduate students. See the Graduate Assistantships sections for detailed information on appointment criteria. Assistantships are requested from the student’s home department.

SCHOOL OF FILM AND PHOTOGRAPHY

Visual Communications Building
Room 202
P.O. Box 173350
Montana State University
Bozeman, MT 59717-3350
(406) 994-2484
naturefilm@montana.edu
http://sfp.montana.edu

Contacts:
- Dr. Dennis Aig, Program Head, MFA in Science and Natural History Filmmaking
  (406) 994-6216
daig@montana.edu
- Vicki Miller, Student Coordinator
  (406) 994 2484
vmiller@montana.edu

Director
Dr. Robert Arnold
(406) 994-7588
rfarnold@montana.edu

Professors
- Arnold, Robert Ph.D.
- Aig, Dennis. Ph.D.
- Tobias, Ronald. MFA
- Stillwell, Cindy. MFA
- Lipfert, Theo. MFA
- Watson, Tom. MFA
- Ricciardelli, Lucia Ph.D.
- Anderson, Christina, MFA
- Van Coller, Ian, MFA
- Pike, Alexis. MFA
- Joyce, James, MFA
- Savoie, Gianna M.S.

Degrees conferred
- M.F.A. in Science and Natural History Filmmaking
The Master of Fine Arts Program in Science and Natural History Filmmaking at Montana State University is the largest and best known of only three programs in the world dedicated to this unique and rewarding field of filmmaking. Students in the program have had their work broadcast on many major channels and programs such as The Discovery Channel, National Geographic, The Science Channel, CNN, Sixty Minutes II, Larry King, CBS Evening News, and NBC Nightly News. They have produced films for the National Park Service, the National Science Foundation, the Department of Agriculture, NOAA, NASA, National Geographic, Discovery, and such non-profit organizations as the Wildlife Conservation Society, the Sierra Club, the Audubon Society, the Nature Conservancy, the Field Museum and the Boston Museum of Science. Students’ work has also been featured in numerous festivals internationally. Our students have won five Emmys, a Fred Rogers Scholarship from the National Academy of Television Arts and Sciences, a Webby, and many other honors. Our students have shot on every continent in the world documenting the work of explorers and scientists. The graduate student podcast and website TERRA: THE NATURE OF OUR WORLD (http://www.lifefronterra.com) attracts almost distributes some of the world’s leading science and conservation productions to almost 100,000 viewers a month. Our mission is to provide filmmaking knowledge to students with formal education and experience in science, engineering and technology so they may create accurate, innovative, and exciting programs that advance the public understanding of science.

Candidates for the MFA take courses that include film and video production, the history and theory of science and natural history film, cinematography, production management, editing, and writing. Almost all students also work at one or more production internships during their time as MFA students. The intention of the program is to prepare students with a contemporary and complete understanding of the media production process.

**Admission**

We seek candidates with at least an undergraduate degree in biological or physical sciences, engineering, technology, or the social sciences, and preferably with some research experience. Candidates are not expected to have any formal education or experience in filmmaking. Candidates with filmmaking degrees or degrees in other fields must have a minor in a scientific field or equivalent work experience.

**Program Requirements**

The curriculum consists of a minimum of sixty semester credit hours of study, written thesis, and thesis film taken over a minimum of three years. To graduate, a student should complete the course of study in good academic standing and produce and defend a written thesis or thesis film.

**Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILM 504</td>
<td>Film and Documentary Theory</td>
<td>3</td>
</tr>
<tr>
<td>FILM 505</td>
<td>Critical Approaches to Natural History Filmmaking</td>
<td>3</td>
</tr>
<tr>
<td>FILM 506</td>
<td>Critical Approaches to Science Filmmaking</td>
<td>3</td>
</tr>
<tr>
<td>FILM 510</td>
<td>Fundamentals of Filmmaking</td>
<td>3</td>
</tr>
<tr>
<td>FILM 513</td>
<td>Advanced Cinematography</td>
<td>3</td>
</tr>
<tr>
<td>FILM 515</td>
<td>Science and Natural History Film Production</td>
<td>3</td>
</tr>
<tr>
<td>FILM 517</td>
<td>Production Management</td>
<td>3</td>
</tr>
<tr>
<td>FILM 518</td>
<td>Writing for Documentary</td>
<td>3</td>
</tr>
<tr>
<td>FILM 519</td>
<td>Post Production Workflow</td>
<td>3</td>
</tr>
<tr>
<td>FILM 521</td>
<td>Contemporary Trends in Non-Fiction</td>
<td>3</td>
</tr>
<tr>
<td>FILM 523</td>
<td>Second Year Film Prep</td>
<td>2</td>
</tr>
<tr>
<td>FILM 525</td>
<td>Second Year Film Production</td>
<td>3</td>
</tr>
<tr>
<td>FILM 526</td>
<td>Alternative Non-Fiction</td>
<td>3</td>
</tr>
<tr>
<td>FILM 533</td>
<td>Adv. Problems TV &amp; Internet</td>
<td>3</td>
</tr>
<tr>
<td>FILM 576</td>
<td>Internship</td>
<td>3</td>
</tr>
<tr>
<td>FILM 590</td>
<td>Master’s Thesis</td>
<td>3</td>
</tr>
</tbody>
</table>

**Financial Assistance**

Depending on the availability of funds, a limited number of teaching assistantships and research assistantships are available each year.
Degree Offered

- M. of Professional Accountancy

The Master of Professional Accountancy (MPAc) degree is designed to prepare students for professional careers in accounting. With the assistance of an advisor, students will formulate a graduate program that will integrate their educational background, areas of interest and career path.

Mission

The mission of the MPAc program is to prepare students for professional careers in accounting. Candidates for the degree will build on the broad general and business education obtained at the undergraduate level to gain more advanced competencies in the practice and theory of financial accounting, auditing, taxation, law, and other business and professional areas. Students will also be introduced to research methods and resources used by accounting professionals. Goals include:

- To produce graduates who will have long-term success in their accounting careers.
- To prepare our graduates to meet the educational requirements recommended by the American Institute of Certified Public Accountants.
- To provide our students with access to professional opportunities through career placement services.

Admission

A bachelor’s degree in accounting or business from an accredited college or university provides the best foundation for this program. Students who have undergraduate course deficiencies may be provisionally admitted while attending to subject matter deficiencies. To apply, individuals must submit an application and fee, a GPA calculation form, scores from either the Graduate Record Exam (GRE) or the Graduate Management Admissions Test (GMAT), three letters of recommendation, all prior college transcripts, and a one-page statement of purpose. Applicants must be formally admitted by The Graduate School after the preliminary recommendation for admission is reached by The College of Business. Refer to the Admission Policies and Application Requirements sections in The Graduate School part of this Catalog for additional information.

Program Requirements

At least 30 credits of acceptable coursework must be completed, including at least 21 credits of coursework from MSU. Elective credits are selected by the student, with approval from the MPAc Director. Students are required to maintain at least a 3.0 semester grade point average, and at least a 3.0 cumulative grade point average at all times while in the MPAc program.

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTG 521 Advanced Auditing</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 525 Accounting Theory &amp; Complex Issues in Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 526 Advanced Taxation</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 528 Legal Issues for Accountants</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 529 Survey of Research in Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACTG 536 Advanced Accounting</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>12</td>
</tr>
</tbody>
</table>

Total 30

Refer to the For Master’s Students section in The Graduate School part of this Catalog for additional degree requirements. Students are expected to be familiar with the degree requirements of both the College of Business and The Graduate School.

Financial Assistance

A limited number of graduate teaching assistantships, awarded on a competitive basis, are available to fully admitted MPAc students. See the Graduate Assistantships section in The Graduate School part of this Catalog for detailed information on appointment criteria.

For information on graduate programs admissions materials and information contact the Program Assistant: (406)-994-6786 or email edgrad@montana.edu

For information on undergraduate teacher preparation programs Please contact:

- Educational Leadership: Dr. William Ruff, (406)-994-1880 or email wruff@montana.edu
- Adult & Higher Education: Dr. Carrie B. Myers, (406)-994-4203 or email cbmyers@montana.edu
- Curriculum & Instruction: Dr. Elisabeth Swanson, (406)-994-5952 or email eswanson@montana.edu

Department Head

Dr. Jayne Downey
213 Reid Hall
994-7426
jdowney@montana.edu

Professors

- J.J. Bruwelheide; library media
- R.G. Carson; director, Northern Plains Transition to Teaching
- A. de Onis; reading, language arts

Associate Professors

- A. Bangert; educational statistic, educational research.
- M. Brody; science education
- J. Carjuzaa; multicultural education
- S. Davis; technology education
- J. Downey; educational psychology
- J. Erickson; educational administration
- J. Herbeck; reading, language arts
- M. Lockhart; adult & higher education
- P. Lund; art education
- B. Palmer; adult & higher education
- W. Ruff; educational administration
- E. Swanson; science education

COLLEGE OF EDUCATION, HEALTH AND HUMAN DEVELOPMENT

Larry J. Baker, Dean

Graduate Programs and Degrees:

- College Teaching Certificate
- School Library Media Graduate Endorsement
- M.Ed. in Education
- M.Ed. in School Counseling
- M.S. in Health and Human Development
- Ed.S. in Education
- Ed.D. in Education
Assistant Professors
- L. Kelting-Gibson; assessment
- M. Leonard; science education
- F. Luo; mathematics education
- N. Lux; educational technology
- C. Myers; adult & higher education

Adjunct Faculty
- L. Baker; higher education
- W. Freese; instructional media
- L. Haughey; technology education
- G. Pease; educational administration
- C. Rogers Stanton; educational psychology
- S. Schmitt-Wilson; multicultural education
- R. Shaffer; educational administration

Professional Faculty
- P. Ingraham; field placements & licensure

Programs and Degrees Offered
- College Teaching Certificate
- School Library Media Graduate Endorsement
- M.Ed.
  - Adult and Higher Education
  - Curriculum and Instruction
  - Educational Leadership
- Ed.S.
  - Educational Leadership
- Ed.D.
  - Adult and Higher Education
  - Curriculum and Instruction
  - Educational Leadership

The department is divided into three units: Curriculum & Instruction, Educational Leadership, and Adult & Higher Education. Doctoral (Ed.D) programs are offered in three majors: Educational Leadership; Adult and Higher Education; and Curriculum and Instruction. Masters degrees also are available in these three majors. A specialist degree is available in Educational Leadership and Curriculum and Instruction. Additional degree requirements are listed in the For Master’s Students and For Doctoral Students sections.

Application Procedures
Application forms, as well as additional program information, may be obtained from the Graduate Programs in Education Office, 215 Reid Hall.

Montana State University, Bozeman, MT 59717. For specific program information contact the Program Leaders (listed above). For admissions information and forms contact the Graduate Programs Office (see above). Admissions materials are reviewed at least three times per year by the individual program screening committees. Successful applicants are accepted into both the department and The Graduate School.

Adult and Higher Education
This program offers the Master’s of Education and Doctor of Education in Adult and Higher Education to admitted students who have varied academic field/discipline and professional backgrounds. Students focus on the theory, research, and informed professional practice in either higher education (academics, administration, or student affairs) or adult post-secondary education. Coursework is divided into two categories: required and electives, and research and statistics. Doctoral students must conduct research and write an original theory-based dissertation. Courses are offered with working students as a target group and are generally offered evenings and weekends. Many courses are offered as hybrid courses with a combination of face-to-face and distance delivery. Some courses are offered 100% online.

Subject areas of particular interest and supported by the program’s current faculty’s research agendas include assessment, institutional research, scholarship of teaching, and distance education. In most cases the diversity of learners and institutions represented in adult and higher education is addressed, and students are encouraged to develop specialization via course assignments. Required courses vary by degree and background of the student. Refer to the Adult and Higher Education handbook located at: www.montana.edu/wwweduc for additional and current information regarding courses offered and schedules.

The Adult and Higher Education Program also offers a Certificate in College Teaching to develop and promote exemplary teaching among graduate students, aspiring faculty, and current faculty wanting to enhance their teaching skills. The goal of the certificate is to make individuals more competitive in the job market as instructors and faculty members at colleges and universities. A total of 12 credits of course work are required to earn the College Teaching Certificate. Taking three credits a semester, participants will be able to earn the certificate in two years. Taking six credits a semester, participants will be able to earn the certificate in a year. Participants may enroll in the program either Fall or Spring.

See course listings on-line at: www.montana.edu/ehld/educ/ahe

Curriculum and Instruction
The program in Curriculum and Instruction offers two degrees: Master of Education and Doctor of Education. The Master of Education degree is designed to meet the needs of elementary and secondary classroom teachers, subject matter specialists, subject area supervisors, curriculum coordinators, and educational scholars and researchers. The Master of Education (M.Ed.) degree has three options:
- Professional Educator option
- Educational Research option
- Technology Education option

The Department also offers the School Library Media K-12 graduate endorsement program. This totally online program is offered through the MSU Extended University. It consists of 21 semester credits (7 courses). The program is for teachers who want to add an endorsement in K-12 Library Media to a teaching license or take courses for recertification in Library Media.

The Doctor of Education (Ed.D.) degree is designed to prepare graduates to assume positions in college and university teacher education programs. Graduates will possess the rich knowledge base in educational theory and practice necessary to conduct research and engage in service to the greater education community. Students will have multiple opportunities to engage in college teaching, research connected to educational issues of their choice and collaborative activities in diverse educational settings, and with faculty from other disciplines. Refer to the Curriculum and Instruction program guide located at www.montana.edu/
www.educ/ and click on Graduate Programs, Curriculum and Instruction, for additional and current information regarding courses offered and schedules.

**Educational Leadership**

The program in educational leadership offers three degrees: Master’s in Education, Education Specialist, and Doctor of Education. Student programs are developed on an individual basis after a review of previous experience as well as future goals. Programs include courses required for a Montana Class 3 administrative license with a K-12 Superintendent endorsement. Certification requirements of other states can be incorporated into the programs. An internship or field experience is required as a part of each of the above degree programs. Furthermore, understanding and applying research is an integral part of the degree programs. For additional information, please review the Educational Leadership program web pages within the Department of Education website at: www.montana.edu/ehhd/educ/edleadership/index.shtml

Review all courses at: www.montana.edu/ehhd/educ/edleadership

**Admissions**

Refer to the Admission Policies and Application Requirements sections for specific application requirements and instructions. Successful applicants must be accepted into both the department and The Graduate School. The Education Specialist degree must meet the minimum requirements under the For Doctoral Students section with the following two exceptions: 1) no dissertation is required, and 2) courses over seven years old may not be included on the graduate program. Additional requirements for the Ed.S. degree are available through the Department of Education. All Ed.S. degree candidates are expected to be familiar with both departmental and The Graduate School’s requirements.

While many requirements for the Education Specialist degree are the same as those for the Doctor of Education degree, it must be clearly understood that admission to one program does not imply admission to the other. Transfer from doctoral to Education Specialist status will be possible only if the applicant has: 1) earned at least a 3.0 grade point average in all prior work applicable toward the doctorate degree, and 2) has not failed the doctoral comprehensive exam.

**Graduate Program**

The major program field is selected from one of the degree options in the College of Education, Health and Human Development. However, all candidates must become competent in each of three areas: 1) major area of study, 2) foundations of education, and 3) research and statistics. Refer to the departmental brochures on each of the three areas for minimum credit requirements.

**Additional Doctor of Education Requirements**

The Doctor of Education degree must meet the minimum requirements in the For Doctoral Students with the following exception: only fourteen (14) credits of dissertation are required. Additional requirements for the Ed.D. degree beyond these minimums are available through the Department of Education. All Ed.D. degree candidates are expected to be familiar with both The Graduate School and Department of Education degree requirements.

**Comprehensive Examination**

Near the completion of course requirements, the student must pass a comprehensive examination covering the major area of study, foundations of education, and research and statistics. This examination is both written and oral. The comprehensive examination must be taken on the MSU campus. Exceptions are granted only after a written request from the student’s advisor is approved by the department head. The department is responsible for making all arrangements for comprehensive examinations. Refer to the section For Doctoral Students for additional requirements.

**Dissertation and Final Examination**

An individually written thesis is required. It must be an original contribution to knowledge in the field of education, worthy of publication in the field of education. Refer to the section For Doctoral Students for additional information.

**DEPARTMENT OF HEALTH AND HUMAN DEVELOPMENT**

Montana State University
218 Herrick Hall
Bozeman, MT 59717-3540
Tel: (406) 994-3242

www.montana.edu/hhd/

Department Head
Dr. Mark Nelson
219 Herrick Hall
406.994.3242

Graduate Coordinator: Exercise and Nutrition Sciences, and Food, Family & Community Health Sciences
Dr. Bethany Letiecq, 316D Herrick Hall, 406.994.7396
bletiecq@montana.edu

Counseling Academic Coordinator
Dr. Rebecca Koltz
223 Herrick Hall
406.994.3299
rebecca.koltz@montana.edu

Professors
- S. Bailey; extension specialist, family and human development
- J.C. Christopher; mental health, counseling
- S. Christopher; community health
- D. Heil; exercise science
- M. Nelson; school counseling
- L. Paul; extension specialist, food and nutrition
- C. Stewart; adaptive physical education, sport pedagogy, coaching

Associate Professors
- A. Harmon; food and nutrition/sustainable food systems
- D. Haynes; family and consumer sciences
- H. Hunts; family and consumer sciences
- B. Letiecq; family health
- L. Massey; early childhood education/child services
- M. Miles; exercise science/nutrition
- S. Osborne; family and consumer sciences
- L. Owens; health enhancement teaching K-12
- J. Seifert; exercise science
- A. Smith; marriage and family counseling
A minimum of 30 credits is required for the Master of Science degree in exercise and nutrition sciences, family and consumer sciences, and health promotion and education. Both thesis and non-thesis plans are available. Because of professional licensure requirements, a minimum of 60 credits is required for the counseling programs. The school counseling program requires a minimum of 48 credits. Transfer credits may not exceed the limit of nine set by the Graduate School and must be assessed by the respective graduate coordinator before acceptance to the program.

Admission
In addition to the requirements listed in the Application Requirements and Admission Policies sections, admission requirements for specific options can be obtained from the department web site at www.montana.edu/hhd or by calling (406) 994-3242.

Provisional admission as a graduate student is possible if there is a deficiency in one or more of these areas. Students accepted provisionally will be required to: 1) successfully complete the undergraduate prerequisites for graduate-level classes, 2) successfully complete the specific undergraduate or graduate classes needed for acceptance, and/or 3) take a required course load and earn a specific grade point average while on a provisional status.

Counseling Program Options
The Department of Health and Human Development offers a Master of Science degree with an option in counseling (marriage and family counseling) and a Master of Education degree with an option in school counseling. All three programs, marriage and family counseling, mental health counseling, and school counseling are accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). The marriage and family and mental health counseling programs are 60 credits and require a minimum of two years of study. The school counseling option is 48 credits. All programs are designed to meet Montana licensure requirements for professional counselors. Students obtain up to 1,500 hours supervised counseling experience and training in core counseling areas. Completed applications must be filed by February 15 as students are expected to begin their graduate program the following summer session. Applications are screened only once each year following the February 15 deadline. A maximum of 25 students shall be admitted into the counseling areas each year.

Interested students may obtain more descriptions by visiting the department web site at www.montana.edu/hhd or by calling (406) 994-3241.

Marriage and Family Counseling
The 60-credit marriage and family counseling program prepares counselors to address mental health and relationship problems from a family systems perspective. Students are taught a conceptual framework for assessment and intervention which focuses on the multiple systems and family context of individual development. Emphasis is on a positive, competency-based view of individual and family strengths. This approach examines the larger environments in which individuals and families interact and the plethora of influences (i.e. social, cultural, and economic) that affect human growth and development. Interpersonal issues between family members and the family and outer environmental systems are highlighted.

In addition to family systems theory, students are well grounded in individual and group counseling theories. Collaboration between marriage and family counselors and other mental health care providers is emphasized.

Graduates of the program qualify for certification through The National Academy for Certified Family Therapists (an affiliate of the International Association of Marriage and Family Counselors). Upon completion of this program and additional licensing requirements, graduates are eligible to apply for clinical privilege with Montana’s mental health centers.

### Summer

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDCO 502</td>
<td>Counseling Ethics/Orientation</td>
<td>2</td>
</tr>
<tr>
<td>HDCO 508</td>
<td>Counseling Theories I</td>
<td>3</td>
</tr>
<tr>
<td>HDCO 558</td>
<td>Career Counseling</td>
<td>2</td>
</tr>
</tbody>
</table>

### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDCO 503</td>
<td>Professional Issues</td>
<td>3</td>
</tr>
<tr>
<td>HDCO 510</td>
<td>Counseling Theories II</td>
<td>3</td>
</tr>
<tr>
<td>HDCO 521</td>
<td>Counseling Skills Lab</td>
<td>1</td>
</tr>
<tr>
<td>HDCO 522</td>
<td>Group Counseling</td>
<td>3</td>
</tr>
</tbody>
</table>
The 60-credits mental health counseling program prepares counselors to apply principles of psychotherapy, human development, learning theory, group dynamics and the etiology of mental illness and dysfunctional behavior in their work and a variety of mental health facilities.

The mental health counseling area of study provides students with 700 hours of supervised experience in appraisal, individual, group counseling, and consultation in primarily clinical and community agencies. Upon completion of the program, students may qualify for national certification as Clinical Mental Health Counselors. Additionally, after the completion of a specific number of postgraduate supervised hours, graduates may obtain licensure.

**Spring**
- HDCO 525 Addictions Counseling.......................2
- HDCO 525 Counseling Children & Adolescents....3
- HDCO 564 Diagnosis & Mental Health..............3
- HDCO 568 Mental Health Methods & Treatment...3
- HDCO 571 Prof Counseling Practicum................3

**Fall**
- HDCF 563 Multicultural Awareness....................3
- HDCO 554 Developmental Theory & Concept.......3
- HDCO 565 Marital and Relationship Couns........3
- HDCO 598 Internship.................................2

**Spring**
- HDCO 551 Appraisal.......................................3
- HDCO 506 School Counseling Programs...............3
- HDCO 554 Developmental Theory & Concept.......3

**Fall**
- HDCO 525 Addictions Counseling.......................2
- HDCO 598 Internship......................................2
- XXX Electives ...............................................8

**Program Total** 60

**Partial List of Electives**
- EDCI 502 Educational Stats II .........................3
- HDCO 529: Adventure Counseling......................3
- HDCO 530 Mind Body Medicine..........................3
- HDCO 556 Sexuality Counseling........................3
- HDCO 568 Mental Health Methods.....................3
- HDCO 575 Professional Paper............................4

**Mental Health Counseling**

The 60-credits mental health counseling program prepares counselors to apply principles of psychotherapy, human development, learning theory, group dynamics and the etiology of mental illness and dysfunctional behavior in their work and a variety of mental health facilities.

The mental health counseling area of study provides students with 700 hours of supervised experience in appraisal, individual, group counseling, and consultation in primarily clinical and community agencies. Upon completion of the program, students may qualify for national certification as Clinical Mental Health Counselors. Additionally, after the completion of a specific number of postgraduate supervised hours, graduates may obtain licensure.

**Summer**
- HDCO 502 Counseling Ethics/Orientation............2
- HDCO 508 Counseling Theories I......................3
- HDCO 558 Career Counseling..........................2

**Fall**
- HDCO 503 Professional Issues........................3
- HDCO 510 Counseling Theories II....................3
- HDCO 521 Counseling Skills Lab.....................1 credit
- HDCO 522 Group Counseling............................3

**Spring**
- HDCO 530 Mind Body Medicine........................3
- HDCO 564 Diagnosis and Mental Health.............3
- HDCO 568 Mental Health Methods & Treatment.....3
- HDCO 571 Prof Counseling Practicum...............3

**Fall**
- HDCF 563 Multicultural Awareness....................3
- HDCO 554 Developmental Theory & Concept.......3
- HDCO 598 Internship......................................2
- Electives ......................................................3

**Spring**
- HDCO 525 Addictions Counseling.......................2
- HDCO 598 Internship......................................2
- XXX Electives ...............................................8

**Program Total** 60

**Partial List of Electives**
- HDCO 525 Counsel Child and Adolescent.............3
- HDCO 526 Adventure Counseling.....................3
- HDCO 556 Sexuality Counseling.....................3
- HDCO 565 Marital & Relationship Couns...........3
- HDCO 569 Advanced Family Counseling.............3
- HDCO 575 Professional Paper.........................4

**School Counseling**

The Master of Education in School Counseling is a 48-credit program designed to prepare students to work in public or private schools as professional counselors. Upon completion, students are eligible to apply for certification as a school counselor with the Montana Office of Public Instruction. School counselors in Montana can be certified with a class 6 (specialist) certificate (for those without a Montana teaching certificate), or certified with a Guidance and Counseling endorsement on a Montana teaching certificate. In addition, graduates may apply for licensure as a licensed professional counselor with the Board of Social Work Examiners and Professional Counselors after completing 2200 hours (postgraduate) of supervised counseling experience in the field.

School Counseling students take a common core of counseling and human development courses. This core of course work provides all students with the knowledge and skills necessary to be a professional counselor and follows the standards developed by CACREP. In addition, students in the School Counseling option also study aspects of counseling germane to the school setting. The program focuses on a comprehensive and developmental approach to designing and implementing a school counseling program, and follows the standards developed by the American School Counselor Association. The program emphasis strives to provide the necessary self-awareness, knowledge, and skills for counseling students to become competent and capable professional school counselors.

**Fall**
- EDCI 506 Educational Research......................3
- HDCO 510 Counseling Theories II....................3
- HDCO 521 Counseling Skills Lab.....................1 credit
- HDCO 522 Group Counseling............................3

**Spring**
- HDCO 525 Addictions Counseling.......................2
- HDCO 598 Internship......................................2
- XXX Electives ...............................................8

**Program Total** 48

**Family and Consumer Sciences Option**

The Department of Health and Human Development offers a Master of Science degree with an option in family and consumer sciences. The option offers an area of study in early childhood education/child development and family science. Students must successfully complete a 36-credit minimum course of study. Interested students may obtain descriptions by visiting the department web site at www.montana.edu/hhd.

**Early Childhood Education/Child Development Program**

The Early Childhood Education/Child Development master’s program requires 36-credits of course work and offers both a non-thesis and thesis option. A non-thesis requires the completion of a professional paper or project that is designed by the student.
A thesis is recommended for individuals interested in pursuing scholarly research or continuing on in a Ph.D. program. The early childhood program emphasizes the advanced study of education, care, and development of children within the context of families, educational and human service settings, communities, and societies. The program focuses on early education, child development, families in social context, and research methods and design. Flexibility within the program enables students to select supporting courses in the areas of specialized early childhood education, working with adults, business, administration, program evaluation and policy, research, internship and individual studies. Students are encouraged to be creative in the development of their program to help them accomplish their professional goals. Students develop skills necessary for working with diverse children and families, planning, developing, implementing, and evaluating programs for children and families, and conducting research. The program prepares students for a variety of careers in early childhood settings, child care related programs and businesses, child-related community, state or federal agencies, non-profit settings, early intervention settings, public policy, parent education, and teaching adults.

**Thesis Option (Plan A)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 501 Educational Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 555 Persp Child &amp; Adolescent Dev</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 563 Multicultural Awareness</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 598 Internship</td>
<td>3</td>
</tr>
<tr>
<td>HDPE 590 Master's Thesis</td>
<td>3</td>
</tr>
</tbody>
</table>

**Take one of the Following**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 506 App Educ Research</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 507 Qualitative Methods</td>
<td>3</td>
</tr>
<tr>
<td>HDHI 512 Research Des in HHD</td>
<td>3</td>
</tr>
</tbody>
</table>

**Supporting Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHD 512 Research Design in HHD</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Program** 36

**Non-Thesis Option (Plan B)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPE 555 Persp Child &amp; Adolescent Dev</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 563 Multicultural Awareness</td>
<td>3</td>
</tr>
<tr>
<td>HDCF 575 Prof Paper/Project</td>
<td>4</td>
</tr>
<tr>
<td>HDPE 598 Internship</td>
<td>3</td>
</tr>
</tbody>
</table>

**Take one of the Following**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 506 App Educ Research</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 507 Qualitative Methods</td>
<td>3</td>
</tr>
<tr>
<td>HDHI 512 Research Des in HHD</td>
<td>3</td>
</tr>
</tbody>
</table>

**Supporting Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHD 512 Research Design in HHD</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Program** 36

### Family Science Program

This program is structured to prepare scholars in the field of family science. Students have the opportunity to develop skills necessary for professional achievement in basic and applied research settings and in public and private organizations. The strength of this master’s program is based on its focused study of the health and well-being of families. One goal of the program is to facilitate student proficiency in producing and consuming research. Curriculum development, program, evaluation, and policy analysis are also emphasized. Nonthesis and thesis plans are available. A nonthesis plan requires the completion of a professional paper and additional course work. Students can also choose to do an internship in a professional setting to further enhance their understanding of the family field. Students must successfully complete a 36-credit minimum course of study. Interested students may obtain more information about the program by visiting the department web site at www.montana.edu/hhd or by contacting Bethany Letiecq at 406.994.7396 or via e-mail at bletiecq@montana.edu.

- EDCI 201 Educational Statistics ...........................................3
- HDCF 555 Current Res in Child/Adol Dev ................................3
- MDCF 563 Multicultural Awareness .........................................3
- or HDPE 464 Gen, Race, Class, Fam Dev ....................................3
- HDPE 576 Internship ..................................................................3
- HDPE 590 Master's Thesis .......................................................3
- (Plan A Only) ...........................................................................3
- HDPE 520 Curriculum Design ..................................................3
- HHD 501 Prof Comm Skills in HHD ............................................3
- HHD 512 Research Des in HHD ................................................3
- or POLS 559 Prog Eval & Policy ..............................................3
- or HDCF 425 Fam Law & Pub Policy ...........................................3

### Exercise and Nutrition Sciences Option

The Department of Health and Human Development offers a Master of Science degree with an option in exercise and nutrition sciences with two programs of study: 1) exercise physiology and nutrition, and 2) sport and coaching sciences. The exercise physiology and nutrition program allows students to focus on understanding the determinants of physical activity and energy expenditure, adaptations to exercise that impact human work performance and disease risk, and exercise metabolism and nutrition. Although not required, a graduate student may simultaneously complete course work needed to become a Registered Dietitian. The sport and coaching sciences program is designed to meet the need in advanced coaching and sport science abilities at the local, state, national and international levels. Course work includes knowledge pertinent to coaches of all sports at developmental, competitive, and high performance levels as well as sport administrators in both public and private sectors. Interested students may obtain descriptions by calling (406) 994-3242, or visiting the department web site at www.montana.edu/hhd. Depending on the students’ goals, undergraduate degree, and course work, additional courses may be added or deleted to supplement the curriculum.

**Required Courses for all Exercise Physiology and Nutrition programs:**

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPE 515 Exercise Performance &amp; Nutr</td>
<td>3</td>
</tr>
<tr>
<td>or HDPE 545 Graduate Exercise Physiology</td>
<td>3</td>
</tr>
<tr>
<td>HHD 501 Prof Communications in HHD</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 401 Stat for Researchers</td>
<td>3</td>
</tr>
<tr>
<td>or EDCI 501 Educ Statistics</td>
<td>3</td>
</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPE 465 Exercise Test &amp; Prescrip</td>
<td>4</td>
</tr>
<tr>
<td>or Elective</td>
<td>4</td>
</tr>
<tr>
<td>HHD 512 Research Design in HHD</td>
<td>3</td>
</tr>
<tr>
<td>or NUTR 511 Exercise Metabolism &amp; Health</td>
<td>3</td>
</tr>
</tbody>
</table>

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPE 515 Exercise Performance &amp; Nutr</td>
<td>3</td>
</tr>
<tr>
<td>or HDPE 545 Grad Exercise Phys</td>
<td>3</td>
</tr>
<tr>
<td>NUTR 411 Nut for Sport &amp; Ex</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPE 575 Research or Prof Paper/Project</td>
<td>3-6</td>
</tr>
<tr>
<td>or HDPE 590 Thesis</td>
<td>10</td>
</tr>
<tr>
<td>Electives</td>
<td>3-6</td>
</tr>
</tbody>
</table>

**Total Program** 36/38

### Required Courses for Sport and Coaching Sciences program:

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCI 501 Educational Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>HDHL 455 The Ethic of Care</td>
<td>3</td>
</tr>
<tr>
<td>or HDPE 445R Applied Sport Psychology</td>
<td>3</td>
</tr>
<tr>
<td>HHD 501 Prof Communications in HHD</td>
<td>3</td>
</tr>
</tbody>
</table>
Food, Family and Community Health Sciences Option

The Department of Health and Human Development offers a Master of Science degree with an option in exercise and nutrition sciences with two programs of study: 1) exercise physiology and nutrition, and 2) sport and coaching sciences. The exercise physiology and nutrition program allows students to focus on understanding the determinants of physical activity and energy expenditure, adaptations to exercise that impact human work performance and disease risk, and exercise metabolism and nutrition. Although not required, a graduate student may simultaneously complete course work needed to become a Registered Dietitian. The sport and coaching sciences program is designed to meet the need in advanced coaching and sport science abilities at the local, state, national and international levels. Course work includes knowledge pertinent to coaches of all sports at developmental, competitive, and high performance levels as well as sport administrators in both public and private sectors. Interested students may obtain descriptions by calling (406) 994-3242, or visiting the department web site at www.montana.edu/hhd. Depending on the students’ goals, undergraduate degree, and course work, additional courses may be added or deleted to supplement the curriculum.

Family and Community Health Program credits

Fall
- HHD 501 Prof Communications in HHD .................................. 3
- EDCI 501 Educational Statistics I ........................................... 3

Spring
- HDPE 554 Devel Theory Across the Lifespan ...................... 3
- HDHL 502 Research Design in HHD ................................. 3
- Electives tailored to program ........................................... 6

Fall
- HHD 501 Prof Communications in HHD .................................. 3
- Electives tailored to program ........................................... 6

Spring
- HDCF 563 Multicultural Awareness ................................... 3
- Electives tailored to program ........................................... 6

Electives (other electives can be approved by the advisor)
- EDCI 502 Educational Statistics II .................................... 3
- EDCI 507 Qualitative Educational Research .................. 3
- HDPE 506 Exercise and Chronic Disease ............................ 3
- HDPE 520 Curriculum Design ....................................... 3
- MDES 562 US Healthcare Systems ................................ 3
- BMGT 469 Community & Social Entrepreneur .......... 3
- NASN 522 Contemporary Issues in Gerontologic Nursing 3
- NASN 530 Federal Law & Indian Policy .......................... 3
- PSCI 550 Prog Eval & Policy Analysis ............................ 3
- SFBS 499 Small Bus & Entre in Food & Health ............ 3
- SFBS 551 Global Food Perspectives ................................ 3
- Total Program .......................................................... 30-37

Sustainable Food Systems Program:

Fall
- HHD 501 Prof Communications in HHD .................................. 3
- STAT 401 Statistics for Researchers ................................. 3
- EDCI 501 or Educational Statistics I ............................... 3
- Electives tailored to program ........................................... 6

Spring
- SFBS 451 Sustainable Food Systems ................................ 3
- SFBS 541 Culinary Marketing: Farm to Table (Summer) .......... 3
- HDHL 512 Research Design in HHD ................................. 3
- Electives tailored to program ........................................... 6

Fall
- SFBS 551 Global Food Perspectives ................................ 3
- SFBS 598 Internship ..................................................... 3
- Electives tailored to program ........................................... 3

Spring
- SFBS 575 or SFBS 590 Research Prof Paper/Project or Thesis ........................................... 5 or 10
- Electives tailored to program ........................................... 96

Electives (other electives can be approved by the advisor)
- HDCF 429 Small Bus & Entre in Food & Health ............ 3
- HDPE 563 Multicultural Awareness ................................... 3
- HDHL 455 The Ethic of Care ......................................... 3
- HDHL 502 Research Design in HHD ................................. 3
- HDHL 502 Health Disparities ........................................ 3
- HDHL 599 Research Design in Health ............................. 3
- HDHL 590 Thesis ....................................................... 10
- HDPE 506 Exercise and Chronic Disease ............................ 3
- HDPE 520 Curriculum Design ....................................... 3
- MDES 562 US Healthcare Systems ................................ 3

Total Program .......................................................... 30-37

Financial Assistance

Teaching assistantships may be available within the Department of Health and Human Development. Assistantships are typically nine-month appointments. Counseling assistantships may include a summer appointment in addition to the academic year appointment. Research assistantships may be available with individual faculty members who have funded grants or contracts. Stipends vary depending on the type of appointment, the requirements of the job, the experience of the applicant, and available funding.

See the Graduate Assistantships sections for detailed information on appointment criteria. Assistantships are requested from the student’s home department.

COLLEGE OF ENGINEERING

Dr. Robert J. Marley, Dean, and Director of the Engineering Experiment Station
Dr. Anne K. Camper, Associate Dean for Research and Graduate Studies
Heidi M. Sherick, Assistant Dean for Undergraduate Programs and Diversity

Graduate Programs Available
- Master of Construction Engineering Management (M.C.E.M)
- M.S. in Chemical Engineering
- M.S. in Civil Engineering
- M.S. in Computer Science
- M.S. in Electrical Engineering
- M.S. in Environmental Engineering (Please see Interdisciplinary Programs)
- M.S. in Industrial and Management Engineering
- M.S. in Mechanical Engineering
- Ph.D. in Computer Science
- Ph.D. in Engineering

DEPARTMENT OF CIVIL ENGINEERING

Montana State University
Po Box 173900
Bozeman, MT 59717-3900
Tel: (406) 994-2111
www.coe.montana.edu/ce
cedep@ce.montana.edu

Department Head
Dr. Warren Jones

Professors
- E.E. Adams; engineering mechanics, continuum and snow mechanics.
- A.K. Camper; water quality and treatment, environmental engineering.
- A.B. Cunningham; water resources, environmental engineering.
- J.D. Dent; engineering mechanics, snow mechanics.
- J.J. Fedock; structural engineering.
- B.W. Gunnink; construction engineering, geotechnical engineering.
- T.E. Lang; solid mechanics.
- Z. Lewandowski; environmental engineering.
- S.W. Perkins; geotechnical and pavements engineering.
- O.R. Stein; water quality management, hydraulics, erosion and sedimentation.
- J.E. Stephens; structural engineering, blast-resistant structures.
- R.D. VanLuchene; structural engineering, computer analysis of structures.

Associate Professors
- J.E. Cahoon; overland flow, soil-plant-water relationships, soil physics, hydraulics, river engineering.
- W.L. Jones; environmental engineering.
- R.G. Oakberg; engineering mechanics.

Assistant Professors
- A. Al-Kaisy; transportation engineering.
- M. Berry (research); structural engineering.
- P.M. Knoll; construction engineering.
- A. Larsson (adjunct); structural engineering.
- W.A. Lutey; construction management.
- P.T. McGwen; travel modeling, transp. safety, highway-wildlife interactions, adv. tech. in transportation.
- R.L. Mokwa; soils, foundations, soil-structure interaction, transportation.
- D.J. Peterson; construction management.
- D.E. Smith (adjunct); surveying engineering.

Instructors
- C.L. Crayton (adjunct); environmental engineering.
- S.A. Keller (adjunct); transportation engineering.
- L.R. McKittrick (research, adjunct); engineering mechanics.
- S.C. Morrical (adjunct); concrete engineering.
- S. Sadik (adjunct); engineering mechanics.

Degree Offered
- M.S. in Civil Engineering
- M.S. in Environmental Engineering
- M.S. in Land Rehabilitation
- Master of Construction Engineering Management (MCEM)
- Ph.D. in Engineering

Options:
- Applied Mechanics
- Civil Engineering
- Environmental Engineering

The department offers graduate study leading to the Master of Science degrees in Civil Engineering, Environmental Engineering, and an interdisciplinary Master of Science degree in Land Rehabilitation. The department also participates in the Doctor of Philosophy degree in Engineering through the College of Engineering.

The M.S. program is also available following a concurrent schedule of undergraduate and graduate classes starting the senior year, allowing a Bachelor of Science degree and a Master of Science degree to be obtained in a total of ten semesters of study. This program is intended for qualified students interested in an advanced degree for practitioners, for which the civil engineering work place is currently seeing an increased demand. Contact the department for further information on this program.

In addition, a Master of Construction Engineering Management (MCEM) degree is available (see description below).

For the M.S. and Ph.D. degrees, major study is offered in various combinations of the subject areas of transportation engineering, geotechnical engineering, fluid mechanics, hydraulic and hydrologic engineering, structural engineering, engineering mechanics, and environmental engineering.

Admission
A bachelor’s degree in a similar engineering field is normally required for admission to the graduate programs in the department, although graduates in the physical and life sciences may be accepted. In certain cases a student may be required to make up subject area deficiencies.

For admission to the Ph.D. program in engineering, the student is required to have earned an M.S. degree in engineering at an accredited college or university or have successfully completed an equivalent amount of advanced study acceptable to the faculty in civil engineering.

For more detailed information, interested students are referred to the Admission Policies and Application Requirements sections. Successful applicants are accepted into both the department and The Graduate School.

Program Requirements: MS Degree
Students may pursue the M.S. degree in any of the programs offered in this department under either Plan A or Plan B. Plan A requires a minimum of thirty (30) credits of acceptable coursework, including a thesis. Plan B requires a minimum of thirty (30) credits of acceptable coursework, including a maximum of six (6) credits of CE 575 and ENVE 575 (Professional Paper). In addition, one (1) credit of CE 500 (Seminar) is required for both Plans A and B.

Some research experience, acceptable to the student’s graduate committee, is required of all M.S. students. A Plan A student prepares a thesis that is submitted to the student’s graduate committee and defended at the oral comprehensive examination. A Plan B student prepares a professional paper that is submitted to the student’s advisor and presented at a CE 500 seminar.

Candidates for the M.S. degree must pass a written comprehensive examination near the completion of their graduate program. A Plan A student must pass an oral comprehensive examination as well. Students are expected
to be familiar with the degree requirements of both the department and the College of Graduate Studies. Refer to the For Master’s Students section.

Curriculum requirements are highly individualized and established in consultation with and approved by the student’s graduate committee.

Program Requirements: Ph.D. Degree

Refer to the College of Engineering and For Doctoral Students sections.

Interdisciplinary M.S. Degree in Land Rehabilitation

The Department of Civil Engineering participates in the interdisciplinary M.S. degree in Land Rehabilitation. This program offers advanced study in disturbed land rehabilitation, site revegetation, soil remediation, riparian zone restoration, stream channel restoration, investigation of impacted geologic resources, and remediation of contaminated sites. Students wishing to obtain an M.S. in Land Rehabilitation through the Department of Civil Engineering are referred to the Interdisciplinary M.S. Degree in Land Rehabilitation description in the College of Agriculture section.

Master of Construction Engineering Management (MCEM)

The MCEM program is designed to provide education for entry into the construction industry and the background for continuing education and advancement in the industry. It has a structured curriculum, with emphasis on oral and written communications and team skills.

Students with a GPA of 3.0 or above may apply for this program at the start of their senior year. With advanced curriculum planning that schedules interdisciplinary courses taught in alternate years, early admission should allow a student to complete both the remaining Bachelor of Science degree requirements and MCEM degree requirements in two years. A capstone construction project course provides a creative dimension and allows for integration and application of the skills a student has acquired. Successful applicants are accepted into both the department and the College of Graduate Studies.

The following thirty (30) credits are required for completion of the Master of Construction Engineering Management degree:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 504 Construction Productivity</td>
<td>3</td>
</tr>
<tr>
<td>CE 505 Qual Assur./Risk Mgmt</td>
<td>3</td>
</tr>
<tr>
<td>CE 506 Adv Construct Mgmt</td>
<td>3</td>
</tr>
<tr>
<td>CE 575 Prof Paper &amp; Project</td>
<td></td>
</tr>
<tr>
<td>XXX Professional Electives</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
</tr>
</tbody>
</table>

Six professional electives are required from approved multi-disciplinary areas. Electives must be 400/500 level and approved by the department.

This multi-disciplinary graduate construction management curriculum is structured to mesh with the Construction Engineering Technology (CET) undergraduate curriculum. Students applying for admission to the MCEM program from disciplines other than CET must complete or have the equivalents of thirty-six (36) semester credits of required preparatory undergraduate coursework prior to entrance into the MCEM program.

Program course requirements, as well as other detailed information, are available from the department. Students are expected to be familiar with both department and Division of Graduate Education degree requirements (see the For Master’s Students section).

Research Facilities

The research facilities of the department include well-equipped laboratories for bituminous materials, concrete, hydraulics and irrigation, fluid mechanics, structures, stress analysis, computer analysis, photogrammetry, geotechnical engineering, and environmental engineering. Civil Engineering students also frequently utilize the research facilities of the Center for Biofilm Engineering (CBE), the Western Transportation Institute (WTI) and the Subzero Science and Engineering Laboratory.

Financial Assistance

A number of teaching and research assistantships are available in the department for students who qualify. Teaching assistantships involve assisting professors with the conduct of classes including preparation and grading. Research assistantships provide the opportunity for work on a research project under the direction of a faculty member. Results of the research done on an assistantship may form the basis for the graduate student’s thesis or professional paper. See the Graduate Assistantships sections for detailed information on appointment criteria.

DEPARTMENT OF CHEMICAL AND BIOLOGICAL ENGINEERING

Montana State University
Po Box 173920
Bozeman, MT 59717-3920
Tel: (406) 994-2221
www.chbe.montana.edu
che_b@montana.edu

Interim Department Head

Brent Peyton, Ph.D.

Professors

- R.W. Larsen; modeling and transport phenomena, engineering education
- J.F. Mandell; composite materials, materials behavior, fracture mechanics, wind energy
- B.M. Peyton; extremophile bioprocessing, biofilms, bioremediation
- P.S. Stewart; biofilm engineering.

Associate Professors

- R. Gerlach; biofilm barriers, bioremediation, bacterial transport in porous media, extremophilic biofilms, biofuels
- J.D. Seymour; magnetic resonance microscopy, membrane and separation science transport, transport in porous media, suspension, granular and colloidal rheology, materials characterization
- D.L. Shaffer; hazardous waste.

Assistant Professors

- R.P. Carlson; biochemical eng., systems biology, metabolic eng., biofilm physiology and control
- A.M. Richards; microbial iron uptake under high salinity and/or pH, self assembly of iron-binding molecules, affect of microbial exudates on metal speciation and mobility
Research Professors
- M.C. Deibert; fuel cells
- G. Cokellet; suspension, granular and colloidal rheology

Degree Offered
- M.S. in Chemical Engineering
- M.S. in Environmental Engineering
- Ph.D. in Engineering

The department offers graduate programs leading to the Master of Science in Chemical Engineering degree and a Master of Science degree in Environmental Engineering. The department participates in the Doctor of Philosophy degree in Engineering through the College of Engineering, with options available in Chemical Engineering and Environmental.

Admission (M.S. and Ph.D.)
Students may enter the Master of Science or Doctoral programs with a bachelor’s degree in chemical engineering or other engineering or science discipline. Non-chemical engineering students wishing to pursue a master’s program may require limited remedial coursework. Students may be admitted directly to the doctoral program without a master’s degree. The Chemical and Biological Engineering department has an on-line Preliminary Application process, found on the CHBE website at www.chbe.montana.edu. For further information, refer to Admission Policies and Application Requirements sections.

Program Requirements:
(M.S. and Ph.D.)

The Master of Science program requires 30 credits total (including a minimum of 10 credits of CHBE 590: Masters Thesis). One half of total credits required for the degree must be at the 500 level. The chemical engineering program for students from other disciplines requires appropriate background remedial coursework in addition to the previously listed requirements. Refer to the For Master’s Students section.

The Ph.D. program requires specific coursework, depending on the option, 60 total credits (18 thesis credits).

- Doctoral candidates will register for dissertation research in one of the five departments offering the above options. Course requirements for the Engineering Ph.D. include completion of 2 credits of EGEN 694, ENGR 610, two courses in Mathematical systems, a minimum of eighteen (18) credits of doctoral dissertation, and other courses chosen to support the proposed doctoral program that are approved by the candidate’s committee. All doctoral candidates will be required to pass three examinations: a Ph.D. Qualifying Examination taken during the first year of the student’s doctoral program, a Ph.D. Comprehensive Examination taken within two years of qualifying for the doctoral program, and a Ph.D. Dissertation Defense. Students are expected to be familiar with the individual program degree requirements as well as those of The Graduate School. For more information, see the For Doctoral Students section.

Research

Coordinating Departments:
Chemical and Biological Engineering. This degree involves research in transport phenomena in complex systems, materials, biofilms, biochemical transformation, biotechnology, remediation of hazardous wastes, and environmental engineering. Research topics include extremophilic bioprocessing, in situ biocatalyzed heavy metal biotransformations in natural and engineered biological systems, biomaterials, biorheology, colloidal system dynamics, duality of materials, surface interactions, membrane materials, composite materials, separations, metabolic engineering, metabolic systems analysis, biofuels processing.

Some departmental research is conducted in collaboration with the Center for Biofilm Engineering, the Thermal Biology Institute and MSU’s Surface Science Program. Research also includes materials science and engineering for energy applications including: high temperature corrosion and corrosion protection, advanced physical vapor deposition (PVD) technologies, and sustainable energy.

Financial Assistance
Research and teaching assistantships and scholarships are available on either a 9-month or a 12-month basis; only MS and Ph.D. candidates are eligible. The research done under an assistantship may form the basis for the thesis. See the Graduate Assistantship section for detailed information on appointment criteria.

DEPARTMENT OF COMPUTER SCIENCE

Montana State University
357 EPS Building
Bozeman, MT 59717
Tel: (406) 994-4780

www.cs.montana.edu
csinfo@cs.montana.edu

Department Head
John Paxton

Graduate Coordinators
Rafal Angryk (Ph.D.), Rocky Ross (Master’s)

Professors
- John Paxton; artificial intelligence, machine learning, computer science education.
- Rocky Ross; web-based active learning resources, theoretical computer science.
- Binhai Zhu; applied computational geometry, intelligent web searching, combinatorial optimization.

Associate Professors
- Brendan Mumey; applied algorithms, optimal and wireless networking, computational biology.
- John Sheppard; machine learning, evolutionary computation, fault diagnosis and prognosis.

Assistant Professors
- Rafal Angryk; data mining, database systems, mobile agents, artificial intelligence.
- Clem Izurieta; software engineering, software evolution, ecological modeling.
- Hunter Lloyd (adjunct); multimedia and Internet, Internet technologies, computer literacy.
- Mike Wittie; network design and management, distributed optimization, network economics.
• Qing Yang; wireless networks, mobile computing, vehicular networks, network security and privacy.

Degrees Offered
• M.S. in Computer Science
• Ph.D. in Computer Science
• M.S. Degree Program

A Bachelor’s degree in Computer Science is recommended. Students with non-computer science degrees at the Bachelor’s level or above are also encouraged to apply; such students will generally be required to take appropriate courses while enrolled at MSU to make up computer science and related subject matter deficiencies prior to full acceptance into the computer science Master’s program. Factors that the department uses in its admissions process include GRE scores, TOEFL scores (for non-native English speakers), reference letters, GPA and previous coursework. For more information, please refer to http://www.cs.montana.edu/masters-degree.

Details about applying can be found at www.montana.edu/gradstudies/apply.shtml.

Ph.D. Degree Program
It is recommended that applicants for the Ph.D. program have a Master’s degree in computer science. Exceptional applicants with a Bachelor’s degree in computer science may apply directly to the Ph.D. program.

Admission to the doctoral program follows the requirements of The Graduate School. Factors that the department uses in its admissions process include GRE scores, TOEFL scores (for non-native English speakers), reference letters, GPA and previous coursework. For more information, please refer to http://www.cs.montana.edu/phd-degree.

Details about applying can be found at www.montana.edu/gradstudies/apply.shtml. The Computer Science Department encourages applicants to use the online application procedure.

Program Requirements: M.S. Degree

Students may pursue the Master’s degree under a thesis option, a project option or a courses only option. For more information, please refer to http://www.cs.montana.edu/masters-degree.

Master’s candidates must take an oral comprehensive exam near the completion of their graduate program. Required courses include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 552 Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 558 Computability</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 580 Master’s Project (project option only)</td>
<td>4</td>
</tr>
<tr>
<td>CSCI 590 Master’s Thesis (thesis option only)</td>
<td>10</td>
</tr>
</tbody>
</table>

Ph.D. Degree

A Ph.D. student must complete a minimum of 60 credits of coursework beyond the Bachelor’s degree or a minimum of 36 credits of coursework beyond the Master’s degree. The degree requirements for the Ph.D. degree are found at http://www.cs.montana.edu/phd-degree. Required courses include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Courses from the following theory courses.</td>
<td></td>
</tr>
<tr>
<td>CSCI 552 Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 558 Computability</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 690 Doctoral Thesis</td>
<td>18</td>
</tr>
</tbody>
</table>

At least 4 courses from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCI 540 Advanced Database Systems</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 541 Computer Graphics</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 547 Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 550 Data Mining</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 551 Advanced Computational Biology</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 556 Advanced Networking</td>
<td>3</td>
</tr>
<tr>
<td>CSCI 575 Computational Research Topics</td>
<td>3</td>
</tr>
</tbody>
</table>

Research Experience
Thesis Option Master’s degree students gain research experience through their thesis and are expected to submit the results of their thesis work to at least one journal or conference. Project Option Master’s degree students gain some research experience in the context of their project. Ph.D. students gain research experience through their doctoral work, journal or conference submissions, and attending conferences.

PhD Research Facilities
Graduate research and coursework can be performed on systems owned and operated by the Computer Science Department. On-campus work is typically performed in laboratories or graduate student offices. A typical machine is a dual boot (Linux / Windows) PC. Intel-based Macs running OSX are also available. Outside the department, the MSU Information Technology Center provides additional computing infrastructure.

Computer Science is completely housed in MSU’s high technology Engineering and Physical Sciences building.

Financial Assistance
A number of research and teaching assistantships are available for qualified graduate students. These appointments are normally for half-time assignments (20 hours per week) during the academic year. Some appointments may also be available during the summer. Assistantships will only be offered to formally admitted graduate students. See the appropriate CS M.S. degree or Ph.D. degree website for more information.

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

610 Cobleigh Hall
PO Box 173780
Bozeman, MT 59717-3780

Telephone: (406) 994-2505
Fax: (406) 994-5958
Email: ccedept@ece.montana.edu
Web site: www.ece.montana.edu/ee/

Department Head
Dr. Robert C. Maher, Professor

Graduate Coordinator
Dr. Todd Kaiser, Associate Professor

Professors
• David Dickensheets; optical microscopy and tissue imaging, silicon micromachining and Micro-Opto-Electro-Mechanical Systems (MOEMS), miniature imaging and spectroscopy instruments.
• Robert Maher; digital signal processing, audio engineering, and acoustics.
• Bruce McLeod; electromagnetic fields in biological materials.
• M. Hashem Nehrir; alternative energy distributed power generation systems, load management, power system stability, fuel cells.
• Joseph Shaw; optical remote sensing system design and application, lidar, radiometry, polarimetry, optical phenomena in nature.
• Richard Wolff, Gilhousen Telecommunications Chair; optical networks, packet switching, wireless systems, satellite communications, rural and private networks, telematics.

Associate Professors
• James Becker; silicon micromachining for millimeter wave applications, microwave and millimeter-wave electronics applications.
• Hongwei Gao; electric motor drives, power electronics, electric vehicles, renewable energy.
• Todd Kaiser; Micro-Electro-Mechanical Systems (MEMS).
• Kevin Repasky; laser research and development, laser remote sensing, electro-optics, feedback and control, optical technology development for communications.
• Steven Shaw; fuel cells, signals and systems, system identification, control, modeling, optimization, Instrumentation and circuit design.
• Ross Snider; signal processing, speech recognition, real-time systems, auditory and visual neuroscience.

Assistant Professors
• Brock LaMeres; high speed digital design, programmable logic, interconnect systems, microprocessor and microcontroller based systems.
• Wataru Nakagawa; near-field optical Interactions In nanostructures, scanning near-field optical microscopy (SNOM), and novel photonic devices based on nanostructures and near-field optical phenomena.

Research and Adjunct Faculty
• Robert Gunderson; controls and robotic systems.
• Phil Himmer; microfabrication, miniature optical systems.
• Yikun Huang; Wireless communications, smart antennas, adaptive signal processing, computational biology.
• Randy Larimer; embedded systems, computer engineering.
• Andy Olson; communications, communications electronics, active and passive microwave circuits.

Degrees Offered
• M.S. in Electrical Engineering
• M.Eng in Electrical Engineering
• Ph.D. in Engineering, Electrical & Computer Engineering option

The department offers graduate study and research leading to the Master of Science degree in Electrical Engineering, the Master of Engineering in Electrical Engineering, and the Doctor of Philosophy degree in Engineering, Electrical & Computer Engineering option. Fields in which the student may specialize include communication systems, computation systems, energy and materials, Micro-Electro-Mechanical Systems (MEMS), optical systems and photonics, and sensors and systems.

Admission
Admission to our graduate program requires a bachelor’s degree in electrical or computer engineering or a closely related field (for example, physics, computer science, Mathematics, etc.). Students with bachelor’s degrees in fields other than electrical and computer engineering (ECE) complete several additional courses to gain proficiency in key undergraduate ECE areas.

All applicants are required to submit scores from the General Test of the Graduate Record Examination (GRE) along with other application materials. A minimum quantitative GRE score of 680 is required, and most students in our program score significantly higher. A minimum verbal GRE score of 480 is recommended. Note that requirements based on the new GRE scoring system for all testing done after August 2011 will be available soon.

International students must have a minimum TOEFL score of 600 on the paper-based test, or 250 on the computer-based test, or 100 on the internet-based test, or a minimum IELTS score of 7.0 to be considered for admission with full standing.

Degree Requirements
Students may pursue the MS degree under either Plan A (thesis) or Plan B (professional paper). All MS students must pass the departmental Graduate Study Qualifying Examination. Plan A requires the completion of at least 20 credits of acceptable coursework and a 10-credit thesis. Under Plan B, a thesis is not required, but at least 27 credits of acceptable coursework and a 3-credit professional paper must be completed. Master’s candidates must take an oral comprehensive examination near the completion of their graduate program.

Students in the M.Eng program earn 30 course credits of acceptable coursework, of which at least 15 credits are in 500-600 level classes. It is typical for a Ph.D. student to earn 20-24 course credits above the M.S. level, in addition to an 18-credit dissertation. In progressing toward this degree, the student must pass the following examinations:

1. A written departmental Graduate Study Qualifying Examination administered to all doctoral students in their first year of work beyond the Master’s degree.
2. A comprehensive examination to be taken within two years of the qualifying examination and after completing two-thirds of their total coursework.
3. A final oral examination and defense of a dissertation based on the student’s research.

There is no foreign language requirement for the degrees.

EE Master of Engineering degree: 30 credits total (credits older than 6 years are not applicable to the degree):
• ≥ 15 500-600-level credits
• ≤ 9 credits of non-ECE classes
• ≤ 6 credits Independent Study (EELE 592)
• ≤ 3 credits pass/fail (excluding thesis)
• ≤ 6 credits challenged
• No credits of 488, 489, 490, 492, or 589

EE Master of Science degree with Thesis (Plan A): 30 credits total:
• 10 credits EELE 590, Master’s Thesis
• 20 course credits:
  • ≥ 10 500-600-level credits
  • ≤ 10 400-level credits
  • ≤ 4 credits Independent Study (EELE 592)
  • ≤ 10 credits 570 + seminars (594)
  • ≤ 3 credits pass/fail (excluding thesis)
  • ≤ 6 credits challenged
EE Master of Science degree with Professional Paper (Plan B):
30 credits total:
• 3 credits EELE 575, Professional Paper
• 27 course credits:
  •  ≥ 17 500-600-level credits
  •  ≤ 10 400-level credits
  •  ≤ 6 credits Independent Study
  (EELE 592)
  •  ≤ 10 credits 570 + seminars (594)
  •  ≤ 3 credits pass/fail
  •  ≤ 6 credits challenged

Ph.D. in Engineering, Electrical & Computer Engineering option:
• A minimum of 60 total credits
• All courses no more than ten (10) years old at time of graduation
• 3 credits Research & Experimental Methods in Engineering (ENGR 610) in 1st semester
• 2 credits Seminar (EGEN 694), taken just before the comprehensive examination
• 3 credits Advanced Math (committee approved)
• 3 credits Numerical Methods (committee approved)
• 18 credits dissertation (EELE 690)
• 31 additional course credits (400 and graduate level), distributed as follows:
  • 2/3rds of course credits at 500 level or above (strongly recommended)
  • 12 new credits in major area after master’s degree
  • 24 graded course credits from M.S. Degree (with committee approval, M.S. credits can be used to satisfy the advanced M and numerical methods Ph.D. requirements)
  • 9 additional credits (beyond 60) for Ph.D. students who do not first earn an M.S.
  • 6 credits Independent Study (EELE 594)
  • 9 credits pass/fail (excluding dissertation)
  • 9 credits challenged
  • No credits of 400, 470, 488, 489, 490, 575, 588, or 589 are allowed
  • 7 additional credits of graded coursework or EELE 690 (for a total of 49 graded class and dissertation credits).

Research Experience
Research experience is required of all Master’s students. This requirement is met by students in the Plan A program through their thesis work, whereas students in the Plan B program must fulfill this requirement through satisfactory participation in an acceptable research or practice-oriented project approved by the student’s advisor. Each student in Plan B must register for EELE 575 (Professional Paper) for three credits.

Research
Faculty and graduate students participate in research in the following main areas, which are continually developing:
• Communication Systems: wireless communication systems, ad-hoc networks, fiber optic communication components and systems, micro-machined mm-wave components, antennas, and atmospheric propagation.
• Computation Systems: biologically inspired signal processing, DSP hardware, novel computational techniques using FPGAs, micro-controllers and embedded systems, digital signal processing, optimal filtering, spectral envelope estimation, compression, audio and acoustical signal processing, and acoustic animal detection and recognition.
• Energy and Materials: fuel cells, fuel cell materials, fuel cell modeling and control; renewable resource and fuel cell distributed generation systems; fuzzy logic and neural network applications to power system control; load management; reduced-component power electronic design and motor drives.
• Optical Systems and Photonics: Micro-Optical-Electro-Mechanical Systems (MOEMS), micro-machined mirrors and applications in confocal microscopes, spectrometers, and sensors; optics of nanostructures and near-field optical interactions; optical remote sensing systems and applications; lidar development and applications to measuring atmospheric aerosols, clouds, and gases; radiometric and polarimetric imaging system development and calibration; optical sensors for detecting explosives and biological species; optical communication components, systems, and networks.
• Sensors and Systems: MEMS sensors and components; micro-machined sensors; lidars, laser sensors, radiometric and polarimetric imagers (see Optics section above); electronic sensors and systems for data acquisition and optical system control; acoustic and audio sensing of environmental noise and wildlife.

Research facilities in the department include: state-of-the-art electronics laboratories; optics laboratories with a variety of lasers, imagers, and electro-optical measurement tools; the Montana Microfabrication Facility with class 100, 1000, and 10,000 capabilities; a machine shop; a microwave and millimeter-wave electronics laboratory; a power and power electronics research laboratory; fuel cell characterization facilities; an audio and acoustics laboratory; and roof-port and roof-top facilities for optical remote sensing. Students have access to all the leading electronics, electromagnetic, and optical design and analysis software resources.

Financial Assistance
A number of research and teaching assistantships are available for qualified graduate students. All applicants are considered automatically for financial support and do not need to apply separately.

ENVIRONMENTAL ENGINEERING

Contact Civil or Chemical and Biological Engineering Departments
http://www.chbe.montana.edu or http://www.coee.montana.edu/ce/che_b@coe.montana.edu or cedept@ce.montana.edu
Participating Faculty

Civil Engineering
- J. E. Cahoon; hydraulics, river engineering, soil physics, porous media and overland flow.
- A. K. Camper; water treatment and distribution.
- A.B. Cunningham; groundwater contamination.
- W.L. Jones; biological treatment process, hazardous waste.
- Z. Lewandowski; water/wastewater treatment, instrumentation.
- O.R. Stein; water quality management, hydraulics, erosion and sedimentation.

Chemical and Biological Engineering
- R.P. Carlson; biochemical eng., systems biology, metabolic eng., biofilm physiology and control.
- B.M. Peyton; extremophile bioprocessing, biofilms, bioremediation.
- R. Gerlach; biofilm barriers, bioremediation, bacterial transport in porous media, extremophilic biofilms, biofuels
- D.L. Shafer; hazardous waste.
- P. S. Stewart; biofilm process engineering.
- B. Tyler; bio materials.
- J. Duffy; water chemistry, remediation of hazardous waste.
- J. T. Sears; biofilms, remediation.

Degree Offered
M. S. in Environmental Engineering

The Environmental Engineering program is an integrated effort of the Departments of Civil and Chemical and Biological Engineering. The vision of the program is to educate students who will develop solutions to environmental and industrial needs for physical/chemical/biological treatment, environmental restoration, and waste management using a cross-disciplinary approach.

The degree of Master of Science in Environmental Engineering is awarded through either the Civil or Chemical and Biological Engineering departments, depending on the student’s background, academic program and research work. Areas of specialty within the program include water quality management, design of water and waste water facilities, and chemical/microbial process analysis and design.

Environmental Engineering is also one of the options for the Doctor of Philosophy in Engineering.

Admission
Students entering the Environmental Engineering program must meet the admission requirements for either Civil or Chemical and Biological Engineering. Generally, students with undergraduate degrees in Civil or Chemical and Biological Engineering will apply to the department of their undergraduate discipline. Students with degrees in disciplines other than engineering may be admitted to the program through either department, but may be required to complete remedial coursework. Successful applicants are accepted into both the department and Division of Graduate Education. For further information, refer to the Admission Policies and Application Requirements sections.

Program Requirements
Candidates for the M. S. degree in Environmental Engineering must meet the degree requirements of either Civil or Chemical and Biological Engineering, depending on the focus of the student’s program, as well as the requirements of The Graduate School.

The coursework carrying the Environmental Engineering rubric (ENVE) is listed in the Course Description section of this Bulletin. Additional courses in Civil Engineering, Chemical and Biological Engineering, Chemistry, Microbiology, Biology, and other disciplines may form part of the student’s academic program.

Curriculum requirements for the M. S. degree in Environmental Engineering in the Civil Engineering Department are highly individualized and established in consultation with and approved by the student’s graduate committee.

Master of Science in Environmental Engineering degree requirements through the Chemical and Biological Engineering Department are:
- CHBE 500 Graduate Seminar 1 cr. (may be taken twice)
- CHBE 503 Thermodynamics 3 cr.
- CHBE 530 Transport Phenomena 3 cr.

Financial Assistance
A number of teaching and research assistantships are available in both the Civil and Chemical and Biological Engineering Departments. Additionally, research assistantships are available in the Center for Biofilm Engineering. Students should apply directly to the appropriate department and/or to the Center for Biofilm Engineering for financial assistance. See the Graduate Assistantships sections for more information.
DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING

http://www.coe.montana.edu/mie/

Application Deadlines
• Fall: July 1 (March 1, if applying for teaching assistantship)
• Spring: November 15

Note: International applicants must submit their applications two months prior to the above dates.

Department Head
C.H.M. Jenkins, Ph.D., P.E.
220 Roberts Hall; (406) 994-2203
cjenkins@me.montana.edu

Graduate Program Coordinator:
Industrial and Management Engineering
Nic Ward
303 Roberts Hall; (406) 994-5942
nward@coe.montana.edu

Industrial and Management Engineering Professors
• R.J. Marley; human factors/ergonomics, applied statistics, engineering management.
• J. Stanislaw (Adjunct); engineering economics, manufacturing, process engineering.
• N.J. Ward; traffic safety, driver behavior, system interface design, product design and usability analysis, human factors, ergonomics.

Associate Professors
• E.L. Mooney; discrete optimization, scheduling, systems modeling, operations research.
• D.K. Sobek II; management engineering, product development, production engineering and management, lean manufacturing.

Assistant Professors
• M.H. Cole; facilities planning, transportation, logistics, production systems, optimization, engineering ethics

Mechanical Engineering Professors
• M.R. Amin; heat transfer, fluid mechanics, numerical methods, fire phenomena energy systems.
• D.S. Cairns; materials, composites, numerical modeling, solid mechanics, mechanics of materials and structures.
• V. Cundy; combustion, heat transfer, incineration of waste, fluid mechanics.
• C.H.M. Jenkins; computational and experimental mechanics, analysis and design of compliant structures, continuum and solid mechanics, theoretical and experimental structural dynamics, mechanical design.
• A. Vinogradov; solid mechanics, mechanics of materials and structures, composites, materials.

Associate Professors
• A.H. George; heat transfer, measurements and instrumentation.

Assistant Professors
• S. Codd; magnetic resonance microscopy studies of ceramics, fluid dynamics in hydrogels, biofilms, and polymer electrolyte membranes.
• A. Mian; microsystems (MEMS and BioMEMS) design, fabrication, reliability, and packaging.
• D. Miller; experimental mechanics of materials, structures/property relationships to strength and damage, shape memory alloys, dynamic properties of materials.
• S. Sofie; innovative ceramic processing, microstructure/nano structure engineering, solid oxide fuel cells, high-temp piezoelectrics, high-temp superconductors, thermoelectrics, and photoluminescent ceramics.

Research Professors
• R. Badaliance; materials and structures
• Degrees Offered
  • M.S. in Industrial and Management Engineering
  • M.S. in Mechanical Engineering
  • Ph.D. in Engineering – Industrial Engineering and Mechanical Engineering options

The department offers the Master of Science degree in Industrial and Management Engineering and the Master of Science degree in Mechanical Engineering. These degrees may be accomplished under Plan A (thesis required) or Plan B (project or professional paper). Under either plan, a program of study is arranged for each student according to his/her particular goal. The department also participates in the Doctor of Philosophy in Engineering degree coordinated through the College of Engineering (refer to the College of Engineering section).

Admission
Industrial and Management Engineering

The minimum requirement for admission is a Bachelor of Science degree and evidence of an ability to maintain a minimum 3.0 grade point average while pursuing a graduate degree. Applicants without a degree in Industrial Engineering (or similar) are eligible to apply, but may be required to make up subject matter deficiencies upon admission. For complete information, refer to the Admission Policies and Application Requirements sections. Successful applicants are accepted into both the department and The Graduate School.

Mechanical Engineering

Normally, applicants must present evidence of graduation with a bachelor’s degree in engineering with ability to maintain a “B” average. Graduates in other fields may be accepted, but generally these students have to make up background material in certain subject areas. Refer to the Admission Policies and Application Requirements sections for detailed admission and application requirements. Successful applicants are accepted into both the department and the College of Graduate Studies.

Research Requirements

Industrial and Management Engineering

A research experience is required for the M.S. degree in Industrial and Management Engineering. Plan A only. Areas of study include operations research, engineering economy, computer modeling, applied statistics, simulation, logistics, management engineering, human factors, ergonomics, computer integrated manufacturing, quality control, and production planning and scheduling.
Master’s students following Plan B (project or professional paper) choose additional coursework and a graduate project in lieu of completing a thesis. Plan B students complete a graduate project, under the supervision of a professor, in the student’s particular area of interest, and demonstrate their ability to define, organize, and follow through on a small research investigation. The project requires both oral and written reports.

**Plan A - Thesis Option**

<table>
<thead>
<tr>
<th>Course/Project</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&amp;ME 500-level courses</td>
<td>12</td>
</tr>
<tr>
<td>I&amp;ME 400-level or non-I&amp;ME courses</td>
<td>9</td>
</tr>
<tr>
<td>I&amp;ME 590 Thesis</td>
<td>10</td>
</tr>
</tbody>
</table>

**Non-Industrial Engineering Undergraduate Degree**

<table>
<thead>
<tr>
<th>Course/Project</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&amp;ME 500-level courses</td>
<td>12</td>
</tr>
<tr>
<td>I&amp;ME 400-level or non-I&amp;ME courses</td>
<td>9</td>
</tr>
<tr>
<td>I&amp;ME 590 Thesis</td>
<td>10</td>
</tr>
</tbody>
</table>

**Plan B - Non-Thesis Option**

<table>
<thead>
<tr>
<th>Course/Project</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&amp;ME 500-level courses</td>
<td>18</td>
</tr>
<tr>
<td>I&amp;ME 400-level or non-I&amp;ME courses</td>
<td>9</td>
</tr>
<tr>
<td>I&amp;ME 575 Research or Professional Paper/Project</td>
<td>3</td>
</tr>
</tbody>
</table>

**Non-Industrial Engineering Undergraduate Degree**

<table>
<thead>
<tr>
<th>Course/Project</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I&amp;ME 500-level courses</td>
<td>12</td>
</tr>
<tr>
<td>I&amp;ME 400-level or non-I&amp;ME courses</td>
<td>9</td>
</tr>
<tr>
<td>I&amp;ME 575 Research or Professional Paper/Project</td>
<td>3</td>
</tr>
</tbody>
</table>

Students may use a 500-level course to meet a 400-level course requirement. Plan B students may elect to substitute two courses (at least one of which is a 500-level course) for I&ME 575.

**Mechanical Engineering**

For a M.S. in Mechanical Engineering, research is required in Plan A only. Students following Plan B are not required to write a thesis, but are required to complete a graduate project under the supervision of a professor.

**Plan A - Thesis Option**

<table>
<thead>
<tr>
<th>Course/Project</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 510 Engineering Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>ME 511 Engineering Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>EM 525 Continuum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>3 Graduate course credits outside the student’s emphasis</td>
<td>3</td>
</tr>
<tr>
<td>ME 500 Seminar (two semesters)</td>
<td>2</td>
</tr>
<tr>
<td>ME 590 Thesis</td>
<td>10</td>
</tr>
<tr>
<td>Elective Courses (Maximum of 3 ME 570)</td>
<td>9</td>
</tr>
</tbody>
</table>

**Plan B - Non-Thesis Option**

The Plan B option substitutes a professional paper (3-4 credits) and additional coursework in lieu of the 10 thesis credits.

**Research Facilities**

The laboratories of the department are well equipped for research in all areas supported by the department. Flexible manufacturing systems, robotics, machine vision, and computer-aided manufacturing are supported by a computer integrated manufacturing laboratory. Extensive facilities for destructive and non-destructive testing of advanced materials and structures are available. Advanced manufacturing facilities for composite materials and structures are continually expanding. Advanced manufacturing facilities for composite materials and structures are available. Advanced manufacturing facilities for composite materials and structures are continually expanding. An ergonomics/human factors laboratory concentrates on industrial ergonomics with equipment to address biomechanical and physiological aspects of industrial tasks. Facilities for decision support systems, facilities design, and expert systems are undergoing expansion. Arrangements can also be made for graduate students to use the research facilities of other University departments. State-of-the-art computer facilities are available at the department, college, and university levels. Research is sponsored by industry and governmental agencies.

**Examinations**

All Mechanical Engineering and Industrial and Management Engineering master’s degree students must follow the degree requirements listed in the For Master’s Students section.

Doctoral candidates are required to pass three examinations: Ph.D. qualifying examination, Ph.D. comprehensive examination, and Ph.D. thesis defense. Refer to the For Doctoral Students and Ph.D. in Engineering sections for additional information.

Students are expected to be familiar with department, college and Division of Graduate Education requirements.

**Financial Assistance**

Both teaching and research assistantships are available on a competitive basis. Teaching assistantships involve assisting professors with the conduct of their classes, including preparation and grading. Research assistantships provide the opportunity for work on a research grant or industry sponsored project under the direction of a faculty member. Interested applicants should make inquiry directly to the Graduate Program Coordinator in I&ME or ME.

See the Graduate Assistantships sections for detailed information on appointment criteria.

**PH.D. IN ENGINEERING**

**Degree Offered**

Ph.D. in Engineering with options in:
- Applied Mechanics
- Civil Engineering
- Chemical Engineering
- Electrical & Computer Engineering
- Environmental Engineering
- Industrial Engineering
- Mechanical Engineering

The Doctor of Philosophy in Engineering degree is offered through the College of Engineering. The most current information on requirements for the degree can be found at: [http://www.coe.montana.edu/graduate_programs.html](http://www.coe.montana.edu/graduate_programs.html)

Candidates will be admitted to both the College of Engineering and the College of Graduate Studies under one of seven options:

**Applied Mechanics**

This option involves research in areas central to engineering mechanics including solid mechanics, fluid mechanics, thermal mechanics, geomechanics, and structures.

**Coordinating Departments:** Chemical and Biological Engineering, Civil Engineering, and Mechanical and Industrial Engineering. Typical Research Areas: solid mechanics, fluid mechanics, biomechanics, thermal sciences, structural mechanics.

**Civil Engineering**

This option involves research in geotechnical engineering, structural engineering, transportation engineering, environmental engineering, water resources engineering, and construction management.

**Coordinating Departments:** Civil Engineering and Mechanical and Industrial Engineering. Typical Research Areas: geosynthetics seismic response of structures and foundations, innovative structural materials, intelligent transportation systems, transportation operations, recycled pavements and base materials, road ecology, and constructed wetlands.
Chemical Engineering
This option involves research in transport phenomena in complex systems, biofilms, biological materials, and the chemical and biochemical transformation of materials.

Coordinating Department: Chemical and Biological Engineering. Typical Research Areas: extremophilic bioprocessing, in situ biocatalyzed heavy metal biotransformations in natural and engineered biological systems, biomaterials, biorheology, colloidal system dynamics, metabolic engineering, metabolic systems analysis, biofuels processing, composite materials, durability of materials, surface interactions, catalysis, membrane materials, separations.

Electrical and Computer Engineering
This option involves research in electronic component and system hardware, design, development and theory.

Coordinating Department: Electrical and Computer Engineering. Typical Research Areas: communications, digital electronics, computer engineering, microelectromechanical systems, optics and optical electronics, power systems and power electronics, signal processing, systems and controls.

Environmental Engineering
This option involves research in all areas of the environment including soil, water, and air, with emphasis on microbial interactions with natural and engineered systems.

Coordinating Departments: Chemical and Biological Engineering and Civil Engineering. Typical Research Areas: bioremediation, wetlands, water treatment, wastewater treatment, solid and hazardous waste treatment, biofilm engineering.

Industrial Engineering
This option involves research related to areas of Industrial Engineering.

Coordinating Department: Mechanical and Industrial Engineering. Typical Research Areas: operations research, transportation modeling, simulation, quality engineering, engineering management, ergonomics, and human factors

Mechanical Engineering
This option involves research in advance structures and materials, fluid dynamics, and energy systems.


Application and Admission (M.S. and Ph.D.)
For M.S. students, applications should be made through the graduate coordinator of the appropriate engineering department. Applications can be initiated through traditional mail or through electronic pre-applications using e-mail or online Web forms. Each department has a World Wide Web page that can be accessed from the College of Engineering web page whose URL is http://www.coe.montana.edu.

For Ph.D. students, the following procedures apply:
1. Contact College or Department for application materials and submit for review.
Minimum College Requirements for Full Admission:
  · at least a 3.0 undergraduate GPA
  · Verbal + Quantitative + Analytical GRE scores >1700
  · Favorable letters of recommendation from three references
  · Graduate GPA (if applicable) of 3.2 or better
  · TOEFL scores of 580 (237 for computer test version) or greater for international students or a minimum International English Language Testing System (IELTS) band score of 7.
  · A personal statement of the applicant’s objectives
2. Department/s attach summary admission form and circulate application to match students with research needs.
3. Department Head reviews application in conjunction with faculty recommendation, and exercises one of the following options.
a. Full admission - Forward to Option Coordinator.
b. Provisional admission - Determine conditions that candidate will be accepted and notes actions to be taken, then forwards to Associate Dean.
c. Reject admission because of academic qualifications
4. Reject admission based on lack of fit with COE research programs or the lack of a potential advisor
4. Associate Dean for Research and Graduate Studies in the College of Engineering reviews applications, returns to department for submission to The Graduate School (GS).
5. GS reviews application to ensure GS standards are met with the following possible options.
a. Accept
b. Reject
c. Return to Department Head and Associate Dean with recommendation for further consideration.
  · Applicant is informed of acceptance or rejection letter by GS.

Acceptance into the program is not always a guarantee of funding (tuition or stipend). Students should establish a dialogue with their chosen department to determine the availability of funding.

If there are course deficiencies that are identified in the student’s educational background, these must be completed prior to full admission (matriculation).

In most cases, students will be admitted to the program only if a suitable advisor has already been identified. For those entering without having an advisor/major professor previously identified, students should secure an advisor as early as possible, but no later than the end of the third semester of registration in the Ph.D. program. During the selection process, there should be discussions with the student that include an understanding of funding available to the student and the term of commitment.

Program Requirements (M.S. and Ph.D.)
Master’s degree candidates should refer to the appropriate engineering department for detailed degree requirements. See the For Master’s Students section for additional program requirements. Students are expected to be familiar with both
departmental and College of Graduate Studies degree requirements.

To satisfy the requirements for the Ph.D. in Engineering, the student will take a minimum of 60 credits beyond the bachelor’s degree according to the table below. Different options within the Ph.D. in Engineering and individual graduate student committees may require additional coursework beyond the minimum requirements (see Declared Option Coursework section later in this document).

For students entering with a Masters degree, up to 24 graded credits may be applied (see below). However, the EGEN 694 and ENGR 610 requirements and a minimum of 15 additional graded course credits must still be taken at Montana State University. Depending on option requirements, students may have the option (with approval of the committee) of using some of their M.S. credits toward the advanced M and numerical methods requirements.

**Minimum Degree Requirements for Ph.D. in Engineering**

<table>
<thead>
<tr>
<th>Description</th>
<th>Minimum Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 610 can only be taken once</td>
<td>3</td>
</tr>
<tr>
<td>EGEN 694 2 credits maximum</td>
<td>2</td>
</tr>
<tr>
<td>counted for program</td>
<td></td>
</tr>
<tr>
<td>Advanced M* - see declared option coursework</td>
<td>3</td>
</tr>
<tr>
<td>Numerical Methods* - see declared option coursework</td>
<td>3</td>
</tr>
<tr>
<td>Other Graded Courses:</td>
<td></td>
</tr>
<tr>
<td>see declared option coursework</td>
<td>24</td>
</tr>
<tr>
<td>Dissertation</td>
<td>18</td>
</tr>
<tr>
<td>Additional Dissertation or Course credits</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
</tr>
</tbody>
</table>

EGEN 694 will be taken once as a two credit class by students enrolling as of August, 2007. For students entering the program under these guidelines, EGEN 694 should be taken the semester prior to scheduling the comprehensive exams. All previous students who have already taken one credit of EGEN 694 will enroll for one subsequent credit. The second credit should be taken the semester prior to the student’s comprehensive exam.

**Students are expected to attend the COE Seminar Series presentations.**

**Note for students entering without a prior degree in engineering**

If a student enters the Ph.D. program without a prior degree in engineering from an accredited program, they may have difficulty in pursuing professional registration. If the student’s career goals are best served by having a P.E., the student should consult with their department head and major professor to determine what coursework will be required for them to seek licensure. These requirements vary with discipline and the state where licensure is sought. This coursework may be above and beyond what is needed to complete the requirements for the degree.

**Examination Requirements**

Ph.D. candidates within the College of Engineering at Montana State University must pass a qualifying examination, a comprehensive examination, and a defense of dissertation. The general rules governing these follow. Different options may have more specific requirements; see the specifics under option requirements below.

**Ph.D. Qualifying Examination:**

The purpose of the qualifying examination is to determine whether the student has sufficiently mastered the core topics within their chosen area of study. It will be a written examination on undergraduate engineering topics determined by the student’s Ph.D. option area chosen by the student and administered by that option’s committee.

Each Ph.D. Option Committee will offer a qualifying examination annually to students in that option. The qualifying examination will be completed within three semesters but typically within two semesters of matriculation into the Ph.D. program. Failure to take the examination in that time period may result in suspension of Ph.D. candidate status, including stipend. The committee will document the results of the examination in a letter to the student, and in the student’s file.

**Ph.D. Comprehensive Examination:**

The purpose of the Ph.D. comprehensive examination is to determine whether the student is ready for independent research in their chosen area of study. The comprehensive examination is administered by the student’s graduate committee (including the Graduate Representative assigned by The Graduate School), and must be completed within two years after passing the qualifying examination. It is also recommended that the student has taken 2/3 of their graded coursework. In addition, students should have completed EGEN 694 prior to taking the exam; the course is designed to assist the student in preparing their proposal.

The Ph.D. comprehensive examination is comprised of:

- A written proposal for the student’s Ph.D. dissertation, and
- An oral presentation of the proposal and oral examination.

The candidate will prepare a written proposal associated with the research topic for the Ph.D. dissertation, in a format designated by the Ph.D. Option. The successful proposal will include a significant literature review, preliminary research to date, and the research proposed to complete the Ph.D. The written proposal will be presented to the student’s graduate committee in advance of the oral presentation, by a date agreed to by the student and graduate committee.

The student will then present the dissertation proposal as a public research seminar. This will be followed by a closed-session oral examination by the student’s graduate committee on:

- the candidate’s current and proposed research;
- the candidate’s graduate level understanding of option specific engineering principles; and
- additional topics relevant to the proposed research, including fundamentals of other disciplines drawn upon in the research.

The student’s graduate committee will inform the student of the results of the comprehensive examination immediately following the oral examination and committee deliberation, and will document the results on the appro-
pont of the Ph.D. program. There may be additional requirements for these exams specified in the option requirements.

**Dissertation Defense:**
The dissertation defense will consist of two parts: an open seminar of the research results and a closed session with the student’s committee and the graduate representative. Written notification of the results within one week of the defense must be delivered to The Graduate School and the student. Committee members must approve the dissertation, along with the Department Head, and Vice Provost for Graduate Education. Deadline for the dissertation approval is 14 working days before the end of the term for a given semester.

If failure occurs at the first attempt, a second defense must be held. At least six months must elapse before the second examination takes place, with the time period not to exceed nine months. Failure of the second exam will result in suspension from the program.

**Graduation Application:**
An application to graduate is prepared by the student, approved by the major professor, and submitted to The Graduate School through the student’s academic department. Applications are due to the GS September 20th for a Fall Semester graduation, February 5th for a Spring Semester graduation and June 10th for Summer semester graduation.

**Declared Option Requirements:**

**Civil Engineering:**
Students must meet the overall requirements for the Ph.D. in Engineering. The student’s committee may require additional credits of study based on the student’s background and needs. Specific course selections will be determined by the student and his/her committee to support the student’s area of study. Up to 24 graded course credits can be applied from an M.S. Degree in meeting the Ph.D. credit requirements, at the discretion of the student’s Ph.D. committee.

**Applied Mechanics:**
Requirements include:
- EM525 Continuum Mechanics 3 credits
- EM510 Elastic and Inelastic Analysis 3 credits
- ME530 Advanced Fluid Mechanics 3 credits
- EM560 Finite Elements Analysis in Engineering 3 credits

The remaining credits are to be established by the student and the Major Professor in consultation with the graduate committee.

**Qualifying Examination:** The qualifying assessment will be a written examination on relevant undergraduate level topics. In the Applied Mechanics Option these areas include: Statics, Dynamics, Mechanics of Materials, Fluid Mechanics, Mathematics, Thermodynamics and an Area of Undergraduate Focus (e.g. Structures, Hydraulics, Geotechnity, Material Science, Heat Transfer) - as specified by the candidate prior to the exam. The exam will be one hour per topic area in an open book, open notes format. Students must satisfactorily address four of the submitted topics. Problems will be graded by the faculty member who presented that topic. Students will be provided an opportunity to examine their results, however, in order to protect the questions from dissemination they will not be permanently returned. A grade for the qualifying examination of Pass (P), Fail (F) or RemEDIATE (R) will be given for each candidate. In cases where remediation in certain topic areas is required, the Ph.D. advisor will develop a problem solving based plan with the Ph.D. candidate to prepare for a retest on the identified topic areas. The retest must occur prior to completion of the following semester and will be overseen by the Ph.D. Advisor.

**Comprehensive Examination:** In the Applied Mechanics Option there are two distinct oral examinations: one associated with the Dissertation Proposal and a separate one pertaining to the candidate’s graduate level understanding of Engineering Mechanics principals.

**Chemical Engineering:**
The advanced M and numerical methods classes are specified:
- ChBE 522/ME 510 - Advanced M 3 credits
- ChBE 525/ME 511 - Advanced Numerical Methods 3 credits

Requirements include:
- ChBE 503 - Thermodynamics 3 credits
- ChBE 530/ME 533 - Transport 3 credits
- ChBE 510 Reactions 3 credits

These requirements leave the remaining credits to be established by the student and the major professor in consultation with the graduate committee.

**Qualifying Examination:** The qualifier will be a written examination on undergraduate Chemical Engineering including: mass and energy balances, thermodynamics, separations (mass transfer), heat (energy) transfer, fluids, transport phenomena and chemical reaction engineering. The exam will be 1 hour per topic area question in an open book, open notes format and students will choose 4 subjects which they will solve the problems for, from the 7 problems provided. Each question will be graded by the Faculty member that submitted the question. Students will not be given the test back in order to protect the questions from dissemination. The results will be analyzed by a Committee composed of all Faculty and a grade of Pass (P), Fail (F) or RemEDIATE (R) given each candidate. In cases where remediation in certain topic areas is required, the Ph.D. advisor will develop a problem solving based plan with the PhD candidate to prepare for a retest on the identified topic areas. The retest must occur prior to the next fall semester and will be overseen by the PhD. Advisor. The qualifying exam must be completed within two semesters of matriculation into the Ph.D. program. Failure to take the exam in that time period may result in suspension of Ph.D. candidate status, including stipend. The exam will be
administered on the second Tuesday in February of the Spring semester to all students required to take the exam in a year.

Comprehensive Examination: The comprehensive exam is required of all Ph.D. candidates, and will be composed of a written NSF-style proposal associated with the research topic for the Ph.D. The proposal should include significant preliminary data on the research to date and the research proposed to complete the Ph.D. The exam will be administered by the student’s Ph.D. Advisor and graduate committee. The proposal will be in the NSF format, in compliance with the current year’s grant proposal guidelines (gpg) at www.nsf.gov. A written exam on graduate level thermodynamics, transport phenomena, Memtical methods, and reactor engineering will be required of graduate students who have a GPA in graduate coursework of less than 3.5. A public oral seminar of 40 minutes plus 10 minutes of public questions, on the research to date and proposed research to complete the Ph.D., will be given by the Ph.D. candidate. This will be followed by a closed-session oral examination of 45-90 minutes by the student’s Ph.D. committee on the research and graduate level understanding of Chemical and Biological Engineering principles and any topics relevant to the research including fundamentals of other disciplines drawn on in the research.

Electrical and Computer Engineering:

Students are required to complete 65 credits. Within the course credits, students must take courses in at least 3 of the following 6 areas: Digital Systems, Signals and Controls, Electromagnetic Fields and Optics, Communications, Power and Power Electronics, and MEMS and Electronics.

Mechanical Engineering:

Students are required to take:

- Advanced M credits
- ME510, Advanced Engineering Analysis I ........................................3
- Numerical Methods
- ME511, Advanced Engineering Analysis II ........................................3
- Additional Coursework
- EIND 525 Continuum Mechanics ..................................................3
- Thermodynamics Mechanics .........................................................3 (min)
- Solid Mechanics .................................................................5 (min)

Note: These requirements are satisfied by the MSU MS in Mechanical Engineering.

Qualifying Examination: The exam will be administered on the second Tuesday in February of the Spring semester. The undergraduate Mechanical Engineering topics will include:
- · Thermodynamics
- · Heat (energy) transfer
- · Fluid Mechanics
- · Structural Mechanics
- · Materials
- · Dynamics and Vibrations
- · Mathematics

Students will solve problems in 4 of the 7 topic areas. The exam will be 8 hours duration in an open book, open notes format. Each problem set will be graded by the faculty member that submitted the set. The results will be analyzed by the Mechanical Engineering graduate studies committee, and each candidate will receive a grade of Pass (P), Fail (F) or Remediate (R). Students will not be given the test back in order to protect the questions from dissemination. In cases where remediation in certain topic areas is required, the Ph.D. advisor will develop a problem-solving-based plan with the Ph.D. candidate to prepare for a retest on the identified topic areas. The retest must occur prior to the next fall semester and will be overseen by the Ph.D. Advisor.

Comprehensive Examination: The public research seminar will include 40 minutes for the student’s presentation and 10 minutes for questions from the audience. This will be followed immediately by a closed-session oral examination and additional remediation may be required at this point.

Industrial Engineering:

Ph.D. candidates under the IE Option must take a minimum of 30 credits of 500-level courses (in addition to EGEN 610 and EGEN 694), of which at least 18 credits must be I&ME courses. Furthermore, Ph.D. candidates must complete the following coursework with a grade of B or better:

- · EIND 554, EIND 567, or other course approved by the I&ME Graduate Studies Committee to satisfy the Advanced M requirement.
- · EIND 509, EIND 558, or other course approved by the I&ME Graduate Studies Committee to satisfy the Numerical Methods requirement.
- · Two courses in the management/quality area: EIND 434, EIND 477, EIND 525, EIND 548, EIND 574, EIND 577.
- · Two courses in the integrated systems design area: EIND 413, EIND 458, EIND 471, EIND 501, EIND 513, EIND 534, EIND 571.

Candidates can meet the above requirements with courses from a prior Master’s degree, though not using independent study, project, thesis, or dissertation credits. The student’s graduate committee will determine course equivalency as needed, and document such in the student’s file.

Qualifying Examination: The qualifying exam will cover three of the following core undergraduate IE topical areas:

- · work design and analysis (EIND 313)
- · engineering economic analysis (EGEN 325)
- · probability and statistics (EIND 354)
- · principles of operations research (EIND 364)

And three other I&ME courses from among those the student has taken at MSU. The student will request a qualifying exam from the I&ME Graduate Studies Committee within three weeks of the start of the term in which s/he intends to take the qualifying exam. The I&ME Graduate Studies Committee will assemble an examining committee to administer the exam, chaired by the student’s advisor.

Environmental Engineering:

Of the credits in the Option Coursework noted above, 12 credits from the following subset of courses are required, with no more than 6 credits at the 400 level. Equivalent courses from prior MS degrees may be used to satisfy this requirement.
EENV 441 Natural Treatment Systems ......................3
ENVE 443 Air Pollution Control ..................................3
ENVE 444 Hazardous Waste Management ......................3
ENVE 445 Hazardous Waste Treatment .........................3
CE 529 Groundwater Contamination .........................3
ENVE 534 Environmental Engineering Investigations ...............3
ENVE 560 Environmental Engineering Processes ..........2
ENVE 561 Environmental Engineering Reactor Theory ........2
ENVE 562 Water Treatment Processes and Design ........3
ENVE 563 Waste Water Treatment Processes and Design .....3
ENVE 564 Environmental Engineering Applications Lab ........3
ENVE 565 Chemical Sensors & Instrumentation for Env. Biotech. 2
ENVE 566 Fundamentals of Biofilm Engineering ..............3

The remaining credits are to be established by the student and the major professor in consultation with the graduate committee.

**EMPower, the College of Engineering Minority Program**

The College of Engineering at Montana State University is committed to equal access to educational opportunities for all students pursuing a graduate degree. EMPower, the College of Engineering Minority Program, helps address issues that led to the serious under-representation of minority women students at the graduate level.

**AMERICAN STUDIES PROGRAM**

Montana State University
Po Box 175006
Bozeman, MT 59717
Tel: (406) 994-3561
Fax: (406) 994-6049
Location: 130-I Gaines Hall
americanstudies@montana.edu
www.montana.edu/amst/graduate

*Program Director*
David Cherry
dcherry@montana.edu

*Program Assistant*
Scarlet Reierson
scarlet.reierson@montana.edu

*Faculty*
American Studies is an interdisciplinary program which draws on a distinguished cohort of full-time and associated faculty with research and teaching expertise in the disciplines of Anthropology, Architectural History, Art History, English, Film & Photography, History, Native American Studies, Political Science, and Sociology.

*Degrees Offered*
- MA in American Studies
- PhD in American Studies

American Studies offers the degrees of Master of Arts and Doctor of Philosophy, with a special focus on the American West. Major fields include American Arts, American History, American Literature, American Pluralism, and Public History.

*Five Year MA in American Studies*
Qualified students will be allowed to enter the Master of Arts program after completing three years of undergraduate course work. For more information, contact the program assistant.

*Master of Arts in American Studies*
The Master of Arts degree requires completion of 30 credits, of which no more than 9 can be at the 400-level. Students who enter the program after receiving their baccalaureate degree will normally require two years of full-time work to complete it.

The program includes a 10-credit Master’s Thesis (Plan A) option, and an all course-work (Plan B) option. All students are required to take AMST 501, Methods in American Studies, and AMST 502, Research and Writing in American Studies. Additional course work will be selected from a list of approved American Studies courses (see the program website for a complete list). Under Plan A, students must register for a minimum of 10 credits of AMST 590 and defend their thesis in an oral examination.

*Doctor of Philosophy in American Studies*
The PhD program is built upon research and intensive course work that will normally require four years of full-time work. Students must complete a minimum of 60 credit hours post-baccalaureate, of which at least 18 must be dissertation credits. A maximum of 30 credits from a previously earned master’s degree (from MSU or another accredited university) may be applied toward the 60 credit minimum required for the doctoral degree.

Students are required to take AMST 501, Methods in American Studies, and AMST 502, Research and Writing in American Studies. Additional coursework will be selected from a list of approved American Studies courses (see the program website for a complete list).

PhD students must declare a major field of emphasis, which will normally require at least 12 credits of coursework. The major fields include...
American Arts, American History, American Literature, American Pluralism, or Public History.

In addition, PhD students must declare a supporting area, which will normally be acquired through three courses (9 credits) and a four-hour written examination administered by the supporting area advisor. The supporting area will be a thematic field, for example, Native American Studies, Technology and Culture, Women’s Studies.

PhD students are required to demonstrate reading knowledge of at least one foreign language. Competency will determined by an examination administered by the program, normally in conjunction with the Department of Modern Languages and Literatures. The foreign language requirement must be completed successfully before a student can present the dissertation proposal.

Financial Assistance
Currently, the only form of financial support available through the program is the Graduate Teaching Assistantship. A small number of teaching assistantships will normally be awarded each academic year, based on merit, as determined by the Graduate Admissions Committee. Interested students should apply for a teaching assistantship by submitting a letter of interest to the Program Director.

ENGLISH DEPARTMENT

Montana State University
P.O. Box 172300
Bozeman, MT 59717-2300

Tel: 406 994-3768
Fax: 406 994-2110
dep@english.montana.edu
Location: 2-176 Wilson Hall

Department Chair
Karell, Linda K., Department Chair
Professor, Ph.D., University of Rochester
Western American Literature, Literary Theory

Professors
• Agruss, David L., Ph.D.,
Cornell University, Victorian Literature, Popular Culture, Gender and Sexuality Studies, Queer Theory
• Bechler, Michael T., Professor
Ph.D., University of California, Los Angeles; Modern Literature, Literary Theory
• Bechler, Sharon A., Professor
Ph.D., University of California, Los Angeles; English Education, Shakespeare
• Bennett, Robert, Assistant Professor
Ph.D., University of California, Santa Barbara
• Branch, Kirk, Associate Professor
Ph.D., University of Washington, Composition, Rhetorical Theory, Literacy Theory, Pedagogy
• Downs, Doug Ph.D., University of Utah, Writing Studies, Writing in the Disciplines, Research Pedagogy
• Eckert, Lisa, Assistant Professor
Ph.D., Western Michigan University; English Education, Literacy Education, Literacy Theory
• Gaines, Philip., Associate Professor
Ph.D., University of Washington; Linguistics, Discourse Analysis, Composition
• Karell, Linda K., Department Chair
Associate Professor; Ph.D., University of Rochester; Western American Literature, Literary Theory
• Keeler, Greg, Professor
D.A., Idaho State University; Creative Writing; Contemporary Literature
• Kollin, Susan, Associate Professor
Ph.D., University of Minnesota; Western American Literature, Environmental Literature
• Lansverk, Marvin D. L., Professor
Ph.D., University of Washington; Eighteenth-Century British Literature
• Minton, Gretchen, Assistant Professor
Ph.D., University of British Columbia; English Renaissance, Shakespeare, Drama, Christian Late Antiquity
• Morgan, Gwendolyn A., Professor
Ph.D., University of South Florida; Medieval Literature, Linguistics
• Sexson, Michael, Professor
Ph.D., Syracuse University; Literature and Religion, Mythology
• Thomas, Amy M., Associate Professor
Ph.D., Duke University; Nineteenth-Century American Literature, History of the Book

Degree Offered
M.A. in English

The Master of Art in English focuses on the interconnectedness of writing, teaching, and literary studies. Students may elect to complete either the Plan A (thesis), or Plan B (professional paper) option. At the heart of the program is a concern for the integrated interests of students and teachers in all branches of the field. Teachers, scholars, and writers in the program gain a better understanding of their own practices by seeing the extent to which each writer is also a literary critic, each teacher is also a writer and reader of literature, and all critics and readers are teachers and writers. The program is designed to extend and deepen the intellectual rigor of customary approaches to literature by examining issues these approaches often leave unaddressed, such as the history and institutionalization of the discipline, the relationship between theory and the practices of writing, teaching, and textual studies; and the process by which knowledge in the field of English has been and is constructed.

Program Requirements
The Master of Arts degree requires the minimum completion of 30 course credits. Students will select one of two options, either the professional paper or the thesis. The first option involves 24 hours of course work and 6 hours of professional paper, the latter 21 hours of course work and 10 hours of thesis. Students are expected to have completed the equivalent of a baccalaureate degree in English. Students with undergraduate degrees other than English are encouraged to apply; however, they may be required to take additional English courses as a condition of their acceptance.

Required Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 510</td>
<td>Studies in Critical Theory and Practice</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 530</td>
<td>Studies in Writing Theory and Practice</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 540</td>
<td>Studies in Literary History</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 575</td>
<td>Professional Paper (Plan B Only)</td>
<td>Max 6</td>
</tr>
<tr>
<td>ENGL 590</td>
<td>Master’s Thesis (Plan A Only)</td>
<td>1-10</td>
</tr>
</tbody>
</table>

OR

ENGL 590 | Master’s Thesis (Plan A Only) | 1-10 |

ENGL 590 | Master’s Thesis (Plan B Only) | 1-10 |
Electives:
- ENGL 550 Focused Research Seminar ........ Max 6
- ENGL 570 Individual Problems ................ Max 6
- ENGL 576 Internship ................................1-12
- ENGL 580 Special Topics .......................... Max 9

Financial Assistance
Teaching assistantships, awarded on a competitive basis, may be available to formally admitted graduate students. See the Graduate Assistantship sections for detailed information on appointment criteria. Assistantships are requested from the student’s home department.

DEPARTMENT OF HISTORY AND PHILOSOPHY

Montana State University
2-155 Wilson Hall
Bozeman , Montana 59717
Tel: (406) 994-4395
www.montana.edu/history/

Department Chair
David Cherry, Chair

Graduate Program Director
Michael Reidy

Graduate Program Coordinator
Jessica Marks
406-994-4395
jessica.marks2@montana.edu

Professors
- James Allard; History of Philosophy, Nineteenth Century Philosophy, History of Logic.
- David Cherry; Ancient History, Comparative Frontiers.
- David Large; Modern Europe, Germany, Intellectual History.
- Mary Murphy (Michael P. Malone Professor); American Women, American West, Labor.
- Lynda Sexson; Religion and Culture, Literature, Nature, Gender, Text and Image.
- Billy G. Smith; Early America, Class, Race, Slavery.
- Brett L. Walker; Japan, East Asian Civilizations, Environmental, Science and Medicine.

Associate Professors
- Prasanta S. Bandyopadhyay; Philosophy of Science, Epistemology, Philosophy.
- Susan Cohen; Syro-Palestinian Archaeology, Hebrew Bible, Political Economy of the Ancient Near East.
- Daniel Flory; Aesthetics, Philosophy and Film, Philosophy and Critical Race Theory.
- Sanford Levy; Ethics, Biomedical Ethics.
- Michelle Maskell; Modern South Asia, Asian Women.
- Michael Reidy; Science, Britain.

Assistant Professors
- Robert B. Campbell; U.S. Environmental, Nineteenth Century U.S. History, American Indian History.
- Kristen Intemann; Ethics, Applied Ethics, Philosophy of Science, Feminist Philosophy.
- Timothy LeCain; History of Technology and Environment, Modern U.S., American West.
- Carla Nalli; History of Chinese Science and Medicine, Ming and Qing History, Natural History in Early Modern Europe.
- Yanna Yannakakis; Latin America.

Degree Offered
- MA in History
- PhD in History

The Division of Graduate Education

The Department of History and Philosophy is dedicated to providing quality education in History for two graduate degree programs, the MA and the PhD. The Department offers concentrated training in three particular areas: the history of science, technology, and society; environmental history; and the history of the American West and Montana. While the degrees offered by the Department are grounded in American history, the faculty is committed to familiarizing students with World history, critical theoretical concerns, the history of women in a multi-cultural context, and to encouraging students to think about the history of the United States in a global context.

Admission
Prospective graduate students should follow the guidelines in the Admission Policies and Application Requirements sections. The GRE General Exam is required; the GRE advanced test in history is not required. Successful applicants are accepted into both the department and The Graduate School.

Program Requirements

Master of Arts in History

Course Requirements: The MA degree requires a total of 30 credit hours. The following required courses have been created to serve as the core of each graduate student’s program. Students may also take 400-level courses in history or in related disciplines, such as historical geography. Internships at museums and historical societies may also count for credit.

Required Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 503 History of America Before 1860</td>
<td>4</td>
</tr>
<tr>
<td>HIST 505 U.S. History 1860 to the Present</td>
<td>4</td>
</tr>
<tr>
<td>HIST 512 Topics in World History</td>
<td>3</td>
</tr>
<tr>
<td>HIST 540 Historical Methods</td>
<td>3</td>
</tr>
</tbody>
</table>

Doctor of Philosophy

Degree in History

The PhD in History requires a minimum of 25 course credit hours above the MA degree and a minimum of 18 credits of History 690 (Dissertation Writing). Note that the precise credit/course requirement will be determined by the student’s doctoral committee chair in consultation with the student and the other committee members.

All students will declare a Major Field of emphasis and two Minor Areas. Major Fields include:
- a. History of Science and Technology;
- b. Environmental History;

Minor Fields include:
- a. gender;
- b. race;
- c. class, labor and economy;
- d. religious studies;
- e. imperialism;
- f. historical theories and methodologies;
- g. comparative frontiers;
- h. science and technology;
- i. environmental studies;
- j. philosophy of science;
- k. museum studies;
- l. American west.
The PhD program in History offers students the opportunity to obtain an area of concentration in Public History. To obtain the area of concentration, students are expected to take an additional 15 credits that include History 502 (Public History and Material Culture). Students are normally expected to complete at least 9 credits of History 576 (Internship).

Financial Assistance
The primary form of financial support available through the Department is the teaching assistantship, which is awarded on a competitive basis. There are sometimes other opportunities available for financial support, such as grading, research assistantships with individual faculty members, and tutoring positions.

Teaching assistantships are awarded on a competitive basis each semester. To be considered for a teaching assistantship, MA students’ applications to the graduate program must be received by Nov. 1st for the following Spring, by March 15th for the following Fall, and by January 15th for PhD students. Current graduate students and GTAs may indicate their interest by submitting a brief letter or email to Diane Cattrell. Under typical circumstances, teaching assistants will teach 4, 50-minute sections of discussion for a history 100-level course. Discussion sections normally have 20 students each.

Professors
• Walter C. Fleming; American Indian cultural studies, American Indian history
• Wayne J. Stein; higher education, Indian studies.

Assistant Professors
• Lawrence W. Gross; economic development, agriculture, Native culture and humor
• Matthew D. Herman; Native American literatures, local tribal histories, and indigenous political theory
• Kristin T. Ruppel; Federal Indian law and policy, Indian land tenure, ethnoecology

Staff
• Jim Burns: American Indian Student Advisor
• Saralyn Sebern: Assistant Graduate Student Coordinator
• Julie Satterwhite: Administrative Associate

Montana State University has an American Indian enrollment of approximately 315 students. There is an active American Indian Student Council (AIC) as well as chapters of the American Indian Science and Engineering Society (AISES) and the American Indian Business Leaders (AIBL). NAS houses the Native American Student Center and the MSU counselor for Native students who provides academic advising, counseling, and mentoring. The Student Center offers tutorial assistance, telephone and fax access, and a computer lab.

Degree Offered
• M.A. in Native American Studies
• Native American Certificate Program

Native American Studies offers a Master of Arts (MA) degree in Native American Studies with an inter-disciplinary approach which makes the best possible use of university resources. The program allows each graduate student the opportunity to select a course of study that combines Native American Studies and a student’s particular area of interest (e.g., history, business, literature, political science). The 31-credit program is designed so that each graduate student could complete the program within three to four semesters of concentrated work. Students will be expected to attend at least two full semesters on campus. The program’s mission, purpose, and objective emphasis is to graduate, in a timely manner, knowledgeable professionals and academicians well grounded in Native American issues and scholarship.

The Master’s program offers two plans: Plan A – Thesis Option or Plan B – Non-thesis Option.

Plan A requires course work, a written thesis, and an oral defense of the thesis. This option is preparation for doctoral work in Native American Studies or a related field of study.

Plan B requires course work, a professional paper, and a comprehensive oral examination. The non-thesis option is preparation for employment in tribal, state, or federal government, a small or large business, and/or a tribal college.

Admission
Candidates are not required to complete the Graduate Record Examination (GRE) General Test, but may do so if they feel it will strengthen their applications. The closing date for receipt of completed applications is February 1. For detailed College of Graduate Studies requirements, visit the Graduate Catalog online (www.montana.edu/gradstudies). Successful applicants must have their applications accepted by the College of Graduate Studies (with departmental endorsement) before an individual is considered a graduate student at MSU.

A Bachelor’s degree or equivalent from an accredited institution is required for admission to the Master’s program in Native American Studies. The College of Graduate Studies recommends that prospective applicants send a letter of interest to the Native American Studies Department in order to ascertain the suitability of the program for the applicant.

Each applicant must submit the following:
1. application to the MSU-Bozeman College of Graduate Studies and a non-refundable $50 application fee
2. Graduate Record Exam (GRE) optional for students who feel it may strengthen their application
3. TOEFL score of 550 for international students where English is not their first language
4. official transcripts from all institutions attended (students must have a minimum GPA of 3.00 for the last two years of undergraduate study)
5. two writing samples
6. a statement of purpose and goals which includes applicant’s experience and knowledge of historical and contemporary American Indian issues, work background, and how the M.A. in NAS will help the applicant reach long range goals
7. three letters of recommendation, signed and sealed in envelopes (in addition to College of Graduate Studies recommendation forms)
8. a current curriculum vita

Limited slots are available, and admissions are competitive. Prospective students may also apply electronically at http://www.montana.edu/wwwdg/apply.shtml.

For students applying for teaching assistantships, the application deadline is March 1 for the following academic year. For international students, the deadline is May 15 for fall and October 1 for spring semester. For all other applicants, the deadline is July 1 for fall and November 1 for spring semester. Applicants must be formally accepted by The Graduate School with departmental endorsement from Native American Studies.

Degree Requirements
- Thirty-one (31) credits minimum.
- Plan A – Thesis Option: 10 credits (min.) thesis credits
- ½ of total credits must be at 500 level
- Maximum of four (4) 570 credits
- Plan B – Non-thesis: 15 credits (min.) at 500 level
- Maximum of six (6) 570 credits
- Pass/Fail – Maximum of 3 credits allowed (excluding thesis)
- 400, 470, 476, 489, 490, 588 589 credits – Not allowed on the program
- 500, 570, 576 credits – May not exceed 1/3 of total credits required for degree
- 575 credits – Maximum of six (6) credits (Plan B students only)
- Non-Degree/Reserved credits – Maximum of six (6) to nine (9) credits allowed depending upon admission at the time the course(s) were taken. (See graduate catalog)
- Course work may not be more than six (6) years old at time of graduation.
- Transfer credits – May not exceed 1/3 of total credits on program.
- Grade performance for courses on Program of Study – Grades below “C-” must be repeated. “I” grades must be resolved before graduation.
- 3 credits (minimum) Registrar Registration required during term of comprehensive exams, defense of thesis, and graduation.
- 3 credits (minimum) Registrar Registration required for continuous enrollment. Continuous enrollment applies to all master’s students who have passed a comprehensive examination or students who have completed program content coursework (excludes thesis credits).

Required Content Courses
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS 510</td>
<td>American Indian Law &amp; Policy</td>
<td>3</td>
</tr>
<tr>
<td>NAS 530</td>
<td>Theory in American Studies</td>
<td>3</td>
</tr>
<tr>
<td>NAS 540</td>
<td>A Critical Approach to American Studies</td>
<td>3</td>
</tr>
<tr>
<td>NAS 541</td>
<td>Native American Studies Methodologies</td>
<td>3</td>
</tr>
</tbody>
</table>

Financial Assistance
Graduate Teaching Assistantships, awarded on a competitive basis, are available in NAS to formally admitted graduate students. Selected graduate students will teach a section of Introduction to Native American Studies and/or other NAS courses. See the Graduate Assistantship sections for detailed information on appointment criteria.

Further Information
For further information regarding the program, contact Native American Studies at 406/994-3884 or e-mail Saralyn Sebern at saralyns@montana.edu. In addition, you may refer questions to The Graduate School or find the graduate catalog and policies online at www.montana.edu/wwwdg or www.montana.edu/wwwdg/catalog. Students are expected to be familiar with the degree requirements of both the department and The Graduate School. Also see www.montana.edu (the university home page) or www.montana.edu/wwwnas (the home page for Native American Studies).

DEPARTMENT OF POLITICAL SCIENCE

Department Head
Linda Young
2-145 Wilson Hall, (406) 994-5604
lmyoung@montana.edu

Professors
- Jerry Johnson - Administrative law, public lands and natural resource policy.
- Franke Wilmer - International organization, international law, human rights, ethnic conflict, peace studies.
- Assistant Professors
- Eric Austin - Organization Theory, Public Policy, Management, Administrative Ethics
- Elizabeth Shanahan - Public Administration Theory, Research Methods, Public Budgeting, Policy Analysis, and Environmental Politics.
- Sarah Rushing - Political Theory, feminist theory.
- Linda Young - International political economy, globalization and politics, the politics of food and hunger, research methods.

Degree Offered
M. in Public Administration

As part of a statewide program of education for the public service, the department grants the Master of Public Administration (MPA) degree.

The MPA degree is a professional degree designed to prepare candidates for management and policy making positions in public sector agencies at the local, state and federal levels. The program stresses sound preparation in public management, personnel and financial administration. Further coursework is available in administrative law, leadership, program evaluation, local government, and ethics. Specializations in local government, administration of Native American affairs, education leadership, planning and other subspecialties are available. Practical experience is obtained through a supervised internship with a public or quasi-public agency. A minimum of 36 semester credits, including a research paper and internship, is required.
Program Requirements
Full time students should be able to graduate in two academic years. The MPA degree requires completion of 36 credits.
Core Required Courses:
- PoLS 551: Quantitative Research Methods
- PoLS 554: Foundations of Public Administration
- PoLS 555: Human Resources Management
- PoLS 557: Public Budgeting and Finance
- PoLS 558: Organization Theory
- PoLS 559: Program Evaluation/Policy Analysis
- PoLS 562: Local Government Administration or PoLS 500: Leadership and Government Administration
- PoLS 560: Ethics and Public Service
- PoLS 574: Professional/Directed Research Project

Financial Assistance
The Political Science Department offers a limited number of teaching assistants which are usually reserved for second year students. Outstanding first year students, however, may receive a teaching assistantship as well. Teaching assistants receive a monthly stipend as well as a tuition and fee waiver. The Local Government Center periodically offers one research assistant position which carries a tuition waiver.

DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY
Montana State University
Po Box 173400
Bozeman, MT 59717
Tel: (406) 994-4801
Fax: (406) 994-5407
www.chemistry.montana.edu/

Interim Department Head
Professor Bern Kohler

Professors
- Joan B. Broderick; bioinorganic chemistry, mechanisms of metalloenzyme-mediated reactions, mechanisms of biological radical reactions, bioremediation
- Patrik R. Callis; physical chemistry, quantum chemistry, biophysical chemistry, electronic structure and photophysical processes in molecules, solvent-solute interactions.
- Mary J. Cloninger; bioorganic and macromolecular Chemistry, organic synthesis.
- Valérie Cypié; biophysical chemistry, protein structures and dynamics as probed by nuclear magnetic resonance.
- Trevor Douglas; Biominalization, bio-materials and nano-materials chemistry
- Edward A. Dratz; biophysical chemistry, biochemistry, NMR, mass spectrometry, and molecular modeling studies of membrane receptors and protein-protein interactions.
- Paul A. Grieco; natural products total synthesis and medium effects in organic chemistry.
- Bern Kohler; ultrafast laser spectroscopy, DNA photophysics and photochemistry, solar energy conversion and photocatalysis
- C. Martin Lawrence; membrane protein structure and function, protein/RNA interactions, macromolecular X-ray crystallography, structure assisted design of ligands and inhibitors.
- Thomas Livinghouse; applied organometallic chemistry, homogeneous catalysis, organic synthesis.
- Timothy K. Minton; physical chemistry, gas-surface interaction dynamics, surface modification, and photochemistry via molecular beam methods.
- John W. Peters; enzyme structure and mechanism
- David J. Singel; physical and biophysical chemistry, high field EPR and DNP biochemistry of NO, laser materials.
- Robert A. Walker; optical spectroscopy in hard to see places; nonlinear optical studies of liquid interfaces and high temperature vibrational spectroscopy in high temperature electrocatalytic devices.

Associate Professors
- Brian Bothner; proteomics, protein dynamics, supramolecular complex formation
- Lee Spangler; physical chemistry, molecular and materials spectroscopy
- Robert K. Szilagyi; synchrotron-based spectroscopic and computational studies of bioinorganic and organo-metallic systems
- Martin Teintze; Biochemistry of membrane proteins, protein-protein interactions, protein engineering, HIV vaccines.

Assistant Professors
- Trevor Rainey; organic synthesis

Research Professors
- Donald A. Bryant; Physiology, biochemistry, genetics, and genomics of photosynthetic bacteria
- David M. Dooley; metallocprotein structure, function & mechanism

Associate Research Professors
- W. Berk Knighton; chemical ionization mass spectrometry

Assistant Research Professors
- Mary Cloud Ammons
- Eric Boyd
- Phillip Sullivan
- Brian Tripet
- Masaki Uchida

Degree Offered
- M.S. in Chemistry
- M.S. in Biochemistry
- Ph.D. in Chemistry
- Ph.D. in Biochemistry

The Department of Chemistry and Biochemistry offers research-oriented programs culminating in the Doctor of Philosophy degree. The faculty in the department have expertise in a broad range of specialty areas including synthesis, structure, spectroscopy, and mechanism. In each of these fields, the strength of MSU Chemistry and Biochemistry Department has been recognized at the international level. MSU is a growing and dynamic university of 14,000 students. MSU is rapidly increasing in research prominence and is now ranked among the nation’s 100 leading research universities by the Carnegie Foundation. The Department of Chemistry and Biochemistry has the largest and best-funded doctoral program on campus. Our doctoral students receive world-class mentoring in a spectacular northern Rocky Mountain
setting and graduate to superb career opportunities.

Graduate programs in chemistry and biochemistry are designed to provide students with a solid and broad foundation on which to base their careers. An appropriate combination of coursework and independent investigation is planned with individual faculty advisors. In consultation with their graduate advisor, graduate students can tailor their program to their own needs and interests. We believe that at the conclusion of their graduate education at Montana State University, students should have a professional command of the fundamentals of their disciplines. We cultivate the ability to think independently and to critically analyze scientific problems that span disciplinary boundaries. A high level of creativity and originality in research is expected of candidates for the Ph.D.

Admission (M.S. and Ph.D.)

An entering graduate student is expected to have had a solid chemistry background, including general, analytical, organic, and physical chemistry courses; Mathematics through calculus; and college level physics. A student less well prepared may be provisionally admitted provided he or she can attain an acceptable background proficiency within one year. Applicants are strongly encouraged to take the GRE subject test appropriate to their area.

Applicants must formally instruct the Graduate School. See the Admission Policies and Application Requirements sections for additional information at http://www.montana.edu/wwwebg/. However, please note that, although you can apply through the MSU Graduate School, we prefer that you send your application directly to the Department of Chemistry and Biochemistry. This saves time in the review process and allows us to waive the $60.00 application fee. Please visit www.chemistry.montana.edu to apply online. Along with your application form, you’ll also need to arrange for your GRE scores, three letters of recommendation and an official transcript to be sent to the address given above. International applicants must also submit an iBT or IELTS score report and the International Student Financial Certificate (ISFC) along with the documents required on the ISFC. Please see our website (www.chemistry.montana.edu) for more information.

Program Requirements

All entering graduate students are required to demonstrate proficiency in three of the six chemistry areas (analytical, inorganic, biological, organic, structural, and molecular biology, and physical) within the first year. The exams are offered during August, November, February, and April of the academic year. A student is permitted three attempts in each area.

During the first semester, each student selects a major advisor, who assists the student in selecting other faculty members for the student’s graduate committee. This committee will offer the major guidance and direct the student’s degree program and bears the prime responsibility for decisions that affect that program. Attendance and participation in the departmental seminars are required of all chemistry graduate students. All students will register for BCHM/CHMY 594 each semester.

For the Doctor of Philosophy in chemistry or biochemistry, students must satisfy the proficiency requirement, complete a core program of coursework, advance to candidacy by passing the comprehensive examination, and write and defend a dissertation based on the student’s research.

The comprehensive examination consists of written and oral parts. Most students satisfy the written examination by writing an original proposal describing the candidate’s planned dissertation research. The second part of the comprehensive examination is an oral defense of the proposal. The student is admitted to Ph.D. candidacy upon successful completion of the written and oral portions. The Graduate Handbook available on the Department’s web site (www.chemistry.montana.edu) has full details and the latest requirements.

For the Master of Science Plan A in chemistry or biochemistry, the minimum requirements are twenty (20) credit hours of appropriate courses, ten (10) credit hours of thesis (BCH/CHMY 590) and an acceptable thesis based on the student’s research and a satisfactory oral defense of the thesis. Plan A candidates must present a seminar in addition to the final thesis defense, which constitutes the comprehensive examination. For the Master of Science Plan B in chemistry or biochemistry, the requirements are thirty (30) credit hours of appropriate courses, a seminar, and satisfactory performance in an oral comprehensive examination during the last term of residency for the degree.

Course Requirements

To earn a Ph.D. in chemistry or biochemistry, a student must successfully complete at least six three-credit courses, maintaining a “B” average or better. Four of these must be Department of Chemistry and Biochemistry courses and at least three must be in the student’s area of specialization.

The Graduate Program Committee will advise entering students on course selection. The listed courses can provide guidance in planning the first year’s courses.

BIOCHEMISTRY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCHM 524</td>
<td>Mass Spectrometry</td>
<td>3</td>
</tr>
<tr>
<td>BCHM 526</td>
<td>NMR Spectroscopy</td>
<td>3</td>
</tr>
<tr>
<td>BCHM 534</td>
<td>Protein Structure</td>
<td>3</td>
</tr>
<tr>
<td>BCHM 541</td>
<td>Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>BCHM 545</td>
<td>Advanced Physical Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BCHM 547</td>
<td>Bioinorganic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>BCHM 550</td>
<td>X-ray Crystallography</td>
<td>3</td>
</tr>
</tbody>
</table>

Inorganic

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 515</td>
<td>Structure and Bonding</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 316</td>
<td>Mechanism and Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 347</td>
<td>Bioinorganic Chemistry</td>
<td>3</td>
</tr>
</tbody>
</table>

Organic

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 323</td>
<td>Organic Reaction Mechanisms</td>
<td>1-3</td>
</tr>
<tr>
<td>CHMY 333</td>
<td>Physical Organic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 335</td>
<td>Reactant Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 349</td>
<td>Organic Synthesis</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 354</td>
<td>Organometallic Chemistry</td>
<td>3</td>
</tr>
</tbody>
</table>

Physical/Analytical

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHMY 357</td>
<td>Quantum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 358</td>
<td>Classical and Statistical Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 359</td>
<td>Kinetics and Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>CHMY 364</td>
<td>Advanced Quantum Chemistry</td>
<td>3</td>
</tr>
</tbody>
</table>

Research Facilities

The Department of Chemistry and Biochemistry at Montana State University provides students, faculty, and staff with access to the state-of-the-art instrumentation that is required to stay at the forefront of research. We
have the region’s best mass spectrometers for proteomics, metabolomics, chemical composition, and imaging. Chemists and biochemists benefit from excellent NMR instrumentation, which includes 600, 500, and 300 MHz NMR spectrometers. These instruments are used in routine analysis of small molecules and also protein structural determination. Current MS techniques that are ideal for many projects in chemical biology include ultra high pressure LCMS, ion traps with CID and ECD, chip and standard nanoflow ESI, MALDI-TOF-TOF, and ultra-high resolution Q-TOF MS/MS. Our instrumentation for dynamic light scattering, zeta potential, isothermal titration microcalorimetry, cryogenic electron microscopy, and stopped flow spectrophotometry is also state of the art. Two protein crystallographers have all the necessary equipment for macromolecular crystal structure determination. Protein-protein interactions can be studied using surface plasmon resonance (Biacore 1000), with quartz crystal microbalance with dissipation (Q-Sense), and using a fluorescence lifetime microplate reader.

The department has some of the nation’s most advanced facilities for time-resolved laser spectroscopy on time scales from femtoseconds to seconds. Multiple Ti:sapphire-based ultrafast laser systems provide tunable laser pulses from UV to mid-IR wavelengths, enabling a rich array of transient absorption and emission spectroscopies. Investigations of high-energy gas-phase and gas-surface molecular interaction are conducted using a molecular beam apparatus that was originally designed by Nobel Laureate, Y. T. Lee, for crossed-beam studies of elementary reaction dynamics. Other advanced instrumentation includes CW and pulsed multifrequency EPR, Raman, FTIR, circular dichroism and fluorescence spectrometers.

In addition to the equipment housed in our department, campus microscopy capabilities include transmission electron microscopy (TEM), scanning electron microscopy with cryogenics (SEM), atomic force microscopy (AFM), confocal imaging, and laser micro dissection and capture.

National NSF Center for Biofilm Engineering
The National NSF Center for Biofilm Engineering is located at Montana State University. Several faculty and students have collaborative research projects with staff associated with this Center and those listed below.

Center for Computational Biology (CCB)
The CCB is an interdisciplinary academic unit supporting research, training and technology transfer in the general area of Computational Biology, combining state-of-the-art experimental techniques with state-of-the-art computer-based analysis and modeling capabilities. The research and training environment in the CCB encourage partnerships between experimentalists, theorists and engineers in diverse fields, providing opportunities to establish genuine research partnerships between students and scientists at many different institutions around the world. For more information, please visit http://ccb.montana.edu/.

MSU Optical Technology Center (OpTeC)
OpTeC is an interdisciplinary center with research groups from three university departments: Physics, Chemistry & Biochemistry, and Electrical & Computer Engineering. Each of the ten research groups is led by a faculty principal investigator and specializes in a different area of optical research. Collaborating teams profit from a multidisciplinary approach to problems. The primary goals of OpTeC are to foster collaboration with local industry and economic growth of the state. OpTeC promotes research on optical materials, lasers and optoelectronic devices, sensors, micro-optical systems, holography, and coherent optics. For more information, visit http://www.optec.montana.edu.

Thermal Biology Institute
The Thermal Biology Institute conducts and promotes research and education focused on the biology and interrelated physical and chemical processes of geothermal environments in the Greater Yellowstone Ecosystem. For more information visit http://thi.montana.edu/index.html

Center for Bio-inspired Nanomaterials
The Center for Bio-Inspired Nanomaterials (CBIN) at Montana State University is a multidisciplinary research and education center focused on utilizing and expanding our fundamental understanding of the formation and hierarchical construction of biological materials such as viruses, cells, and biomolecules (bones, teeth, seashells etc.). One extension of this fundamental work is the use of biological macromolecular assemblies as templates for the construction of novel functional nano-materials. However, the goal of the Center is to study a wide range of materials, beyond those of biological origin, to achieve unique physical properties by design. For more information visit http://www.cbin.montana.edu/index.html

NASA Astrobiology Biogeocatalysis Research Center
The major research theme of the ABRC is in the area of prebiotic chemistry and specifically the role for iron-sulfur mineral motifs in the transition between the non-living and the living world. The project has three major thrusts including 1) iron-sulfur mineral catalysis, 2) iron-sulfur enzyme catalysis, and 3) biomimetic approaches to bridging iron-sulfur mineral and iron-sulfur enzyme structure and reactivity. These projects are highly integrated and the characterization of the unique iron-sulfur centers of nitrogenase and hydrogenase provide the inspiration to examine the structure determinants for effective nitrogen reduction and reversible hydrogen oxidation catalysis. For more information visit http://www.chemistry.montana.edu/john.peters/research.html#abrc

Molecular Biosciences Program
The Molecular Biosciences Program offers numerous graduate research and training opportunities in Basic and Applied Life Sciences. Internationally recognized interdisciplinary research programs and Research Centers of Excellence provide students excellent career development opportunities.

The MB Program provides students with the opportunity to view faculty involved in life science research divided into research areas. The new approach should be easier for the prospective
student to find a faculty conducting the research of most interest to them. For more information visit http://www.montana.edu/index.asp

**Financial Assistance**

Graduate students in the program are supported continuously throughout their studies by stipends that average between $22,000 and $24,000 per year and by tuition waivers. First-year students are supported as graduate teaching assistants, while most students in their second and later years are appointed to grant-funded projects as graduate research assistants. Funding per investigator in the Department of Chemistry and Biochemistry is at a very high level found at only a small number of departments nationwide.

**DEPARTMENT OF ECOLOGY**

Montana State University
310 Lewis Hall
Bozeman, MT 59717-3460

www.montana.edu/eco/eco/eco/eco/eco/eco@montana.edu

Tel: (406) 994-4548
Fax: (406) 994-3190

**Department Head**
Dr. David Roberts

**Professors**
- Scott Creel Ph.D.; Behavioral endocrinology; conservation biology; population biology; social evolution; and biology of carnivores.
- Robert Garrott Ph.D.; Ecology; population dynamics, management and conservation of mammalian species.
- Daniel Goodman Ph.D.; Applied Mathematical demography; evolutionary demographic theory; environmental statistics; and environmental modeling.
- Christopher Guy Ph.D. (Affiliate); Applied fisheries science; population ecology; predator-prey interactions; and fisheries management.

- Andrew J. Hansen Ph.D.; Landscape ecology and management; land use effects on biodiversity; sustaining greater park ecosystems; conservation biology.
- Thomas McMahon Ph.D.; Wild trout management; fish-habitat relationships; winter ecology; conservation biology of salmonids.
- David W. Roberts Ph.D.; Vegetation ecology; ecological modeling; and multivariate analysis of ecological data.
- Jay J. Rotella Ph.D.; Ecology; population dynamic; habitat relationships; and management of avian species.
- Alexander V. Zale Ph.D. (Affiliate); Applied aquatic ecology; effects of hydropower and reservoirs on fish populations; fisheries management.

**Associate Professors**
- Billie L. Kerans Ph.D.; Behavior, ecology and evolution of freshwater macro invertebrates; and assessing the impact of human disturbances on freshwater ecosystems.
- Steven Kalinowski Ph.D.; Conservation and evolutionary genetics.

**Assistant Professors**
- Laura Burkle Ph.D.; Community ecology; plant-animal interactions; pollination ecology; climate & land-use change; invasive species; conservation.
- Wyatt Cross Ph.D.; Aquatic food webs and ecosystem; ecological stoichiometry; cross-ecosystem material subsidies.
- Andrea Litt Ph.D.; Effects of invasive species on wildlife, restoration ecology, quantitative ecology.

**Degree Offered**
- M.S. in Biological Sciences
- M.S. in Fish and Wildlife Management
- Ph.D. in Biological Sciences
- Ph.D. in Fish and Wildlife Biology
- Ph.D. in Ecology and Environmental Sciences (interdisciplinary)

The department offers advanced work leading to Master of Science degrees in biological sciences, and fish & wildlife management. The Master’s degree may be taken under either Plan A (thesis) or Plan B (without thesis). At the doctoral level, the Doctor of Philosophy degree is offered in ecology and environmental sciences, biological sciences and in fish and wildlife biology. At both the Master’s and Doctoral level the following areas of study are available: terrestrial and aquatic ecology, fish and wildlife management, evolutionary biology, quantitative ecology, and conservation biology.

Successful applicants are accepted into both the department and The Graduate School.

**Admission**

Only a limited number of graduate students are admitted to our program each year. There is an excellent article written by Dr. Al Zale, Director of the Fishery Cooperative Research Unit, “How to Surpass the Competition,” which you may find helpful as you think about applying for admission. We accept students into the program based on their academic performance, graduate record examination scores, recommendation letters, experience, and potential for scientific and professional excellence. Students must meet the minimum entrance requirements to be considered by an advisor.

Qualified students must secure an agreement from a faculty member who is willing to serve as major professor, or graduate academic advisor. We do not accept students into the program unless an advisor has agreed to supervise the student. Generally, the major professor will identify a research project and possible sources of funding as part of the admission process. We highly recommend that you formally apply only after a faculty member indicates that he or she is willing to serve as your graduate advisor.

**Program Requirements**

The minimum credit requirement for a master’s degree is 30 credits, and at least 20 credits must be from course work other than thesis work. A minimum of 10 thesis credits must be successfully completed. Minimum thesis registration is one (1) credit for a semester.

The minimum credit requirement for a Doctoral degree is 60 credits beyond the bachelor’s degree, and at least 42 credits must be from course
work other than thesis work. A minimum of 18 thesis credits must be successfully completed. A maximum of 30 credits from a previously earned Master’s degree may be applied toward the 60 credit requirement.

No specific courses are required for graduate degrees. The program of study is determined by the graduate committee following Division of Graduate Education guidelines.

Financial Assistance

Graduate Teaching Assistantships (GTAs) are chosen in the semester before the next academic semester, and reflect teaching needs and financial assistance needs. GTA’s carry tuition fee waivers, and in 2007/08 the stipend was a total of $1140.89 per month during the nine-month academic year. This includes money to be used for medical insurance which is not provided directly by the department. (For further graduate school expenses, consult the MSU fee schedules as provided in the Graduate Catalog.) Graduate Research Assistantships (GRAs) are research project-specific and are awarded by individual faculty as funds are available. GRA stipends are comparable to those of GTAs but often cover the calendar year or multiple years. Some fee waivers may be available with GRAs depending upon funding sources.

DEPARTMENT OF EARTH SCIENCES

Montana State University
P.O. Box 173480
200 Traphagen Hall
Bozeman, MT 59717-3480
Phone: 406 994 3331
Fax: 406 994 6923

http://www.montana.edu/wwwes/earth@montana.edu

Department Head
David W. Mogk

Emeritus Professors

- K.J. Hansen; climatology; physical geography, mountain systems, biogeography.
- W.W. Locke; Earth surface processes, natural hazards, glacial geology, soil development and paleo climate, post-glacial volcano-tectonic deformation in Yellowstone.
- S.G. Custer; ground and surface water hydrology, stream morphology, water quality, snow dynamics (snow-melt runoff, wet and dry snow avalanche processes; snow distribution).
- D.R. Lageson; structural geology and regional tectonics of the Northern Rocky Mountains, earthquake geology, crustal extension of the northern intermountain region.
- D.W. Mogk; evolution of the Archean crust of SW Montana, petrogenetic processes in the middle crust, chemistry and isotopic studies of the Archean rocks, surface chemistry of minerals, geoscience education.
- J.G. Schmitt; tectonics and sedimentation in foreland and extensional basins, alluvial fan sedimentology, vertebrate taphonomy.
- C. Whitlock; Quaternary environmental change, vegetation fire, and climate history of the western U.S. South America, and New Zealand.
- W.K. Wyckoff; cultural and historical geography of the United States, evolution of western American cultural landscapes, rural and urban settlement geography.

Associate Professors

- T.C. Feeley; volcanology, volcanic hazards, geochemistry of continental magmatism.
- M.H. Gardner; stratigraphy, sedimentology, subsurface geology, ancient ocean systems, petroleum geology.
- J. Liu; economic-urban geography, China.
- L. Skidmore; biogeochemistry and geomicrobiology of glaciated systems.
- D.J. Varricchio; dinosaur paleontology, taphonomy and anatomy.

Assistant Professors

- J. Hendrix; snow, avalanche, cryosphere, climate change, snow hydrology, alpine and arctic systems.

Adjunct Assistant Professors

- S.R. Challender; geographic information science instruction, database structures, geographic information analysis.
- A.C. Eppe; physical and cultural geography.

Assistant Research Professors

- F.D. Jackson; paleontology, taphonomy and reproductive paleobiology of dinosaurs.
- D.B. McWethy; ecosystem and paleobiology of ancient systems.
- D.W. Bowen; sedimentary basins, stratigraphy of basin fill deposits.
- G.T. Federson; climate change, water resources, and ecosystem interaction.

Degree Offered

- M.S. in Earth Sciences
- M.S. in Land Rehabilitation (Interdisciplinary degree)
- Ph.D. in Earth Sciences

Assistant Research Professors

- R.L. Lawrence (Land Resources and Environmental Science); remote sensing, forestry, hydrothermal and ecological change in Yellowstone National Park.
- K.L. Pierce (US Geological Survey, NRMSC)
- D.W. Bowen; sedimentary basins, stratigraphy of basin fill deposits.

Affiliate Professors

- M.S. in Earth Sciences
- M.S. in Land Rehabilitation (Interdisciplinary degree)
- Ph.D. in Earth Sciences

Earth Sciences offers M.S. and Ph.D. degrees in Earth Sciences (Geography, Geology, and Geobiology content areas). We stress independent thesis research with some supporting course work. Although we are a small department, our expertise spans most of the subfields of Earth Sciences. Our Geography faculty includes specialties from settlement geography through bioclimatology to GIS and snow science, while the interests of our Geology faculty range from petrogenesis to paleobiology to applied hydrogeology and from dinosaur taphonomy...
and stratigraphy to geomorphology. Our Geobiology faculty have research interests in vertebrate paleontology, paleoecology, biogeography, paleoclimatology, and geomicrobiology. Our program strengths are in basin analysis and energy resources, dinosaur paleontology, geography of the northern Rocky Mountains, architecture and composition of the lithosphere, snow science and cryospheric processes, and climate change. Examples of thesis titles can be found on the Department of Earth Sciences web page (see above).

**Admission**

The department generally expects applicants to have a GPA of 3.0 or higher and GRE Scores better than the 50th percentile and a strong academic background in Earth Sciences (Geography, Geology, or Geobiology). Foreign students must have a TOEFL score better than 550 for the paper test and 231 for the computer test. The Department does not accept general applicants to our graduate program. An applicant should identify a major advisor from the list of faculty above, contact that individual, and determine whether there is space available in that advisor’s program.

For students who wish to study geography, the department requires the equivalent of a geography minor (eight semester geography courses including map skills, world regional, human, and physical geography) as background. A geography undergraduate degree is preferred and coursework and practical experience involving geographic skills such as cartography, field methods, aerial photograph interpretation, remote sensing, GIS and quantitative methods are considered a desirable part of an applicant’s background.

For students who wish to study geology, the department expects an applicant to have a year each of calculus, physics and chemistry as well as physical geology, mineralogy, petrology, historical geology, geomorphology, sedimentation, stratigraphy, structural geology, and a field geology course which emphasizes mapping. These requirements are typically met by an undergraduate degree in geology. A student who has not completed all requirements may be admitted but is expected to make up deficiencies during the first year of graduate study.

For students who wish to study geobiology, the department expects an applicant to have a degree in geology, biology or a closely related field. The most competitive students have significant upper-division course work in both geology and biology.

For optimum course scheduling, applicants are accepted into the graduate program only at the start of Fall semester. However, a student desiring to take courses to strengthen qualifications for the graduate program may be admitted as a non-degree student at the beginning of either the Spring or Summer term. Successful applicants must be accepted both by the department and by The Graduate School.

**Program Requirements**

Students are expected to develop a solid curricular foundation in geography, geology or geobiology. All graduate students in the Earth Sciences Department are required to take Earth Science 500 Section 01 Thesis Design for one credit in the fall of their first year. Graduate programs include a core of geography, geology, or geobiology courses and are further tailored in consultation with the advisor and graduate committee to the specific talents and interests of the individual student. Coursework in disciplines outside the department is encouraged to support and enhance specific research areas in the Earth Sciences.

Graduate and 400-level (senior) courses in earth science include:
- surface-water resources, ground-water resources, snow dynamics, physiography, geobiology, geomicrobiology, Quaternary Environments of the Western US, Quaternary paleoecology, and Quaternary environments.
- Graduate and 400-level (senior) courses of study in geography include: historical geography, geographic thought, aerial photo interpretation, mountain geography, applied GIS and spatial analysis, tourism planning, mountain geography, regional geography, East Asia in the global system, GIS research fundamentals, settlement geography, bioclimatology, and land use planning.
- Graduate and 400-level (senior) courses of study in geology include: glacial geology, sedimentology, applied geological hydrology, advanced stratigraphy, clastic sedimentology, ancient ocean systems, tectonics of sedimentary basins, petroleum geology, depositional systems, vertebrate paleontology, macroevolution and the fossil record, taphonomy, comparative vertebrate anatomy, Hell Creek paleontology, geology of the northern Rocky Mountains, structural analysis, tectonics, igneous geochemistry, igneous geochemistry, and volcanology.

**The Marathon Center of Research and Teaching Excellence in Earth Science**

M-CORTES is a partnership between Marathon Oil and Earth Sciences funded through the MSU Foundation. This Center is designed to support students, education, and research related to oil and gas. This center includes general department support, scholarships, training opportunities, internships, and travel grants.

**Facilities**

The primary research facility is the northern Rocky Mountain field laboratory which includes Yellowstone National Park, and the Greater Yellowstone GeoEcoSystem. Field work is also done in China, Argentina, Chile, and New Zealand. Field-based research in the Rocky Mountains is a component of many Earth Sciences graduate students’ study. Field equipment includes tools for location and altitude (from conventional compasses and altimeters to auto levels, a total station and GPS ground stations), sampling devices including suspended and bed-load sediment samplers, current meters paleomagnetic rock drills, hammer seismograph, auto level, total station, snow density kits, U.S. Federal Snow samplers, ram sondes, shear frames, lake-sediment coring equipment and the like. Field work is supplemented by laboratory analysis in several facilities across campus. The Department has crushers, Franz magnetic-susceptibility separator, balances, rock saws, lap wheels, and a paleontology preparation laboratory. The Department also has several high-quality (Leitz and Nikon) transmitted and reflected light research petrographic microscopes with photo microscopy and cathode luminescence capability and computer-driven image analysis capabilities. There is an MSU
Paleoecology Lab under the direction of Cathy Whitlock, a geomicrobiological/geochemical laboratory under the direction of Mark Skidmore, a structural geology laboratory under the direction of David Lageson, and the stratigraphic and basin analysis laboratory under the direction of Michael Gardner.

There are other laboratories on campus that Earth Scientists use. The MSU Spatial Sciences Center under the direction of Rick Lawrence provides instruction and research opportunities for faculty and students interested in Global Positioning Systems, GIS and remote sensing. This center supports ARC/INFO and ERDAS on workstations, pcARC/INFO and IDRISI and IMAGINE on PCs, and a variety of digitizers, scanners, printers and plotters for data input and output.

The Imaging and Chemical Analysis Laboratory (ICAL) contains analytical equipment which includes a scanning electron microscope (with EDS, BSE, and CL spectrometers), automated powder X-ray diffraction, X-ray photoelectron spectroscopy, Auger electron spectroscopy, and time-of-flight SIMS.

The Subzero Science and Engineering Laboratory under the direction of Ed Adams has a variety of cold rooms for research on snow and ice including a flume laboratory for the study of ice in streams and lakes, and laboratories with radiation and thermal pulses to examine snow and ice properties under varying weather and climatic regimes.

The vertebrate (dinosaur) paleontology laboratory of the Museum of the Rockies, under the curation of Jack Horner, contains state-of-the-art microscopic and computerized image-enhancement equipment for the study of dinosaur bones, as well as other chemical and mechanical equipment for the preparation and analysis of fossilized vertebrates.

Graduate students in Earth Sciences have been successful with National Science Foundation Fellowships and research grants from Geological Society of America, the American Association of Petroleum Geologists, the Society for Sedimentary Geology, the U.S. Forest Service, and Sigma Xi, and have won University-wide and regional awards for thesis research.

Financial Assistance

Teaching and research assistantships are available each year. Graduate scholarships are awarded annually on a competitive basis in the second year of residence to assist with thesis research. See the Earth Sciences web page or contact the department for more information.

Department of Mathematical Sciences

PO Box 172400
Wilson Hall 2-214
Office Number 406-994-3601

Department Head
Dr. Kenneth Bowers

Professors
- M. Barge; dynamical systems.
- J. Borkowski; experimental design, response surface methodology, sampling, quality control.
- K. Bowers; applied mathematics, numerical analysis.
- J. Dockery; applied mathematics.
- W. Esty; stochastic processes, probability, mathematics education.
- T. Gedeon; applied dynamical systems.
- I. Klapper; applied mathematics.
- J. Kwapisz; dynamical systems, ergonomic theory.
- J. R. Lund; numerical analysis.

Associate Professors
- J. Banfield; statistical computation, pattern recognition.
- E. Burroughs; mathematics education.
- J. Cherry; spatial statistics, linear models, ecological and environmental statistics.
- L. Davis; sensitivity analysis, optimal design, numerical analysis.
- L. Geyer; dynamical systems, complex analysis.
- M. Greenwood; functional data analysis, time series, model selection criteria.
- J. Luebeck; mathematics education.
- M. Pernarowski; applied mathematics.
- J. Robison-Cox; statistical computing, graphics, mixed effects models.
- D. Yopp; mathematics education.

Assistant Professors
- M. Higgs; ecological and environmental statistics, bayesian hierarchical models, spatial statistics, computational statistics.
- B. Lindaman; mathematics education.
- T. Zhang; applied mathematics, numerical analysis.

Degrees Offered
- M.S. in Mathematics
- M.S. in Mathematics (Mathematics Education option)
- M.S. in Statistics
- Ph.D. in Mathematics
- Ph.D. in Mathematics Education Emphasis
- Ph.D. in Statistics

The Department offers graduate study leading to the degree of Master of Science in either Mathematics or Statistics. The M.S. in Mathematics degree is available with two options: Mathematics and Mathematics Education. The Doctor of Philosophy degree is offered in Mathematics and Statistics. The Ph.D. in Mathematics is available with two emphases: Mathematics and Mathematics Education. The Department also offers a Graduate Certificate in Statistics.

Admission

For regular admission to either the M.S. or the Ph.D. degree program, a student should have completed at least eighteen (18) credits of mathematics beyond calculus. For mathematics majors, this should include a year of advanced calculus. For statistics majors, it should include a year of statistical theory and a year of probability and statistical methods. Admission to the mathematics education program is determined on an individual basis. Successful applicants are accepted into both the Department and the Graduate School.

Master of Science Requirements

The Master of Science degrees are offered under Plan A (Thesis) and Plan B (Non-thesis). Of the required thirty (30) credit minimum, at least eighteen (18) credits of 500-level course work must be taken under either plan.

Available under Plan B is a comprehensive master’s degree in either math-
emematics or statistics. Although no thesis is required in this plan, a sound knowledge of several areas of mathematics and/or statistics is expected. Also available under Plan B is a master’s degree in mathematics with an option in mathematics education. This option is designed primarily for secondary teachers and is offered as a combination of on-line academic year course work and summer sessions. The mathematics education option requires completion of a program portfolio through a series of seminars.

For further information, refer to the For Master’s Students section. Students are expected to be familiar with both the Department and the Graduate School degree requirements.

M.S. in Mathematics – Mathematics Option

Program Guidelines

The Master of Science degree in mathematics at Montana State University is designed to prepare students for further graduate work or for employment in academic, industrial, business, or government forums. Upon entrance, each student meets with the department’s Graduate Program Committee to discuss career objectives and first year course work. During the second semester in the program each student forms a Graduate Committee and together, they outline the student’s degree program. The prerequisites for the master’s degree program in mathematics consist of the following courses or their equivalent: Linear Algebra (M 333) and Advanced Calculus (M 381-382). Students who have not completed these courses or their equivalent may still enter the master’s program but it is suggested that these courses then be taken.

Both non-thesis and thesis plans are offered for the M.S. in Mathematics – Mathematics Option degree:

Non-thesis Plan

This plan requires both completing the course work and passing the written comprehensive exam. At least 30 credits of course work are required. Of these, at least 18 credits must be numbered 500 or higher. Regardless, all of the following core courses must be completed:

- M 503 Advanced Linear Algebra (every Spring)
- M 504 Abstract Algebra (every Spring)
- M 505 Mathematical Analysis (every Fall)
- M 511 General Topology (every Fall)

Additionally, students must fulfill a breadth requirement by completing at least two of the following courses:

- M 441 Numerical Linear Algebra & Optimization (every Fall)
- M 450 Applied Math 1 (Fall odd numbered years)
- M 454 Dynamical Systems I (Fall even numbered years)
- STAT 421 Probability (every Fall)

Either or both of these two required courses may be replaced by the corresponding semester of the appropriate 500 level course: M 581 (numerical analysis), M 560 (applied mathematics), M 595 (dynamical systems), or STAT 501 (probability), respectively. Any other exceptions to the course requirements must be approved by the student’s graduate committee and adhere to the minimum policy requirements set forth in the Graduate Catalog (Plan B). Requirements for the written comprehensive exam are listed separately below.

Thesis Plan

This plan requires completing the course work, passing the written comprehensive exam, writing a thesis and an oral defense of the thesis. At least 30 credits must be completed of which 10 must be thesis credits. Students must also complete both the core and breadth course requirements described in the Non-Thesis Plan above. Any exceptions to the course requirements must be approved by the student’s graduate committee and adhere to the minimum policy requirements set forth in the Graduate Catalog (Plan A). Thesis and oral defense requirements must be arranged with and approved by the student’s graduate committee. Requirements for the written comprehensive exam are listed separately below.

M.S. in Mathematics Comprehensive Exam

The M.S. comprehensive exam is a written exam administered in disjoint 3-hour components. Each component is graded as pass or fail. To pass the comprehensive exam a student must pass four different components within two examination periods. At least two of these components must be from the following list:

- Linear Algebra (M 503)
- Abstract Algebra (M 504)
- Analysis (M 505)
- Topology (M 511)

The other two required components may be from the list above or from the following list:

- Numerical Analysis (M 441-442)
- Applied Mathematics (M 450-451)
- Dynamical Systems (M 454-455)
- Probability and Statistics (STAT 421-422)

The first examination period occurs in January with the specific dates and times for each component determined by the department.

Students must attempt at least four components the first examination period after 3 semesters of study.

Typically, these four, 3-hour components will be administered in a morning and afternoon of two different days. If the student fails one or more components in the first examination period, a failure will be reported to the Graduate School. The student must then pass the remaining required components in a second examination period administered either during spring semester (at least two months after the first examination) or the following January. No more than four components may be taken in the second examination period. If the student has not passed the remaining required components after the second examination period, a second failure of the comprehensive exam will be reported to the Graduate School.

M.S. in Mathematics - Mathematics Education Option (MSMME)

MSMME Admission Requirements

A typical MSMME applicant will have (1) a BS or BA with a major or minor in mathematics, (2) an under-
graduate GPA of 3.0 or higher, (3) certification to teach mathematics, and (4) at least two years of successful mathematics teaching experience at the secondary level. Applicants who do not have the above qualifications (e.g., those teaching at a private school) will be reviewed on a case-by-case basis.

MSMME Advising
A designated MSMME faculty coordinator develops a program of study for each student and assigns the student a three-person faculty committee. The committee must include at least two faculty members from the Department of Mathematical Sciences. The MSMME coordinator is charged with facilitating the student’s program while the committee chairperson oversees development and assessment of the student’s program portfolio.

MSMME Program Requirements
The MSMME program requires 30 semester hours of coursework. The program of study includes required coursework in fundamental areas of high school mathematics content: algebra, analysis (calculus), geometry, and statistics. Elective courses offer further study in number theory, discrete mathematics, and mathematical modeling, as well as mathematics education courses in curriculum, assessment, standards, and learning theory.

1. Core Content Courses (required):
   • M518 Statistics for Teachers
   • M521 Algebra for Teachers
   • M524 Analysis for Teachers
   • M525 Geometry for Teachers
2. Pedagogy Courses (choose at least 2 of 4):
   • M520 Standards-Based Mathematics for Teachers
   • M521 Learning Theories in Mathematics for Teachers
   • M528 Curriculum Design
   • M529 Assessment Models and Issues
3. Electives:
   • M517 Modeling and Technology for Teachers
   • M523 Number Structures for Teachers
   • M526 Discrete Mathematics for Teachers

Courses are scheduled on a rotating basis that potentially allows completion of the program in two academic years and three summers. Adherence to this pace requires taking summer coursework in both online and face-to-face formats as well as online academic year courses.

MSMME Program Portfolio
As a summative assessment experience under Plan B (non-thesis) MSMME students engage in an ongoing and embedded process of portfolio development. Teachers exiting the MSMME program must demonstrate a thorough understanding of the standards for content and practice that guide their profession; reflect on completed coursework as a coherent whole; and self-assess their acquired knowledge of mathematical content, pedagogical applications, and classroom research. The portfolio includes representative coursework, “living laboratory” research reports, and a series of reflections. Three credits of the program are designated for portfolio-related work.

A. Students participate in a 1-credit online portfolio seminar during spring semester of their first year in the program. They will:
   • Read and discuss documents and articles related to standards of content and practice
   • Complete a guided reflection for each course taken since admission to the program
   • Synthesize knowledge from all courses completed up to this point
   • Assemble reflections, work samples, and “living laboratory” reports into a portfolio

B. Students participate in a 1-credit online portfolio seminar during spring semester of their second year as well. They will:
   • Read and discuss documents and articles related to standards of content and practice
   • Complete a guided reflection for each course taken since the first seminar
   • Synthesize knowledge from all courses completed up to this point
   • Assemble reflections, work samples, and “living laboratory” reports into a portfolio

C. Finally, students attend a 1-credit, 1-week seminar their final summer. During this week all teachers near completion of the program will meet to reflect on program coursework and assignments, discuss current trends and issues in mathematics education, present “living laboratory” classroom research results, and share highlights from their portfolios.

MSMME Program Completion
Completion of the program requires 30 credits of approved coursework and satisfactory completion of the program portfolio. The portfolio will be reviewed by the faculty member supervising each of the three portfolio seminars and by the student’s graduate committee chair.

The Graduate School mandates that each student must be enrolled in at least 3 credits of coursework during the semester they complete Plan B requirements and during the semester they intend to graduate. The MSMME program design ensures that a typical student will meet both of these requirements simultaneously by attending the third portfolio seminar and completing at least one 3-credit course during their final summer in the program.

M.S. in Statistics

M.S. in Statistics Program Guidelines
The Master of Science degree in statistics at Montana State University gives students a solid background in the applications as well as the theory of statistics. Students in this program prepare either for further graduate work or for academic, industrial, business, or government employment. Upon entrance, each student meets with the department’s Graduate Program Committee to discuss career objectives and first year course work. During the second semester in the program each student forms a Graduate Committee and together, they outline the student’s degree program. The prerequisites for the master’s degree program in statistics consist of the following semester courses or their equivalent: Multivariable Calculus (M 273), Linear or Matrix Algebra (M 221), Probability (STAT 421), and Mathematical Statistics (STAT 422). Students who have not completed these courses may
be accepted into the master’s program with the understanding they should make up these courses.

Either Plan A (thesis and 20 credits of course work) or Plan B (30 credits of course work) can be chosen. In either case, all courses on a graduate program must be numbered 400 or higher and STAT courses must be numbered 408 or higher. The specific program of study depends on the student’s previous training and experience. Regardless of the plan chosen, (i) at least half of the required non-thesis credits must be STAT courses, (ii) at least two-thirds of the required non-thesis credits must be numbered 500 or higher, and (iii) the following 15 semester core course credits are required:

M.S. in Statistics Required Courses
(15 semester credits) credits
STAT 501-502 Intermediate Prob and Math Stat ... 6
STAT 505-506 Linear Stat Models ...
Adv Regression .......................................... 6
STAT 510 Statistical Consulting ... 2
STAT 575 (Plan B below) ................................. 1 or 2

Additional requirements
1. The M.S. in Statistics degree requires completion of either a thesis or a writing project.
   • Thesis (Plan A): The Plan A thesis typically requires 450-500 hours of work. The student must register for at least 10 thesis credits (STAT 590) in addition to the required 20 credits of course work. The student must give an oral defense or his/her thesis.
   • Writing Project (Plan B): The Plan B writing project typically requires at least 90 hours of work, for which the student earns 2 credits of STAT 575. With permission from the student’s committee, additional credits of STAT 575 (no more than 4 total) may be earned. Students should enroll in Stat 575 in their final Spring semester, and must give a seminar on the writing project before graduating.
2. Experience in data collection – either through a course such as Sampling or Design of Experiments, or a course taken in a former degree program, or real-life experience.
3. For either Plan A or Plan B, the student must pass a comprehensive examination.

M.S. in Statistics Comprehensive Exam
The M.S. comprehensive exam consists of a written exam over material from STAT 501, 502, 505, and 506.

The exam is given each August with the specific date determined by the department. The exam is graded as PhD pass, M.S. pass, or fail. Examinees will be informed of the results within five working days of taking the exam. The M.S. comprehensive exam may be repeated once.

Ph.D. Requirements
Students in mathematics are expected to develop competence in real and complex analysis and at least two areas chosen from applied mathematics, dynamical systems, functional analysis, numerical analysis, partial differential equations, probability, topology or other topics the student’s committee may approve.

Students in statistics must demonstrate proficiency in the Ph.D. core (linear models, probability, and mathematical statistics) by passing the M.S. comprehensive exam at a Ph.D. Level.

Students in mathematics education must demonstrate competence in three areas: (1) at least one Ph.D. level mathematics topic (see above) to be determined by the student’s graduate committee (2) current theory in mathematics curriculum, assessment, and instruction; and (3) educational statistics and research methods.

The student’s graduate committee determines additional requirements. Degree candidates are expected to be familiar with both departmental and Graduate School degree requirements.

Ph.D. in Mathematics
Described below are the Department of Mathematical Sciences requirements for the Ph.D. in Mathematics. These departmental requirements supplement those set out by the Graduate School in the Graduate Catalog for Ph.D. Students.

There are no foreign language requirements or qualifying exam for a Ph.D. in Mathematics.

Ph.D. in Mathematics Committee
• The Ph.D. committee must include a minimum of five members excluding the Graduate School-assigned Graduate Representative.
• A committee must be formed before the end of the student’s second semester of study.
• The Committee Chairperson (Advisor) must be a faculty member within the Department of Mathematical Sciences.
• The first three committee members listed on a candidate’s Program of Study read and assess the dissertation.

Ph.D. In Mathematics Course Requirements
• A minimum of 30 credit hours are required (see the Graduate Catalog for Ph.D. Students for details).
• A minimum of 18 credit hours must be dissertation credits (M690)
• The Ph.D. student’s Program of Study listing their intended coursework must be approved by all committee members.
• The student must take a minimum of 4 credits of the M 594 seminar series.

Typically, a Ph.D. student takes 18 credits of mathematics in courses numbered 500 or higher to prepare for their comprehensive examination. Students are encouraged to begin some form of doctoral reading or research (either informally or in the form of M 689 credits) with a committee member by their second year of study.

Ph.D. In Mathematics Comprehensive Exam
The Ph.D. Comprehensive examination consists of both a written and an oral comprehensive examination. The candidate must pass the written comprehensive exam before taking the oral comprehensive examination.

Written Comprehensive Exam
How a student may choose and retake exam components is determined by (a)-(f):

a. The written comprehensive exam consists of 4-hour exam components graded as Pass or Fail.
b. The candidate must pass three components to pass the written comprehensive examination though they may attempt more.
c. If a candidate fails a component it may be attempted at most one more time.
d. The candidate must pass the following “required” components:
i. M 547, M 551 Measure Theory and Complex Analysis
c. Normally the remaining components are from the following list of “standard” components:
ii. M 511-512 Topology
iii. M 595-596 Dynamical Systems
iv. M 584-585 Functional Analysis
v. M 581-582 Numerical Analysis
vi. M 544-545 Partial Differential Equations
vii. M 560-561 Applied Mathematics
viii. M 547, 586 Measure Theory and Probability
f. At most one “nonstandard” component not from (i)-(viii) may be taken. To take such a component a petition form must be completed.

Oral Comprehensive Exam
After passing the written comprehensive exam the candidate must pass an oral comprehensive exam at a date agreed upon by the candidate’s committee. Normally the oral comprehensive exam is a thesis topic proposal where the candidate’s ability to conduct research on the proposal is assessed. When this is not the case, the candidate will be informed of the nature of the oral comprehensive exam by their committee. The candidate has at most two attempts to pass the oral comprehensive examination.

Ph.D. In Mathematics
Dissertation Requirements
Once the Ph.D. candidate has passed the comprehensive exam (both written and oral parts) the student has at most five years to submit an acceptable dissertation and pass their final defense. The first three committee members listed on a candidate’s Program of Study must be given a dissertation draft at least two weeks prior to the Final Defense. Regardless, all committee members must have access to a dissertation draft at least one week prior to the Final Defense. The dissertation should embody the results of extended research by the candidate, be an original contribution to knowledge, and include new material worthy of publication. The dissertation must be submitted as an electronic dissertation, in final form to the Graduate School not later than 14 working days before the end of the term in which graduate work is completed.

Ph.D. In Mathematics Final Defense
Department policies on the final defense and all other administrative procedures regarding the degree completion are exactly those as set out by the Graduate School.

Ph.D. in Mathematics Education
The Department of Mathematical Sciences offers a Ph.D. in Mathematics specializing in Mathematics Education. This program blends the study of advanced mathematics with coursework covering current trends in K-12 curriculum, assessment, and instruction, current research on mathematics teaching and learning and educational research design. As an emphasis within the Ph.D. in Mathematics, this program follows similar requirements regarding the Ph.D. committee. Credit requirements are also similar.

This pathway is designed for candidates who plan a future of teaching, research, and service focused on mathematics education in K-12 or collegiate settings. The program carries a strong emphasis on the pedagogy, content, and issues that characterize K-12 school mathematics, and graduates typically go on to faculty positions that involve teacher preparation and research in K-12 mathematics education. Doctoral students conduct research in areas that align with the faculty’s ongoing research interests and currently funded projects.

The education components of the program are coupled with a strong preparation in graduate-level mathematics. Ph.D. candidates possess or earn the equivalent of a master’s degree in mathematics and must complete a doctoral-level comprehensive examination in one area of mathematics, equipping graduates to seek employment in university mathematics departments as well as schools of education. A separate program leading to an Ed.D. in Curriculum & Instruction, with a 15-credit concentration in mathematics, is offered by the Department of Education in the College of Education, Health & Human Development. Information about this program is available through the MSU Education Department.

Ph.D. in Mathematics Education Admission
Applicants should possess a solid background in mathematics content, most often indicated by an earned master’s degree in mathematics, statistics, or mathematics education. Applicants with a strong undergraduate degree in mathematics or mathematics teaching will also be considered for the program. Undergraduate applicants will need to take necessary coursework to ensure both masters level competency in mathematics and roughly the equivalent of a secondary teaching credential in mathematics. Candidates who enter the Ph.D. program from baccalaureate programs can expect to add two to three years to their program of study while they complete these prerequisites.

Ideally, applicants will have teacher certification with a mathematics endorsement and/or two years of K-12 teaching experience. Applicants who lack K-12 teaching experience will be expected to acquire the following equivalencies by the time they complete the coursework:

1. Doctoral candidates are expected to possess a minimum level of competency in secondary mathematics instruction. This is represented by an undergraduate degree in mathematics along with at least six credit hours of education coursework, earned by:
   • Completing a secondary mathematics methods course (EDU497)
   • Completing a pedagogy course from M520, M521, M528, M529

2. Students who lack sufficient exposure to instruction at the elementary or secondary level will be required to complete school-based internships prior to beginning dissertation research. Each internship calls for extensive field experience as well as participation in a Mathematics Education seminar. Internships may include:
   • Elementary level – teach, tutor, and observe students in a K-8 classroom
   • Secondary level – teach one or more courses in a high school setting
Ph.D. in Mathematics Education
Comprehensive Examination
The written comprehensive examination for the Ph.D. in Mathematics Education consists of three separate components. Each component is completed in a 4-hour session.

- One component in mathematics chosen from the examination areas accepted for the Ph.D. in mathematics. This includes Real and Complex Analysis (M547-M551) or another sequence approved by the student’s committee.
- One component in mathematics education including M528, M529 and any other mathematics education courses required by the student’s committee.
- One component in educational statistics and research methods.

The mathematics and education/research components are typically completed in different years. Upon successful completion of all three written comprehensive examinations, the student must pass an oral defense of the comprehensive examinations. The student’s full committee attends the oral defense, which is often coupled with presentation of the dissertation proposal.

Along with passing the comprehensive examination, a Ph.D. candidate must have the support of a research advisor in order to transition from Ph.D. coursework to dissertation research. This advisor is not necessarily the committee chairperson of the student’s original committee. While still completing their coursework, Ph.D. candidates should seek out faculty to discuss potential research opportunities and eventually establish a formal advisor relationship.

Ph.D. in Statistics
Ph.D. in Statistics Program Requirements
The Ph.D. program in statistics at Montana State University prepares students for academic, industrial, business, or government employment. To earn a Ph.D. in statistics, a student must pass the M.S. comprehensive exam at the Ph.D. level, pass the Ph.D. comprehensive exam, and write and defend a Ph.D. dissertation. The exams are described below. The dissertation must be an original contribution to statistical science and must include new material worthy of publication. There is no departmental foreign language requirement for the Ph.D.

A Ph.D. student typically takes at least 24 credits of statistics in courses numbered 500 and higher. Additional course work in statistics and/or mathematics may be necessary, depending on the candidate’s chosen area of specialization and background. For instance, a Ph.D. student is expected to have completed all courses required for the M.S. degree in statistics and may need to make up one or more of these courses. Also, it is expected that a Ph.D. student will take directed study courses (STAT 689) in his/her area of specialty. STAT 690, dissertation credit requirements, are listed in the Graduate Catalog. Two credits of STAT 510, Statistics Consulting Seminar are required.

Ph.D. in Statistics Qualifying Exam
The Ph.D. qualifying exam is identical to the statistics M.S. comprehensive exam except that the exam must be passed at the Ph.D. level (i.e., Ph.D. pass). A student who earned an M.S. in Statistics from MSU need not take the Ph.D qualifying exam if the M.S. comprehensive exam was passed at the Ph.D. level. Other students are expected to take the Ph.D. qualifying exam as soon as coursework in the M.S. core has been completed. Two attempts to pass the qualifying exam are allowed.

Ph.D. in Statistics Comprehensive Exam
The topics and format of the written comprehensive exam for the Ph.D. in Statistics will be determined by the student’s committee.

Each student must devise areas of concentrated study. The concentration areas must be approved by the student’s committee and must include, in total, at least 3 graduate level courses. An area could involve course material from outside the department.

Each component of the written comprehensive examination is graded separately as pass or fail. A failed component may be repeated once. Once the written comprehensive examination has been passed, the student must pass the oral comprehensive examination. The student’s committee will inform the student of the structure and timing of the oral exam.

Graduate Certificate in Statistics
Training in statistical methods is a required part of the education of graduate students in engineering and the sciences. The Graduate Certificate in Statistics is designed to provide additional education in statistical thinking and methodology over and above the basic coursework taken by the typical graduate student. This transcriptable certificate will provide a clear record of additional training in statistics for future graduate programs or employers. The Graduate Certificate will also be of interest to those currently employed in technical businesses in the and to post-baccalaureate students.

Course Requirements
- All students must take
  - STAT 511/512 - Methods for Data Analysis I/II
- Students choose 2 courses from the following list, at least one of which must be either STAT 446 or STAT 526
  - STAT 446 - Sampling
  - STAT 526 - Experimental Design
  - STAT 431 - Nonparametric Statistics
  - STAT 436/536 - Introduction to Time Series Analysis
  - STAT 437 - Introduction to Applied Multivariate Analysis
  - STAT 439 - Introduction to Categorical Data Analysis
  - STAT 448 - Mixed Effects Models
  - STAT 524 - Biostatistics
  - STAT 528 - Statistical Quality Control
- Current graduate students must:
  - Obtain the approval of the department head/graduate coordinator of the student’s major department and the Department of Mathematical Sciences.
  - Obtain a grade of B or better in all coursework counted toward the certificate.
- Other students must:
  - Obtain the approval of the department head/graduate coordinator of the Department of Mathematical Sciences and the Graduate School.
  - Obtain a grade of B or better in all coursework.
DEPARTMENT OF MICROBIOLOGY

Montana State University
109 Lewis Hall
Bozeman, MT 59717
Tel: (406) 994-2902
www.montana.edu/wwwmb

Department Head
Mark Jutila, Interim

Professors
- A.K. Camper (affiliate); bacterial attachment to surfaces, biological treatment of drinking water and microbial regrowth in drinking water distribution systems.
- T. Douglas (affiliate); use of protein cage architectures for the development of MRI imaging agents.
- G. Geesey; metal and radionuclide transformations by iron- and sulfate-reducing bacteria in sub-surface environments.
- A.J. Jesaitis; host defense; leukocyte cell biology and biochemistry, chemotaxis, and electron transport.
- M.A. McClure; genomics and computational biology.
- T.R. McDermott (affiliate); soil microbiology focusing on plant-microbe interactions, biological transformations in soils, microbial diversity in extreme thermal soil.
- D.M. Ward (affiliate); microbial ecology, evolution & diversity, bio-remediation.
- M. Young (affiliate); spherical virus assembly & disassembly, viral protein cages, unusual archael viruses from extreme thermal environments.

Associate Professors
- M.J. Franklin; molecular genetics, biofilms, microbial exopolymer production, physiology of sessile bacteria, alginate biosynthesis.
- H.M. Miettinen (research); signal transduction in leukocytes, inflammation, cell adhesion and migration, function of inflammatory receptors.
- B. Peyton (affiliate); extremophilic bioprocessing, in situ biocatalyzed heavy metal biotransformations.
- B.H. Pyle (research); environmental microbiology, biofilms, microbial ecology, gravitation microbiology, water microbiology.
- J.R. Starkey (research); biology of cancer metastasis, cell moblility, angiogenesis & tissue invasion, structure based design of anti-metastatic drugs.

Assistant Professors
- J.B. Burritt; protein topological analysis, phage display methods, neutrophil-mediated inflammation.
- M. Dlakic; ribosome synthesis in budding yeast, protein evolution and 3D modeling of proteins, structural polymorphism of DNA, comparative genomics.
- M. Fields; anaerobic microbiology, physiology, ecology, bioremediation, environmental genomics.
- R. Gerlach (affiliate); biofilm processes and bioremediation in contaminated soils and water.
- T. Goins (research); ecology of Mycobacterium spp., gravitation microbiology.
- B.L. Granger (research); DNA vaccines, intracellular membrane traffic, cytoskeleton, host-parasite interactions.
- S. Halonen; intracellular protozoan parasites, immunobiology of Toxoplasma gondii in the central nervous system, cell biology of intracellular G. James (research); medical biofilms.
- J.S. Mills (research); G protein coupled receptors, enzymology, protein chemistry.
- R. Taylor (research); cloning and recombinant expression of monoclonal antibodies, neutrophil cell biology.

Instructors
- K.L. Cargill (adjunct); general microbiology, instruction.
- B.K. Hudson (adjunct); medical laboratory science, science education.
- L.M. Sherwood (adjunct); microbial genetics, science education.

Emeritus Professors
- K.E. Cooksey (research); cellular adhesion, marine & freshwater microbial ecology, industrial microbiology, biofilms.
- G.A. McFeters; microbial physiology & environmental microbiology of aquatic ecosystems, indicator bacteria, biofilms.

Degrees Offered
- M.S. in Microbiology
- Ph.D. in Microbiology

Interdisciplinary programs with strong ties to other departments and programs are encouraged. Students interested in environmental sciences can satisfy the requirements for a degree in microbiology while pursuing a broadly based program in areas such as biology, chemistry, entomology, plant, soil and environmental science, and plant pathology, and through interaction with the Center for Biofilm Engineering.

Students interested in biomedical sciences can satisfy the requirements for a degree in microbiology while pursuing a broadly based program in medically related subjects like biology, chemistry, and veterinary molecular biology, and through interaction with the WWAMI medical program.

Admission
Graduate Record Examination (GRE) General Test scores must be submitted at the time of application for admission to the graduate program. Studies in Chemistry should have included the fundamentals of organic chemistry as well as quantitative analysis; physical chemistry is desirable but not required; studies in Mathematics should have included an introduction to calculus and statistics; studies in physics should have provided the student with a background in heat, light, electricity and modern physics.
Program Requirements

Degree programs are designed to match the needs of student’s with differing goals. Specific requirements are detailed in the Department of Microbiology Graduate Student Handbook.

Research

Faculty research interests are medical microbiology, environmental microbiology, microbial ecology, microbial physiology, biology of extreme thermal environments, mechanisms of pathogenicity, medical mycology, microbial communities, molecular genetics, geomicrobiology, aquatic microbiology, cellular immunology, molecular immunology, virology, leukocyte cell and molecular biology, and environmental health and epidemiology.

Financial Assistance

Students of high scholastic caliber are encouraged to contact the Department of Microbiology for information about teaching and research assistantships, and fellowships. Most of our graduate students are supported financially throughout their graduate training. Both assistantships and fellowships are awarded for one-year periods but are renewable if the graduate student’s progress has been satisfactory. See the Graduate Assistantship sections for detailed information on appointment criteria.

DEPARTMENT OF CELL BIOLOGY AND NEUROSCIENCE

513 Leon Johnson Hall
Montana State University
Bozeman, MT 59717

cbn@cns.montana.edu
406-994-5120

Department Head
Thomas Hughes, Ph.D.

Graduate Coordinator
Charles Gray, Ph.D.

Professors
• Charles Gray; neurophysiology of visual perception and cognition.
• Gwen Jacobs; systems neuroscience, informatics and information technology.
• Frances Lefcord; molecular and cellular neural development.
• John Miller; neurophysiology.

Associate Professors
• Roger Bradley; developmental neuroscience.
• Steve Eiger
• Thomas Hughes; biophysics.
• Linda Hyman; yeast genetics, cell biology, biochemistry.

Assistant Professors
• Alexander Dimitrov; theoretical and computational neuroscience.
• Christa Merzdorf; developmental neurobiology.
• Anneke Metz; science pedagogy.

Research Professors
• Sheila Nielsen-Preiss (Associate); molecular microbiology.

Emeritus Professors
• Dwight Phillips (Professor); developmental neuropathology.

Debates Offered
• M.S. (plan-A and plan-B) in Neuroscience or Biological Sciences
• Ph.D. in Neuroscience or Biological Sciences

The department offers graduate study and research leading to both the Master of Science (M.S.) degree and the Doctor of Philosophy (Ph.D.) degree in either Neuroscience or Biological Sciences. Ph.D. applicants are encouraged to contact faculty in their anticipated research area before applying. The departmental website http://www.montana.edu/cbn/ provides links to detailed descriptions of the department.

Ph.D. and M.S. Degree Programs

A Bachelor’s degree in an area of Biology, Chemistry, Physics, Applied M or Psychology is recommended. Students with Bachelor’s degrees outside these areas are also encouraged to apply; such students will generally be required to complete appropriate courses while enrolled at MSU to make up subject matter deficiencies prior to full acceptance into the Ph.D. and Masters programs. Factors that the department uses in its admissions process include GRE scores, TOEFL scores (for non-native English speakers), reference letters, GPA and previous coursework and research experience.

The department of Cell Biology and Neuroscience also participates in the Molecular Biosciences Program at MSU (http://mbprogram.montana.edu/index.asp). This is an interdisciplinary graduate training program that includes faculty from a wide range of departments specializing in aspects of biology on the MSU campus.

For more information, and details about applying, please refer to http://www.montana.edu/wwwdg/ or http://www.montana.edu/cbn/Graduate_Program.html. The department encourages applicants to use the online application procedure.

Program Requirements

M.S. Degree

Students may pursue the Master’s degree under either Plan A or Plan B. Plan A requires the completion of 20 credits of acceptable coursework and 10 credits of thesis. Under Plan B, a 4 credit project and 26 credits of acceptable coursework must be completed. For more information, please refer to http://www.montana.edu/cbn/Graduate_Program.html.

Master’s candidates must take an oral comprehensive exam near the completion of their graduate program. Required curriculum will be tailored to the needs and interests of each student in consultation with their graduate advisor and advisory committee.

Ph.D. Degree

A Ph.D. student must complete a minimum of 35 dissertation credits and a minimum of either 25 credits of coursework beyond the Bachelor’s degree or 10 credits of coursework beyond the Master’s degree. Accepted students will be assigned an advisory committee upon entering the program to assist them in tailoring a curriculum that best fits their educational needs, research interests, and career plans. The degree requirements for the Ph.D. in Neuroscience can be found at http://www.montana.edu/cbn/Graduate_Program.html.
### Required courses include

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 611</td>
<td>Neuroscience I</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 612</td>
<td>Neuroscience II</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 424</td>
<td>Ethical Practice of Science</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 524</td>
<td>Biostatistics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 566</td>
<td>Gene Construction</td>
<td></td>
</tr>
<tr>
<td>BIOL 525</td>
<td>Neuroethology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 526</td>
<td>Sensory Neurophysiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 538</td>
<td>Developmental Mechanisms</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 555</td>
<td>Biomimetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 554</td>
<td>Cognitive Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 566</td>
<td>Gene Construction</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 567</td>
<td>Molecular Medicine</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 592</td>
<td>Independent Study</td>
<td>1.3</td>
</tr>
<tr>
<td>BIOL 591</td>
<td>Special Topics</td>
<td>1.4</td>
</tr>
<tr>
<td>MEDS 532</td>
<td>Medical Neuroscience</td>
<td>6</td>
</tr>
</tbody>
</table>

### Plus a minimum of 4 courses from the following list:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 510</td>
<td>Topics in Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 522</td>
<td>Genes and Cancer</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 525</td>
<td>Sensory Neurophysiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 526</td>
<td>Neuroethology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 538</td>
<td>Developmental Mechanisms</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 555</td>
<td>Biomimetics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 554</td>
<td>Cognitive Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 566</td>
<td>Gene Construction</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 567</td>
<td>Molecular Medicine</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 592</td>
<td>Independent Study</td>
<td>1.3</td>
</tr>
<tr>
<td>BIOL 591</td>
<td>Special Topics</td>
<td>1.4</td>
</tr>
</tbody>
</table>

### Research Experience

- **Plan A (thesis option)** Master’s degree students gain research experience through their thesis and are expected to submit the results of their thesis work to at least one journal or conference. Plan B (project option) Master’s degree students gain some research experience in the context of their project. Ph.D. students will gain research experience through their doctoral work, journal or conference submissions, and attending conferences.

### Research Facilities

Graduate research will be performed primarily in the laboratory of the student’s thesis advisor. Additional facilities will be available from the department and in laboratories collaborating with the student’s advisor.

Cell Biology and Neuroscience is dually housed in the 5th floor of Leon Johnson Hall and in the Center for Computational Biology (http://cns.montana.edu/) located in the basement of Lewis Hall.

### Financial Assistance

A number of research and teaching assistantships are available for qualified graduate students. These appointments are normally for half-time assignments (20 hours per week) during the academic year. Some appointments may also be available during the summer. Assistantships will only be offered to formally admitted graduate students. Fellowships are available through MBS program.

### DEPARTMENT OF PHYSICS

**Montana State University**  
P.O. Box 173840  
Bozeman, MT 59717-3840  
http://www.physics.montana.edu

**Tel:** (406) 994-3614  
**Fax:** (406) 994-4452  
**Location:** EPS Building, Rm 264  
physics@montana.edu

**Department Head**  
Dr. Richard Smith

### Professors

- W.R. Babbitt; laser and solid-state physics.
- J.L. Carlsten; laser physics.
- R.L. Cone; laser and solid-state physics.
- G.E. Francis; physics education.
- W.A. Hiscock; general relativity and gravitational waves.
- Y. Iderza; magnetic nanostructures; spin electronics.
- B. Link; theoretical astrophysics.
- J. Neumeier; condensed matter; oxides.
- A. Rebane; laser physics.
- V.H. Schmidt (emeritus); solid-state physics.
- R.J. Smith; surface physics.
- S. Tsuruta; theoretical astrophysics.

### Associate Professors

- J.P. Adams; astronomy and physics education.
- N. Cornish; general relativity and gravitational waves.
- C. Kankelborg; solar physics; experimental space physics.
- D. Longcope; solar physics.
- G. Malovichko; defects in optical materials.

### Assistant Professors

- J. Qiu; solar physics.

### Research Assistants

- M. Drobiijev; laser physics.
- D.E. McKenzie; solar physics.
- D. Nandi; solar physics.

### Adjunct Faculty

- C. Riedel; experimental nuclear physics.
- S. Willoughby; physics education.

### Degrees Offered

- M.S. in Physics
- Ph.D. in Physics

### Admission

**Application Requirements:**

The closing date for Fall admission is June 1st of each year. New graduates are accepted for Fall term only. Applications received before January 31 will be acted upon and notification of admission given by March 15. Applications received after January 31 will be treated individually on a “space-available” basis. Assistantships and fellowships will normally be awarded by March 15th.

All applicants are required to take the Graduate Record Examination General (Aptitude) Test and Subject (Advanced) Test in Physics before submitting their applications.

### Program Requirements

#### Master’s Degree

The Department of Physics grants the Master of Science Degree under two options: Plan-A (thesis required), and Plan-B (without thesis).

#### Plan A Requirements:

**Coursework:** A minimum of 20 credits of acceptable course work is required, which shall include the following.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 560</td>
<td>Teaching Seminar</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 500</td>
<td>Research Introduction Seminar</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 561</td>
<td>Advanced Classical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 562</td>
<td>Quantum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 519</td>
<td>Electromagnetic Theory I</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 566</td>
<td>Mathematical Physics</td>
<td>3</td>
</tr>
<tr>
<td>XXX Electives</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Thesis:**  
PHYS 590 Master’s Thesis ........................................ 10

#### Examinations:

A written comprehensive examination is required. A final oral examination is also required, covering the thesis and related areas.
Plan-B Requirements:

Coursework: A minimum of 30 credits of acceptable course work is required, which shall be distributed as follows:

- PHYS 500 Teaching Seminar ............................................ 1 credit
- PHYS 500 Research Introduction Seminar ....................... 1 credit
- PHYS 501 Advanced Classical Mechanics ..................... 3 credits
- PHYS 506 Quantum Mechanics I ...................................... 3 credits
- PHYS 507 Quantum Mechanics II ...................................... 3 credits
- PHYS 519 Electromagnetic Theory I ................................. 3 credits
- PHYS 520 Electromagnetic Theory II ............................... 3 credits
- PHYS 566 Mathematical Physics ........................................ 3 credits
- XXX Electives .................................................................. 10 credits

Thesis Requirements: None

Examinations:
A written comprehensive examination is required.

Program Information - Ph.D.

Coursework: A minimum of 60 credits of acceptable course work and research is required, which shall include the following:

- PHYS 500 Teaching Seminar ............................................ 1 credit
- PHYS 500 Research Introduction Seminar ....................... 1 credit
- PHYS 501 Advanced Classical Mechanics ..................... 3 credits
- PHYS 506 Quantum Mechanics I ...................................... 3 credits
- PHYS 507 Quantum Mechanics II ...................................... 3 credits
- PHYS 519 Electromagnetic Theory I ................................. 3 credits
- PHYS 520 Electromagnetic Theory II ............................... 3 credits
- PHYS 535 Statistical Mechanics ........................................ 3 credits
- PHYS 566 Mathematical Physics ........................................ 3 credits
- PHYS 567 Mathematical Physics ........................................ 3 credits
- XXX Electives .................................................................. 14 credits

Thesis
An acceptable thesis is required. A minimum of 20 credits of Physics 690 Research is required in addition to the courses listed above.

Examinations
A written and oral comprehensive examination is required. A final oral examination is also required, covering the thesis and related areas.

Financial Assistance
Seifert Scholarships are available to qualified domestic graduate students. A number of graduate teaching and research assistantships also are available. The period of appointment for teaching assistantships is August 15 to May 15. See the Graduate Assistantships sections for detailed information on appointment criteria.

Research Groups
Our research facilities include a new building housing state-of-the-art laboratories and equipment. External collaborations bring national and international experts to the department and open opportunities for research to be conducted at other world-class laboratories around the globe. On-campus, interdisciplinary research programs include the departments of Chemistry and Biochemistry, Electrical and Computer Engineering, the Center for Biofilm Engineering, and others. Research collaborations with local industries are also actively pursued. Collectively, our research groups foster interactions among the faculty, undergraduate and graduate students, research scientists, visiting scientists and other departments. Details of the research, as well as other aspects of the physics graduate program, are described on the Physics home page (http://www.physics.montana.edu).

Astrophysics, Relativity, and Cosmology (ARC)
The ARC group studies extreme astrophysical phenomena such as black holes, the big bang, and neutron stars, and uses them to further our understanding of fundamental physics. The incredible conditions that occur in these astrophysical environments far exceed those attainable in any Earthbound laboratory. Our research involves many branches of physics, including general relativity, particle physics, fluid dynamics, magnetohydrodynamics and plasma physics. Current research in the ARC group focuses on two areas: gravitational wave astronomy and neutron star interiors. Other areas of study include determining the size and shape of the universe, investigating quantum effects in strong gravitational fields, and energy extraction from rotating black holes. Neutron stars are excellent laboratories for studying matter in extreme environments - a teaspoon of neutron star material has a mass of several hundred million tons. The ARC group studies the role of magnetic fields, superfluidity and crustal rigidity in neutron stars, and how these factors may be related to star quakes and spin glitches. Gravitational wave astronomy is an exciting new area of research that is poised to open a new window on the Universe. The ARC group is investigating how the space-based LISA gravitational wave detector and the ground based LIGO detectors can be used to study violent astrophysical events such as the collision of two black holes.

Biophysics
The field of biophysics today comprises a wide variety of topics which do not have a single identifiable definition. The topics cover more than the mere application of physical principles to biological systems. Ultimately the field aims to understand life itself, which involves highly dynamic, organized and collective processes that survive and thrive in highly fluctuating environments. In a sense biophysics is the field of exploration taking place at the boundaries of physics and biology. The Department of Physics has several faculty members with interests in biology, who collaborate with a number of other departments on campus including Biochemistry, Microbiology, Biology, Center for Biofilm Engineering, and Land Resources and Environmental Sciences. Interest in biophysics is growing rapidly in parallel with the growth in the number of undergraduate, graduate and postgraduate students with multidisciplinary backgrounds involving physics and biology. The three groups in the Department of Physics with strong interests in biophysics issues have access to a large number of facilities both in Physics and in the many traditional biology and bio-chemistry laboratories located on campus and to the expertise in these facilities.

Condensed Matter Physics
The Department of Physics pursues an exceptionally broad spectrum of fundamental and applied research in condensed matter physics. The topics include defect characterization, ferroelectrics and piezoelectrics, fuel cells, interfacial growth, magnetism (bulk and thin film), nanotechnology, phase transitions, spintronics, superconductivity, structural studies using x-ray and neutron diffraction, and specimen synthesis including single-crystal and thin-film growth. State-of-the-art experimental facilities at MSU enable measurements to temperatures as low as 0.3 K. We are leaders in the measurement of thermal expansion, using a novel device developed at MSU that is capable of detecting sub-angstrom length changes of specimens to study phase transitions and critical phenomena with superb resolution. Our Ion Beams Laboratory conducts experiments on thin films and buried solid-solid interfaces to reveal phenomena with superb resolution.
fundamental properties and growth mechanics of importance for fuel cells and electronic devices. Ceramics for fuel cells are fabricated and tested for their electrical properties. The spectroscopy group investigates defects in advanced materials at the atomic level using a host of techniques such as EPR, ENDOR and optical spectroscopy, with the goal of engineering new properties for novel applications in photonics and information technology. The Center of Bio-Inspired Nanomaterials utilizes biological molecules as templates for the synthesis of nanoparticles with unusual physical properties; this interdisciplinary effort thrives on close collaboration among biologists, chemists, and physicists at MSU. Some experiments are also conducted at facilities such as the High Magnetic Field Laboratory, Argonne National Laboratory, Brookhaven National Laboratory, and Pacific Northwest National Laboratory.

Physics Education Research

The Physics and Astronomy Education Group endeavors to improve teaching and learning at all levels. Graduate Students pursue a Ph.D. in physics with a principal research focus on science education. Students whose primary research is in other areas may pursue a minor in science education. Members in this group have extensive expertise in: improving learning in large lecture courses; research driven curriculum development; WWW-based instructional strategies; K-12 teacher education and authentic student assessment strategies and project evaluation. Working in this group prepares students for continuing research in the growing number of physics education groups across the country, teaching at two and four year colleges and universities and for careers in educational material development.

Optics and Lasers

Research in optics and lasers at MSU extends from exploring fundamental physics to development of optical instruments and photonic devices. Research areas include: developing and studying new types of optical materials, sensors, and lasers; using optical crystals as novel photonic processing devices; exploring the non-linear response of molecules to laser pulses shorter than a trillionth of a second; and applying advanced laser and non-linear optics technologies to remote sensing and medical applications. Collaborations with researchers in the Optical Technology Center, Spectrum Lab, and Bozeman’s growing optics industry provide enhanced research opportunities.

Spectrum Laboratory

The Spectrum Lab was established in 1999 to advance the opto-electronic technologies emerging from the research laboratories of Montana State University and foster their transition to Montana companies, while providing enhanced educational opportunities for our undergraduate and graduate students. Teams of research scientists and students in Spectrum Lab and from science and engineering departments across the campus collaborate on research including photonic signal processing, lidar, quantum computing, laser development and stabilization, and optical material engineering and characterization.

Solar Physics

The MSU solar physics group is engaged in undergraduate and graduate education, public outreach, and solar research, including observation, data analysis, theory, and instrument development. In both research and graduate education, we collaborate closely with the solar group at the Lockheed-Martin Solar and Astrophysics Laboratory, and the Solar & Stellar X-ray Group at the Harvard-Smithsonian Center for Astrophysics. We are actively involved in several international collaborations, including: analysis and operations of the X-ray Telescope for the Japan/US/UK Hinode mission; design calibrations and observations planning for the Atmospheric Imaging Assembly of NASA’s Solar Dynamics Observatory; construction of space experiments for flight on rockets and satellites, using the facilities of MSU’s Space Science and Engineering Laboratory; day-to-day operation and scientific utilization of the NASA Transition Region And Coronal Explorer (TRACE) mission; the Max Millennium program, a key element of NASA’s Ramaty High Energy Solar Spectroscopic Imager (RHESSI) mission; observational studies of solar magnetic fields, using the facilities of the National Solar Observatory and Mees Solar Observatory; scientific utilization and archiving of the results from the Japan/US/UK Yohkoh mission for studies of high-energy solar physics; theoretical and computational studies of solar magnetic fields; and the Yohkoh Public Outreach Project (YPOP), funded by NASA to create high quality public access to the Yohkoh/SXT data and other solar data via the Internet and educational products for the K-12 community.

SSEL

The Space Science and Engineering Laboratory at Montana State University is an interdisciplinary center of expertise with faculty, staff and facilities for space research and space technologies. The laboratory enables students and faculty in the science and engineering disciplines to conduct space science research through the development of space hardware instrumentation. SSEL was started under the auspices of the Physics Department at MSU in November, 2000. SSEL strengthens existing programs at MSU in solar-terrestrial physics, microelectronics, optical mechanisms, composite and ultra-light structures, bio-films and remote sensing.

MSGC

The Montana Space Grant Consortium embraces the goals and objectives established by the National Space Grant Program, working within a national network of colleges and universities to expand opportunities for Americans to understand and participate in NASA’s aeronautics and space programs by supporting and enhancing science, and engineering education, research, and outreach programs. To achieve these goals, the Montana Space Grant Consortium awards fellowships and scholarships to students pursuing aeronautical or space related studies and also awards stipends to students pursuing space-related research at all member campuses.
DEPARTMENT OF PSYCHOLOGY

Montana State University
Graduate Admissions Committee
PO Box 173440
Bozeman, MT 59717-3440

Tel: (406) 994-3801
http://www.montana.edu/wwwpy/msprogram.htm

Department Head
Prof. Colleen Moore

Professors
• R.A. Block; cognitive psychology: memory and attention, temporal information processing, metaanalysis.
• C. Moore; Developmental Psychology; early life effects on behavior such as prenatal alcohol, prenatal stress, and environmental pollutants. Risk perception and moral reasoning about hazards
• A.M. Babcock; physiological psychology; cerebral ischemia, neurobiology of learning and memory.
• W.C. Lynch; eating disorders, motivation, learning, behavior modification, physiological psychology.

Associate Professors
• K. A. Hutchison; Cognitive psychology; attention, implicit and explicit memory, cognitive aging, psycholinguistics, cognitive neuropsychology
• J. L. Smith; social psychology; self-regulation of motivation, gender studies, interpersonal and achievement goals, stereotype threat.

Assistant Professors
• I. M. Handle; social psychology; social cognition, attitudes and persuasion, affect and decision-making.
• M. L. Meade; cognitive psychology; memory, cognitive aging, collaborative memory, individual difference in performance

Degree Offered
• M.S. in Psychology (with an emphasis on psychological science)

We offer a research-oriented Master of Science (M.S.) degree in psychology. Through advanced coursework, thesis credits, research colloquia, and individualized mentoring from faculty, this program is designed to train graduate students to conduct psychological research in the following areas: cognitive psychology, social psychology, learning, health psychology, physiological psychology, and developmental psychology. Our M.S. research program in psychological science prepares students for admission into a doctoral program or for employment in applied settings.

Admission
The Graduate Studies application process can be completed on-line at http://www.montana.edu/gradstudies. You must also submit information listed on the Psychology Department’s Supplemental Application form. Please note, on this form there is an essay requirement. (Specific instructions for the essay are below.)

Essay requirement: In application materials, applicants must include a 1-2 page letter of intent/personal statement that summarizes your academic background in psychology or related field, career plans, research experience, research interests, and why you are applying to Montana State University’s M.S. program in psychological science.

Please be aware that the Psychology Department requires that applicants submit Graduate Record Exam Scores (General test, which yields a Verbal and Quantitative score). The GRE Psychology Subject Test is not required, but recommended. Please arrange to have scores sent directly to us. All successful candidates must demonstrate knowledge of the fundamentals of psychology, as well as undergraduate-level training in statistics and research methods. The closing date for receipt of completed applications is February 1. For detailed Division of Graduate Education admission requirements, review the Admission Policies and Application Requirements sections. Successful applicants must have their applications accepted by the Division of Graduate Education (with departmental endorsement) before an individual is considered a graduate student at MSU. Three letters of references are required.

Program Requirements
The Master of Science program requires a minimum of 31 credit hours of graduate level coursework. The required coursework is designed to provide students with a general overview of specific content areas, as well as with research methods and statistics in psychology. Courses we typically require include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYX 501</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 539</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 541</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 542</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 543</td>
<td>3</td>
</tr>
<tr>
<td>PSX 544</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 546</td>
<td>3</td>
</tr>
<tr>
<td>PSYX 590</td>
<td>10-15</td>
</tr>
</tbody>
</table>

Financial Assistance
Teaching Assistantships or Research Assistantships, which are awarded on a competitive basis, are usually available to formally admitted graduate students during their two years of study. See the Graduate Assistantships sections for detailed information on appointment criteria. Assistantships are requested by the student’s home department.

COLLEGE OF NURSING

Helen Melland, Dean
A. Gretchen McNeely, Associate Dean
Donna A. Williams, Associate Dean
Elizabeth Kinion, Bozeman Campus

COLLEGE OF NURSING
PO Box 173560
Montana State University
Bozeman, MT 59717-3560
406.994.3500
www.montana.edu/nursing

Dean
Helen Melland,
Associate Dean
Donna A. Williams

Professors
• Elizabeth Kinion; oral health, health disparities
• Helen Melland: interdisciplinary education, faculty roles and responsibilities Jean Shreffler-Grant; allopathic and complementary health care; health literacy
DIVISION OF GRADUATE EDUCATION

Associate Professors
- Yoshiko Colclough; oncology; end-of-life decision making, minority populations
- Barbara Derwinski; women’s health; health disparities
- Wade Hill; public health; environmental exposures
- Patricia Holkup; elder abuse; historic trauma, health disparities
- Sandra Kuntz; community/public health; environmental health, disaster, health disparities
- Susan Luparell; nursing education
- Kathleen Schachman; postpartum depression, military families
- Christina Sieloff; administration/nursing theory; impact of groups of clinicians on patient outcomes
- Carolyn Wenger; homeless populations, social networking
- Donna Williams; cardiovascular physiology; microcirculation, permeability, capillary function
- Charlene Winters; chronic illness, rural health, asbestos-related disease, heart failure
- Karen Zulkowski; wounds, pressure ulcers, nurse’s knowledge of wound care

Assistant Professors
- Laura Larsson; environmental public health; radon exposure, health disparities
- D. “Dale” Mayer; cardiovascular; grief and loss, palliative care, end-of-life issues, sudden cardiac health
- Teresa Seright; acute care; rural nurse decision-making, critical access hospitals
- Linda Torma; gerontology; pain, fibromyalgia, resilience, physical function

Adjunct Faculty
- Deanna Babb; MN, APRN, FNP
- Kelli Begley; MSN, APRN, CNS, FPMHNP
- Gelene Berkram; EdD, FNP
- Glenna Burg; MS, RN, Certified Nurse Educator
- Laurie Glover; MN, APRN, FNP
- Linda Kedington; MS, APRN
- Laura Marx; MSN, CFNP, RN
- Karrin Sax; MSN, RN, WHNP
- Jennifer Sofie; MSN, APRN, ANP, FNP
- Maria Wines; PhD, PNP

Degree Offered
- Master of Nursing (MN)
  Options:
  · Family Nurse Practitioner (FNP)
  · Clinical Nurse Leader (CLN)
  · Clinical Nurse Specialist-Adult Health (CNS)
  · Psychiatric

The College of Nursing’s Master of Nursing (MN) degree program focuses on assessment and management of health needs and delivery of health care services in sparsely populated areas. The program strives to serve the unique health care needs of rural dwellers. It is fully accredited by the Commission on Collegiate Nursing Education (CCNE).

The College provides the educational preparation for many exciting opportunities to practice in rural and frontier areas of Montana. Nursing faculty are recognized nationally for their expertise in rural cultural values and health beliefs. Clinical experiences with Native American populations are available and provide students with opportunities to make a real difference in health practices of Native American and rural clients.

Admission
For admission, a student must be a graduate of a nationally accredited, upper division baccalaureate program in nursing which included supervised clinical practice in a variety of nursing settings, including community health and management. Current unencumbered licensure as a registered nurse is required in the state where clinical educational experiences will occur. Students are expected to have completed undergraduate nursing courses in health assessment, research and statistics (including inferential statistics) before admission.

Undergraduate cumulative grade point average, three letters of reference from professional colleagues who have current knowledge of the applicant’s professional and academic abilities, a faculty interview, and a writing sample are used to evaluate applicants for admission. Proficiency in computer skills, including e-mail and Internet access, is required for those admitted to the program. A TOEFL score of 580 or the computer equivalent is required of international applicants.

Applicants must be admitted formally to The Graduate School. See the Admission Policies and Application Requirements sections for more information.

Program Requirements
Students select one of the MN degree program specialty options (FNP, CNL, or CNS). Each student completes courses in research, advanced health assessment, pathophysiology, pharmacotherapeutics, and finance and budgeting of health care systems. Remaining courses are determined by specialty option. The graduate student’s experience culminates in a master’s thesis or professional project.

Graduate program options are available on a full- or part-time basis. Students may access graduate nursing courses through any of the College’s five campus sites located in Billings, Bozeman, Great Falls, Kalispell, or Missoula. All graduate courses are offered via audio teleconference, interactive video or online. Clinical supervision is provided to students by faculty on each campus site. Travel to Bozeman is required for orientation and face-to-face coursework at the beginning of fall semester.

Non-Degree Options
Certificate in Nursing Education - open to all graduate nursing students and to nurses with at least a BSN.
Post-Master’s Family Nurse Practitioner Certificate - designed for registered nurses who already hold a master’s degree in nursing and desire to practice as an advanced practice nurse (APRN).
Post-Master’s Clinical Nurse Specialist Certificate - designed for registered nurses who already hold a master’s degree in nursing and desire preparation as an APRN.

Financial Assistance
Limited financial assistance is available to full-time, degree seeking graduate nursing students. Federal Advanced Education Nursing Traineeship awards, which help defray tuition costs, may be available to full-time students who are U.S. citizens. Nurse Faculty Loan Program funds also may be available to
full-time students interested in teaching. For the Loan Program students must complete requirements for the Certificate in Nursing Education along with their specialty option. Teaching or research assistantships are awarded on a competitive basis and may be available to graduate students (see the Graduate Assistantships section of the Graduate for appointment criteria).

Further Information
For further information contact: Ms. Lynn Taylor, Graduate Program Assistant, College of Nursing, 119 Sherrick Hall, (406) 994-3500, e-mail: lynnt@montana.edu

EXTENDED UNIVERSITY

Kim Obbink, Ed.D., Director

Extended University works closely with campus colleges, departments and Montana’s K-12 and business communities to nurture and grow online and hybrid learning opportunities for enrolled MSU students and working professionals.

EU works closely with The Graduate School and MSU’s colleges to offer graduate-level credit courses, certifications, degrees and renewal units. EU also collaborates with other four-year institutions to provide interdisciplinary graduate programs.

Extended University’s NTEN (National Teachers Enhancement Network) is one of the country’s most-established online programs for science teachers, having offered online graduate courses since 1993. www.science-teacher.org

Graduate Programs Available
• Master of Science in Health and Human Development-Family Financial Planning

FAMILY AND FINANCIAL PLANNING

College of Education, Health and Human Development
250 Reid Hall
Bozeman, MT 59717-2940

(406) 994-6752
lbaker@montana.edu

Dean
Larry J. Baker

Degree Offered
Masters Degree

The Family Financial Planning master’s degree is a 42-credit distance degree program that is offered through a consortium of eight mid-western and western land grant universities. The program is registered with the CERTIFIED FINANCIAL PLANNER® Board of Standards and meets the education criteria for individuals who wish to fulfill the education component for obtaining CFP® certification. Students also take the six core courses to fulfill the CFP® education requirement, rather than the full master’s program. As a participating university in this consortium, Montana State University offers two of the twelve required courses, in addition to the three-credit practicum experience and three-credit professional paper. The program is designed to be a part-time program for fully or partially employed students. Students apply at their home institution and take approximately two to three 3-credit courses via distance delivery from each of the participating universities, at a uniform tuition rate determined by the consortium. More information is available at http://www.montana.edu/montanagpi-dea/faq.htm.

Program Requirements: (subject to change - check with program contact) Sem. credits
HDFP 510, Fundamentals of Financial Planning, Fall...........3
HDFP 555, Financial Counseling, Spring...........3
HDFP 545, Family Economics, Summer...........3
HDFP 505, Family Systems, Fall...........3
HDFP 515, Insurance Planning for Families, Spring...........3
HDFP 550, Housing/Real Estate, Summer...........3
HDFP 540, Personal Income Taxation, Fall...........3
HDFP 530, Estate Planning for Families, Spring...........3
HDFP 520, Investing for the Family’s Future, Fall...........3
HDFP 560, Professional Practices in Family Financial Planning, Spring...........3
HDFP 525, Retirement Planning, Employee Benefits and the Family, Summer...........3
HDFP 576, Professional Practicum, Spring...........3
HDFP 572, Financial Planning Case Studies, Fall...........3
HDFP 575, Professional Paper, Spring...........3

Financial Assistance
Currently, financial aid is not available for courses taken outside the MSU Extended University program, but work is underway for solving this problem.

INTERDISCIPLINARY AND OTHER PROGRAMS

Graduate Programs Available:
• Master of Science in Environmental Engineering
• Master of Science in Health Sciences
• Master of Science in Science Education
• Molecular Biosciences Program
• Doctor of Philosophy in Ecology and Environmental Sciences
• Post Baccalaureate in Pre-Medical Certificate
• WWAMI Medical Education Program

MASTER OF SCIENCE IN SCIENCE EDUCATION

Montana State University
403 Linfield Hall
Bozeman, Montana 59717

Tel: (406) 994-5679
www.montana.edu/msse

Participating Faculty

Biology
• J. Bradshaw; ecology/biology
• J. Johnson; land use issues
• B. Kerans; freshwater ecosystems
• T. McMahon; aquatic ecology
• J. Rotella; ecology
• T. Weaver, III; ecology
• D. Willey; ecology

Chemistry & Biochemistry
• J. Amend; inorganic Chemistry, Chemistry education
• C. Bahn; inorganic Chemistry
• S. Holmgren; Chemistry education
• A. Sower; Biochemistry

Earth Science
• S. Custer; geology, hydrology
• F. Jackson; dinosaur paleontology
• D. Lageson; structural geology and tectonics
• J. Schmitt; geology, relationships between tectonics & sedimentation

Education
• E. Brunsell, science education
• J. Graves, science education
• J. Reuter; science education
• E. Swanson; science education
• W. Woolhaugh, science education

Electrical Engineering
• T. Kaiser; micro electro mechanical systems

Health and Human Development
• M. Stein; nutrition
• P. Steinmuller, nutrition

Land Resources and Environmental Sciences
• Bauder; soil science and water resources.
• B. Inskeep; soil and environmental science, Thermal Biology Institute
• S. Kelly; Thermal Biology Institute

Mathematics
• M. Burke; M education
• K. Jacobs; M education
• J. Luebeck; M education

Microbiology
• B. Pyle; environmental microbiology
• P. Glee; microbiology research
• E. Pulcini, biofilms research, microbial genetics

Physics
Adams ; physics education
G. Francis; physics education

Plant Science
• R. Klein; medical botanist

Degree Offered
• M.S. in Science Education

The Master of Science in Science Education (MSSE) program is an interdisciplinary, intercollege degree program designed by educators and scientists for middle and high school science teachers. MSSE is sponsored by the Colleges of Agriculture; Education, Health and Human Development; and Letters & Science and is coordinated by Intercollege Programs for Science Education.

Admission
Entrance requirements include: a bachelor’s degree in an area of science or in science education; at least two years of science teaching; and an undergraduate GPA of 3.0 or higher.

Program Requirements
The program of study may begin with distance learning courses in any semester or summer classes at the MSU-Bozeman campus. Study continues with distance learning courses that students take from their homes or workplaces, and ends with a second campus visit for presentation of the results of a personalized science education capstone project. Over 80% of the courses and credits may be taken off-campus by asynchronous, computer-mediated communication. Thirty semester credits are required for the degree. Students typically will complete the degree in two or three years.

All students seeking the MSSE degree complete core courses (12 credits) in education. For the remaining credits (18), students select interdisciplinary combinations of science content courses emphasizing topics in biology, chemistry, earth science, land resources and environmental science, microbiology, physics, and plant science. Interdisciplinary efforts and incorporation of both science content and pedagogy have been encouraged during the development of courses.

Required Core Courses credits
EDCI 504 Evaluation and Measurement ..................3
EDCI 505 Foundation of Action Research ............... 3
EDCI 509 Implementing Action Research ............... 3
EDCI 575 Capstone Project and Presentation .......... 3

Further information
For additional information and application forms, contact: 406-994-5679 (voice), dianap@montana.edu (e-mail), www.montana.edu/msse (web site), or write to Intercollege Programs for Science Education, 403 Linfield Hall, Montana State University-Bozeman, Bozeman , MT 59717-2805.

MS IN HEALTH SCIENCES

http://www.montana.edu/hpa/

A 1-year Plan B MS degree that serves to increase the academic breadth and/or depth for students interested in health professions. Access to the program is through a competitive application process and the program is two semesters in length, preferably beginning in the Fall. Students must choose an emphasis from Molecular Medicine, Community Health, International or Health and Medicine. Completion of the degree requires a minimum of 30 graduate credits, including presentation of a scholarly project. Each student will design a specific curriculum with the assistance of an advisor in the Health Professions Advising office and a faculty mentor.

MOLECULAR BIOSCIENCES PROGRAM

960 Technology Blvd
Montana State University
Division of Graduate Education
P.O. Box 172580
Bozeman, MT 59717-2580

mbprogram@montana.edu
406-994-6652

Program Chair
Matthew Fields

Program Director
Stephanie Cunningham

Program Description
The Molecular Biosciences Program offers an interdisciplinary program towards a Doctorate in Philosophy. You are able to pursue your science in a research area across departmental boundaries. Our integrated curriculum provides you with broad academic training necessary to excel in life science research. You will be able to participate in a first-year rotation in three different laboratories in your chosen research area.

Research Areas:
• Biofilm Sciences & Engineering
• BioInspired Materials
• Bioinformatics/Genomics/Proteomics
• Biomedical Sciences
• Biophysics
• Cell, Developmental, & Molecular Biology
• Chemical Biology
• Environmental Microbiology
• Immunology & Infectious Disease
Our program offers students a common but rigorous educational experience for the first year, and continued challenge as you begin to specialize during your second year. MB Program students participate in seminar series, program retreats, teaching, and may attend scientific meetings. In the second year once you have chosen a research advisor based on your first-year rotation process, you will be formally admitted to one of the nine participating departments to conduct a research project leading to the awarding of a Doctorate of Philosophy.

Professors
This interdisciplinary program brings together over faculty from nine basic science departments: Cell Biology and Neuroscience; Chemical and Biological Engineering; Chemistry and Biochemistry; Earth Sciences, Ecology, Land Resources and Environmental Sciences, Microbiology, Plant Sciences and Plant Pathology, and Veterinary Molecular Biology and three research centers: Center for Biofilm Engineering, Center for BioInspired Materials and the Thermal Biology Institute to provide students with the didactic and laboratory instruction they require to become successful research scientists.

Admission
Ph.D. Degree Program
It is recommended that applicants for the Ph.D. program have a Bachelor’s or Master’s degree with a solid foundation of science courses.

Admission to the doctoral program follows the requirements of The Graduate School. Factors that the department uses in its admissions process include GRE scores, TOEFL scores (for non-native English speakers), reference letters, GPA, research experience and previous coursework.

Details about applying can be found at http://mbprogram.montana.edu/application.asp. The Molecular Biosciences Program encourages applicants to use the online application procedure.

Program Requirements
Ph.D. Program First-Year
A Ph.D. student must complete a minimum of 9 credits of coursework each semester their first-year. Required courses include:

Fall Semester
MBSP 500, Molecular Biosciences Program Seminar
MBSP 561, Molecular Biosciences Lab Rotation I
MBSP 562, Molecular Biosciences Lab Rotation II
Two courses from any of the approved courses in the nine participating sciences departments

Spring Semester
MBSP 500, Molecular Biosciences Program Seminar
MBSP 563, Molecular Biosciences Lab Rotation III
MBSP 564, Molecular Biosciences Lab Rotation IV
(if needed) or MBSP 575 Molecular Biosciences Program Research Project (You have an option of taking a research credit within your chosen home department)
Two courses from any of the approved courses in the nine participating sciences departments

Research Experience
Ph.D. students will gain research experience through their lab rotation, conference submissions, and attending conferences.

Research Facilities
Research Facilities vary on lab rotation selection

Financial Assistance

The Molecular Biosciences Program at Montana State University is offering outstanding students a fellowship of $22,000 plus tuition per year to fund their Ph.D. graduate education in the life sciences.

Professional Certificate Options
(12 credits each)
In addition to the new graduate degree, four graduate level, professional certificate options are being offered through the program. These certificates are for those individuals who are technically competent but not interested in a full master’s program. The certificate options will allow an individual to develop skills that will enhance their work performance and strengthen their marketability. Certificate(s) obtained through this master’s program will be included on the student’s transcript. The Graduate Certificate offerings are:

• Science and Engineering Business Management
• Science and Engineering Project Management
• Manufacturing Best Practices – PROCESS
• Manufacturing Best Practices – SYSTEMS

Ph.D. Degree in Ecology and Environmental Sciences
This cross-college doctoral degree represents a broad collaboration among departments and faculty from across MSU. It provides the opportunity for motivated students to integrate our world-class faculty research programs in diverse aspects of ecology and environmental sciences, within the unparalleled natural laboratory that is the Greater Yellowstone Ecosystem. Particular program strengths include terrestrial and aquatic ecology, environmental biogeochemistry, evolutionary biology, hydrology and watershed analysis, quantitive ecology, invasive plant ecology and management, conservation biology, land rehabilitation/restoration ecology, environmental microbiology, remote sensing and spatial sciences.

Please see our website for a more comprehensive list of EES faculty programs and research opportunities: http://eesprogram.montana.edu/index.asp
Graduates will be well-trained professionals who will compete strongly in research, teaching, and related fields nationally and internationally.

EES doctoral students will be affiliated with a home department that corresponds to that of their major faculty advisor. Some specific graduate program criteria, procedures, and processes vary among departments; students will follow those of their home department, which are also consistent with policies set forth by The Graduate School.

Admission
Prospective students should submit a pre-application or application to the graduate program online at http://eesprogram.montana.edu/index.asp. The application should specify the desired area(s) of study to facilitate its full evaluation by faculty members in the desired field(s). Applicants are expected to have appropriate preparation to undertake the doctoral degree in the area of study. Students may undertake the Ph.D. following completion of a Master’s degree, or exceptional students may apply directly following completion of a suitable bachelor degree. An appropriate faculty mentor must agree to serve as the student’s major advisor as a condition of admission. Stipend and operations funding are generally from research grants and contracts awarded to faculty members, but graduate teaching assistantships and other forms of support are also available on a limited basis.

Core Curriculum
Because of the substantial diversity in disciplinary and multidisciplinary foci within the EES doctoral program, there is no universal required core curriculum. The student’s individual course work program will be developed in partnership with the major advisor and graduate committee, and must be consistent with the home department and GS guidelines and requirements. A minimum of 30 credits of resident coursework must be taken from MSU.

Candidates for the Ph.D. degree in Ecology and Environmental Sciences are expected to be familiar with the degree requirements of both their home department and The Graduate School.

Program Participants
The program is jointly centered in the departments of Ecology (College of Letters and Sciences) and Land Resources and Environmental Sciences (College of Agriculture), but is also specifically open to students and faculty mentors in other MSU departments and colleges who undertake relevant doctoral study.

Interested students should consult the program website at http://eesprogram.montana.edu/index.asp for additional information and to submit a graduate pre-application or application.

POST BACCALAUREATE
PRE-MEDICAL CERTIFICATE
http://www.montana.edu/hpa/

This is a 1-year/3 semester ‘career changing’ program for students who have completed a Bachelor’s degree, but have not taken the science courses necessary for health professional school admission. Access to the program is through a competitive application process and classes begin in the first summer session. A minimum of 36 approved credits is required to earn the Certificate.

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>CHMY 141</td>
<td>College Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>Fall</td>
<td>CHMY 143</td>
<td>College Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PHSX 205</td>
<td>College Physics I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PHSX 207</td>
<td>College Physics II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>BIOL 260</td>
<td>Cell and Molecular Biology</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>STAT 216Q</td>
<td>Elementary Statistics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CHMY 321</td>
<td>Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Elective</td>
<td></td>
<td>1-4</td>
</tr>
<tr>
<td>Spring</td>
<td>BIOL 256</td>
<td>Intro Bio: Cells to Organisms</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>M 161Q</td>
<td>Survey of Calculus</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CHMY 325</td>
<td>Organic Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Elective</td>
<td></td>
<td>0-4</td>
</tr>
</tbody>
</table>

WWAMI MEDICAL PROGRAM
310 Leon Johnson Hall
994-4411
mteintze@montana.edu
www.montana.edu/dhs/

Interim Director
Dr. Martin Teintze

Professors
- R. Baricos (adjunct); pathology
- R. Flaherty (adjunct); medical science
- A. Goodman (adjunct); microbiology
- J. Hensold (adjunct); medical science
- M. Herring (adjunct); medical science
- M. Jutila; immunology
- F. Lefcort; cell biology
- D. Phillips; cell biology.

Associate Professors
- V. Copie; Biochemistry/Chemistry
- S. Eiger; cell biology
- M. Teintze; Biochemistry/Chemistry.

Assistant Professor
- J. Burritt; microbiology
- S. Gibson; cell biology
- S. Halonen; microbiology
- B. Komlos (adjunct); Spanish
- N. Meissner (adjunct); pathology
- S. Sindelar (adjunct); medical science
- J. Voyich-Kane; microbiology

Program Description
Sponsored by the University of Washington School of Medicine and leading to an M.D. degree from that school, the WWAMI program is designed to provide medical education for citizens of the participating states (Washington, Wyoming, Alaska, Montana and Idaho), to provide physicians for these states, to encourage physicians to practice in locations where physicians are most needed and to provide a nucleus of medical education in regions that do not have an independent school of medicine.

WWAMI is a medical school program, not a premedical program. The program is supported by the State of Montana and guarantees that 20 qualified Montana residents can be admitted to the Medical School at the University of Washington School of Medicine each year.

Students who enter the program receive their first year of their medical education at the participating university in their home state. First year programs exist at Washington State University-Pullman, the University of Wyoming-Laramie, the University of Alaska in Anchorage, Montana State University-Bozeman, and the University
of Idaho-Moscow. The curriculum at each site is similar and compatible with the University of Washington School of Medicine curriculum which integrates the basic and clinical sciences, stresses rural health care at an early time in medical education, and incorporates a department of family medicine.

Course subject matter at MSU includes human anatomy and tissue structure, human physiology, medical BIOCHEMISTRY, introduction to clinical medicine, pathology, infectious diseases, behavioral systems, nervous system, and anatomy of the head and neck. A clinical preceptorship program has been developed which involves the student with local physicians for several hours each week.

Following one year of study at MSU, students join their classmates from other WWAMI sites at the Seattle campus for the remaining years of their medical education.

At the conclusion of the first two years, students enter the clinical phase of their education. During this phase students have the opportunity to complete their third year and most of their fourth year of medical school at either Billings or Missoula. Students receive training from physicians in the communities where the physicians live and practice (community phase). These “Clerkships” are established for a given educational need (e.g., pediatrics, family medicine). Six Clerkship sites have been established in Montana: Billings (Internal Medicine, OB/GYN, Pediatrics, Family Medicine, Surgery and Psychiatry), Great Falls (Pediatrics), Missoula (Internal Medicine, OB/GYN, Surgery and Psychiatry; Pediatrics and Family Medicine will start in July 2008), Whitefish (Family Medicine), Havre (Family Medicine and OB/GYN), and Dillon (Internal Medicine).

To be eligible for the Montana State University WWAMI program, the prospective medical student must be certified by the Montana University System as a resident of Montana and must satisfy the admission requirements of the University of Washington School of Medicine. It is not necessary for a student to take premedical (undergraduate) education at MSU in order to be eligible for the WWAMI program. Students admitted to the program are selected by the Admissions Office at the University of Washington School of Medicine and are regarded as members of the freshman medical class there, although they register as resident students in their home states for the first year of the program.

First Year Medical School Curriculum

The first year basic medical school curriculum is required for all medical students accepted at the University of Washington School of Medicine.

Required Courses: Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MedS 510</td>
<td>Anatomy - Microscopic</td>
<td>3</td>
</tr>
<tr>
<td>MedS 511</td>
<td>Anatomy - Gross</td>
<td>4</td>
</tr>
<tr>
<td>MedS 512</td>
<td>Mechanisms in Cellular Physiology</td>
<td>4</td>
</tr>
<tr>
<td>MedS 513</td>
<td>Introduction to Clinical Medicine I</td>
<td>2</td>
</tr>
<tr>
<td>MedS 514</td>
<td>Molecular and Cellular Biology</td>
<td>5</td>
</tr>
<tr>
<td>MedS 516</td>
<td>Clinical Preceptorship</td>
<td>1</td>
</tr>
<tr>
<td>MedS 533</td>
<td>Systems of Human Behavior</td>
<td>3</td>
</tr>
<tr>
<td>MedS 591</td>
<td>Medical Info &amp; Decision Making</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>

Required Courses: Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MedS 520</td>
<td>Molecular/Cell Basis of Disease</td>
<td>4</td>
</tr>
<tr>
<td>MedS 521</td>
<td>Infections Disease s &amp; Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>MedS 522</td>
<td>Introduction to Clinical Medicine II</td>
<td>2</td>
</tr>
<tr>
<td>MedS 523</td>
<td>Immunology &amp; Hum Diseases</td>
<td>2</td>
</tr>
<tr>
<td>MedS 531</td>
<td>Head and Neck Anatomy</td>
<td>4</td>
</tr>
<tr>
<td>MedS 532</td>
<td>The Nervous System</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>

Further Information

Contact the Montana WWAMI Director at MSU or the URL http://www.montana.edu/wwami for complete application, admission, and program requirements.
Application for Graduate Admission

Thank you for your interest in Montana State University!

Any individual who has received a bachelor’s degree from a regionally accredited college or university may apply for admission to the Graduate School (GS). The GS provides two application options: an online application and a paper application. Paper applications may be downloaded or are available from the department to which you are applying as well as from the GS. All paper application materials for graduate degree programs must be submitted directly to the department to which you are applying. All paper application materials for non-degree graduate status must be submitted to The Graduate School.

At the time of application, each student is assigned a MSU student identification number. We ask that you voluntarily provide a social security number to help distinguish between individuals with the same or similar names. You will not be penalized should you decline to provide this number. Federal law requires that students applying for financial aid, graduate assistantships, fellowships, traineeships, or tuition waivers must provide their Social Security number for purposes of identification.

Please contact the department you are interested in applying to prior to completing the application. Departmental deadlines vary and some departments may require a preliminary application.

For more information on application requirements please see:

- **Degree Seeking Graduate Students**
  http://www.montana.edu/gradschool/cat_apple&deadlines.html

- **Non-Degree Graduate Students**
  http://www.montana.edu/gradschool/cat_non_deg_standing.html

- **International Students**
  http://www.montana.edu/gradschool/cat_international.html

The following applications are for both degree-seeking and non-degree students.

- **Graduate Online Application**
  https://www.msugradschool.org/application/index.cfm?&isndl

The $60 online application fee may be paid using a credit/debit card or direct payment from a United States checking account at the time the application is submitted.

- **Graduate Paper Application, pdf**
  WORD http://www.montana.edu/gradschool/apply.html
The $60 paper application fee may be paid by check or money order payable to Montana State University and should be submitted directly to the department if applying to a degree program or to the GS if applying to non-degree graduate status.

Supplemental Application Forms

Please note that viewing and printing the application forms requires Adobe Reader.

Degree Seeking Graduate Students

Please contact the department you are interested in applying to prior to completing the application. Departmental deadlines vary and some departments may require a preliminary application.

In order for your graduate degree application to be reviewed for admission, all of the required documents must be submitted to the department to which you are applying prior to their application deadline. For more information regarding deadlines and requirements, please contact the department.

We recommend that you follow up with the department to ensure that all supporting documents were received for review. Once the department reviews your completed application and all of the accompanying documents, they will send your file to The Graduate School (GS) with their recommended admission decision. The Graduate School then reviews your application and issues a formal decision letter.

International students should refer to the international student section for more information.

Application Requirements

All applications must include the following:
- a completed Application for Graduate Admission;
- a nonrefundable application fee payment of $60 for online applications or paper applications;
- official transcripts reflecting all baccalaureate work including bachelor’s degree and post-baccalaureate work;
- three letters of recommendation;
- official entrance exam scores (contact department for requirements);
- a letter of intent or essay, if required by the academic department.

Application Deadlines

Each department sets its own application deadlines. Contact the department to which you are applying for their specific deadlines.

Entrance Exam Requirements

Please contact the department to which you are applying for information regarding their entrance exam requirements.

If the department requires an entrance exam, The Graduate School must receive an official score report from the specific testing agency. Unofficial score reports may be used to initiate the application process. However, if accepted, registration for classes will be prohibited until an official score report is received.

If an official score report is not obtainable, a score report will be accepted directly from another accredited academic institution.

Non Degree Graduate Status

General Information

- Non-degree graduate students are those who have earned a bachelor’s degree and:
- do not wish to pursue a graduate program leading to an advanced degree at MSU but wish to take courses;
- have been denied regular or provisional admission;
- have non-degree standing through the recommendation of the department or The Graduate School;
- whose formal degree application is pending final action;
- who applied too late to be admitted for the intended term;
- who wish to apply for the teacher certification program, Northern Plains Transition to Teaching, Post-Baccalaureate Pre-Medical Certificate, or WWAMI.

International students should refer to the international student section for more information.

Non-Degree Application Requirements

Non-degree seeking applicants must submit the Application for Graduate Admission to The Graduate School. All applications must include:
- a completed Application for Graduate Admission;
- a non-refundable application fee payment of $60 for online applications or paper applications;
- an official transcript reflecting the completion of the first bachelor’s degree.

Non-Degree Application Deadlines

Domestic non-degree applications must be received by The Graduate School by the following dates:
- Fall Semester: September 10
- Spring Semester: January 31
- Summer Semester: June 30

Non-Degree Registration

New non-degree students will be eligible to register for classes as soon as the completed application is processed. An acceptance letter with registration information will be mailed to the applicant within five business days following the receipt of the completed application.

Non-degree graduate students may register for both graduate and undergraduate level courses.

Ineligible for graduate assistantships

Non-degree graduate students are not eligible for graduate assistantships.

Use of non-degree credits on a future graduate program

For information regarding the use of non-degree credits on a future program on study, please refer to the section on Transferring Credits.

Continuing Education

- Enrollment in continuing education courses does not imply application to non-degree graduate status.
- If taking continuing education courses while in non-degree graduate status, the courses are considered non-degree credits unless the student has been formally admitted into a graduate degree program.
International Graduate Students

Degree-Seeking International Students

Please contact the department you are interested in applying to prior to completing the application. Departmental deadlines vary and some departments may require a preliminary application.

In order for your graduate degree application to be reviewed for admission, all of the required documents must be submitted to the department to which you are applying prior to their application deadline. For more information regarding deadlines and requirements, please contact the department.

We recommend that you follow up with the department to ensure that all supporting documents were received for review. Once the department reviews your completed application and all of the accompanying documents, they will send your file to The Graduate School (GS) with their recommended admission decision. The Graduate School then reviews your application and issues a formal decision letter.

International Students must submit the following application materials:

• a completed Application for Graduate Admission;
• a nonrefundable application fee payment of $60 for online applications or paper applications;
• official transcripts reflecting all baccalaureate and post-baccalaureate work with official English translation;
• official degree certificate from each college or university from which a degree was received with official English translations;
• three letters of recommendation;
• official entrance exam scores (contact department for requirements);
• official English proficiency exam score report;
• a completed and signed Financial Certificate including proof of available funds (items such as a certified bank statement, certificate of deposit or other verified document). In the case of a sponsor, the document should be accompanied with a letter indicating support;
• a letter of intent or essay, if required by the academic department.

Application Deadlines

Each department sets its own application deadlines. Contact the department to which you are applying for their specific deadlines.

Entrance Exam Requirements

Please contact the department to which you are applying for information regarding their entrance exam requirements.

If the department requires an entrance exam, The Graduate School must receive an official score report from the specific testing agency. Unofficial score reports may be used to initiate the application process. However, if accepted, registration will be prohibited until an official score report is received.

If an official score report is not obtainable, a score report will be accepted directly from another accredited academic institution.

Non-Degree International Student

Non-degree graduate students are those who have earned a bachelor’s degree and:

• do not wish to pursue a graduate program leading to an advanced degree at MSU but wish to take courses;
• have been denied regular or provisional admission;
• have non-degree standing through the recommendation of the department or The Graduate School;
• whose formal degree application is pending final action;
• who applied too late to be admitted for the intended term;
• who wish to apply for the teacher certification program, Northern Plains Transition to Teaching, or Post-Baccalaureate Pre-Medical Certificate.

International students must submit the following application materials:

• a completed Application for Graduate Admission;
• a nonrefundable application fee payment of $60 for online applications or paper applications;
• official transcripts and bachelor’s degree certificate with official English translation;
• official English proficiency exam score report;
• a completed and signed Financial Certificate including proof of available funds (items such as a certified bank statement, certificate of deposit or other verified document). In the case of a sponsor, the document should be accompanied with a letter indicating support.

International graduate students and non-degree status

International students will be accepted as non-degree graduate students for a maximum of one year.

Deadlines

International non-degree applications must be submitted approximately 75 days prior to the start of the term to ensure enough time for the issuance of an I-20. Specific deadlines for non-degree international applicants are as follows:

• Fall Semester: May 15
• Spring Semester: October 1
• Summer Semester: February 1

English Proficiency Exam

International applicants to both degree and non-degree status must submit an official English proficiency exam score report. The accepted exams and minimum required scores are as follows:

• TOEFL (Test of English as a Foreign Language)
  - 80 (internet based test)
  - 213 (computer based test)
  - 550 (paper based test)
• IELTS (International English Language Testing System)
  - 7.0 (minimum band score)

Some departments may require higher scores. International student requirements for teaching assistantships are addressed in the section on Graduate Assistantships.

English proficiency exam scores are not required if:

• English is the first official language of the applicant’s country of citizenship, or
• the applicant has received an undergraduate or graduate degree from an institution in the United States.
If sending official TOEFL or IELTS scores, please have them sent directly from ETS (Educational Testing Service) or the IELTS to Montana State University. Unofficial score reports may be used to initiate the application process. However, if accepted, registration will be prohibited until an official score report is received. Photocopies of the TOEFL may be accepted from the student and will be verified by ETS for accuracy.

For information regarding the TOEFL, please view the website www.toefl.org.

For information regarding the IELTS, please view the website www.ielts.org.

Admission Policies

General Guidelines

Admission decisions are made on an individual basis. Before admission is granted, each application is reviewed by the appropriate departmental faculty and The Graduate School to determine if the applicant’s academic history and preparation is satisfactory. Enrollment in a graduate program may be limited by the availability of faculty, staff, facilities, area of interest, or financial resources. In such cases, it may not be possible to admit all students who are otherwise qualified.

Students may be admitted into full or provisional status. A student’s admission status may also include a condition specified in the letter of acceptance. An admission decision is based upon the department’s recommendation and the final approval by The Graduate School. Applicants should consider themselves admitted only when official notification has been received from The Graduate School. Please note that admission is permitted for only one degree program at a time.

The Graduate School will designate a specific term for which the student is accepted. Applicants may request a change in that term for up to one year. When a student does not register for the term admitted or is denied admission, the application materials submitted will be retained for one year. If a student decides to reapply after this one year time frame, the student will be required to resubmit all the application materials as well as the application fee.

Full Admission

In order to receive full admission, the student must demonstrate potential for success in graduate study. The Graduate School requires a minimum GPA of 3.0 for both undergraduate and post-baccalaureate work. Some departments have higher admissions standards; please contact the department for their minimum GPA and entrance exam requirements.

Provisional Admission

Provisional admission is granted when the department or The Graduate School determines the student has not met the requirements for full admission.

Provisional admission may be granted to a student when some type of deficiency is noted in the student’s academic work, such as:
- the student has less than 3.0 but greater than 2.75 cumulative GPA in undergraduate work;
- the student’s last two years of undergraduate or post-baccalaureate work does not appear to be of sufficient rigor;
- the student has made a major change in his/her area of specialization but has demonstrated potential for graduate study;
- the student has low entrance exam scores;
- the department or The Graduate School identifies other academic weaknesses that may adversely impact the student’s graduate career.

The Graduate School may grant provisional admission with up to fifteen (15) credits of deficiency coursework needed. The following stipulations apply:
- the deficiency coursework must be listed in writing on the official acceptance letter from The Graduate School. The acceptance letter will also state when the department requires additional prerequisites or deficiency work;
- the department must list additional deficiency courses in writing on either its acceptance letter or in a memo to the student on or before the first day of the term the student begins his/her graduate career;
- it is up to the department to monitor acceptable progress of deficient coursework and to ensure completion of such coursework in a timely manner;
- provisions stated in the acceptance letter from the Vice Provost for Graduate Education must be satisfied as required prior to completion of degree.

Admission with Condition

A student admitted into either full or provisional status may also have a condition placed on his/her admission. A condition is typically placed on a student’s admission when The Graduate School is missing an official document, such as transcripts or exam scores. When a condition is placed on a student’s admission, a corresponding hold is placed on the student’s record that will prevent registration until the hold is removed.

Admission Denial

Students may be denied admission based on academic qualifications as well as the availability of faculty, facilities, and/or financial resources. The department or The Graduate School may recommend enrollment as a non-degree graduate student or completion of additional undergraduate coursework to improve the student’s GPA standing and provide evidence of the student’s ability to do well in graduate school.

The falsification, omission, or willful suppression by the applicant of any information requested, whether on the application forms or in the application packet, is grounds for either denial of admission or dismissal from Montana State University.

Residency and Fees

University and Graduate Student Fees

Refer to the Estimated Expenses-Fee Schedules, which contains both graduate and undergraduate student fees. Current tuition and fee schedules also are available from the MSU Business Office. For summer fees, refer to the MSU Summer Session Bulletin. Late fees are assessed for registration
after regular registration days. All fees are subject to change at any time by action of the Board of Regents of Higher Education.

Residency Requirements for Fee Purposes
Residency for fee purposes is determined by the regulations of the Board of Regents. The Graduate School reviews the residency status of each newly accepted graduate student and follows the general guidelines outlined by the Office of the Registrar’s Residency Policy. If a student is unemancipated and normally resides with a parent who is a Montana resident, The Graduate School will apply resident status.

Training and Development

Welcome Reception
Each semester, The Graduate School hosts a reception for all new graduate students. This event offers each new student the opportunity to meet with faculty, staff, students in their degree program and other students pursuing graduate degrees at Montana State University.

Graduate Seminars
The Graduate School offers Professional Development seminars. These seminars are designed to assist graduate students in pursuit of their career. The presentations are delivered by a diverse and highly knowledgeable pool of MSU staff, faculty, and outside experts.

Graduate Teaching Assistant Orientation
A separate mandatory orientation is held for new graduate teaching assistants (GTAs) each fall and spring, usually the day before classes begin. Attendance by new graduate teaching assistants is required.

Training and Development Fee
A non-waivable training and development fee of $50 is assessed to each degree-seeking graduate student the first term of registration. Students not assessed this fee are those registered for Extended University courses only, or are those who are non-degree graduate students only.

Master’s Requirements

Master’s Degree Plans
Masters programs in most fields may be taken under two plans: thesis plan (Plan A) or a professional paper or project plan (Plan B).

Thesis (Plan A)
This is the research-oriented master’s degree. It is particularly recommended for the student whose educational and professional goals make early research experience desirable. In some professions, a master’s degree is the terminal degree. In other professions, the master’s is a necessary step to the doctorate.

Conversion of thesis credits to professional paper credits: When a Master’s student changes from a thesis plan to Plan B (professional paper/project plan), a maximum of six credits of thesis (department rubric 590) may be converted to six credits of Professional Paper (department rubric 575). The student must be able to show support of the change from the entire Committee: A memo/letter signed by all committee members would suffice.

Professional Paper or Project (Plan B)
This plan is designed to serve two types of graduate students.
1. In some study areas, a student needs coursework beyond the baccalaureate before being qualified to do acceptable research. Plan B allows the student to defer original research until enrolled in a doctoral program.
2. For students in professional or terminal degree programs, thesis research is not necessary. A professional paper or project is submitted for the thesis requirement.
3. A maximum of six credits of Professional Paper/Project (department rubric 575) may be included on a Plan B program.

Conversion of professional paper credits to thesis credits: If a student wishes to switch from a Plan B option to a Plan A option, professional paper credits may not be converted to thesis credits.

Second Master’s Degrees
A candidate for a second or additional master’s degree must fulfill all requirements for a master’s degree.
A maximum of nine (9) semester credits completed during a master’s degree program may be applied toward the requirements for a second or additional master’s degree at MSU, with approval of The Graduate School and the student’s graduate Committee.

General Credit Requirements for Master’s Degrees
1. The minimum credit requirement for master’s degrees is thirty (30) credits, individual degree programs may require more.
2. Only those courses listed on a graduate Program of Study are applicable toward graduate degree credit requirements.
3. Non-thesis credits: In all non-thesis programs, at least thirty (30) credits or more as determined by the department) must be for content coursework (not thesis credits).
4. Conversion of thesis credits to professional paper credits: When a Master’s student changes from a thesis plan to Plan B (professional paper/project plan), a maximum of six credits of thesis (department rubric 590) may be converted to six credits of Professional Paper (department rubric 575). The student must be able to show support of the change from the entire Committee: A memo/letter signed by all committee members would suffice.
5. Conversion of professional paper credits to thesis credits: Professional paper credits may not be converted to thesis credits.

Registration Requirements for Master’s Degrees
Students must register for a minimum of three (3) credits the semester of intended graduation.
Course Limitations for Master’s Degrees

General Guidelines

1. Undergraduate (MSU 4XX) courses for Plan A students: Up to 9 credits at the 400-level are allowed on a graduate Program of Study under two circumstances:
   - They were taken as a graduate student, or
   - They were reserved for graduate credit as a bachelor degree seeking student.
2. For Plan B students, a minimum of 21 credits must be at 5XX level.
3. Repeating or challenging previously taken courses: Courses taken as an undergraduate or non-degree student may not be later repeated or challenged and then applied toward requirements for a graduate degree.
4. 3XX (or lower numbered) courses are not applicable to master’s degree requirements.
5. A maximum of three pass/fail credits, excluding thesis, may be used toward the minimum credit requirements for the degree.
6. Challenging courses: Master’s degree students may challenge no more than six (6) credits toward a degree program.
7. Limit on age of courses: The age of courses at the time of graduation may not exceed six (6) years.
8. Once a course is taken, it cannot be removed from a Program of Study.

Limits on Specific Courses

1. Seminar (594), Independent Study (592), Internship (598) and departmental practicum courses may not comprise more than one-third (1/3) of the minimum required credits for a graduate degree.
2. Undergraduate Independent Study (492), Professional Development (588) and Graduate Consultation (589) courses or Undergraduate Seminars (494) are not allowed on a Program of Study and will not count toward requirements for the degree.
3. Graduate Consultation (589): Registration in ‘Graduate Consultation’ (MSU 589) is permitted only for master’s degree students who have completed all of their coursework (and the thesis or the professional paper) but who need additional faculty or staff time to complete requirements for the degree. Registration in 589 (Consultation) does not count toward meeting degree credit requirements.
4. Special Topics (591): This course may be included in the graduate Program of Study. The total number of Special Topics courses for which a student may register is not limited.
5. Individual Problems (592): A total of four (4) credits of Individual Problems (592) courses may be included in the master’s Program of Study on thesis plans; six (6) credits of Individual Problems may be included in non-thesis plans.

Foreign Language Requirement
Foreign Language requirements are specific to degree programs.

Master’s Graduate Committee
The master’s committee advises the student on academic matters and is the examining committee for the master’s comprehensive and/or defense-of-thesis examinations.

Committee composition
A master’s Committee is comprised of 3 to 5 faculty members. The chair must be a PhD, tenure track (or tenured) professor from the degree granting department. The majority of the committee should be made up of faculty from the degree granting department, but due to the interdisciplinary nature of many degrees, is not limited to the degree granting department.

The major professor and the department head recommend the committee which must be approved by The Graduate School on the “Program of Study” or “Change of Committee” forms found at [www.montana.edu/wwdg/forms.html](http://www.montana.edu/wwdg/forms.html)

Faculty affiliates and Non-MSU committee members
Faculty affiliates, faculty of other institutions and nonacademic experts may serve as additional committee members, but not as committee chair. Committee members not holding faculty status at MSU must submit documentation of their qualifications, including a vita. In some cases, faculty affiliates, faculty of other institutions or non-academic experts may act as co-chairs of a student’s committee.

Changes to the committee
The student has the right to make faculty changes in his/her committee. For Master’s students, only changes to the committee chair must be made through the “Committee Change” form and approved by The Graduate School.

Committee appointment deadline
The committee must be appointed by the end of the second semester of graduate study. If the committee is not submitted by the end of the student’s second semester of attendance, the student is seen as not making satisfactory academic progress, becomes ineligible for financial aid (including graduate assistantships, student work-study and student labor) and will be placed on college probation.

Program of Study
The graduate committee and the student jointly develop a proposed Program of Study. The Program of Study defines the minimum requirements for the degree. Other requirements as determined by the student’s graduate committee may also be listed.

The Program of Study acts as a contract between the student and the University. It may be amended through the course of the student’s graduate education. Changes to a student’s program of study must be made though the “Change of Program of Study” form and approved by The Graduate School.

Program approval
The Program of Study must be approved by the student’s committee and department head. Final approval rests with The Graduate School.

Filing deadlines
The Program of Study must be submitted on an official ‘Program of Study’ form to The Graduate School by the end of the second semester of graduate study. Students failing to submit a program by this date will be seen as failing to achieve satisfactory progress. Consequently, the student becomes ineligible for financial aid (including graduate assistantships, work-study and student labor) and will be placed on college probation. Exceptions to this policy will be granted only for extraordinary reasons.
When filed, attachments to the program must include transcripts of all non-MSU coursework. If the student obtained those required transcripts during the application process, they may be reused for program purposes. Changes in the program must be requested before or during the semester affected. Once a course is taken, it cannot be removed from the program.

**Thesis Credit Requirements**

1. At least ten (10) thesis credits must be successfully completed for thesis plan programs. An unlimited number of 590 credits may be taken to complete a thesis; however, only ten thesis credits may be applied toward degree requirements. As such, “Plan A” students must include ten thesis credits on the graduate program. The remaining twenty credits (or more as determined by the department) on the graduate Program of Study must be content coursework.

2. Registration in Master’s Thesis (590) credits is required during those terms the student is working on the thesis, using faculty time, and or university facilities.

3. When registering for thesis credit, the minimum registration is one (1) credit for a semester.

4. Thesis credits are taken pass/fail only.

**Master’s Thesis**

A thesis, written by the student seeking the degree and based on original research, is a requirement for all thesis plan (Plan A) master’s degree programs. The thesis is usually the result of research by the candidate and is an original contribution to knowledge.

**Committee composition for thesis plan students**

Three members of the student’s graduate Committee will be designated to guide the thesis. The graduate advisor is chairperson of the thesis committee.

**Submission of the final thesis**

The thesis must be submitted in final form to The Graduate School by published deadlines (usually no later than fourteen (14) working days before the end of the term in which graduate work is completed.

---

**One-credit extension**

If a thesis is submitted after the published deadline and the student is currently registered for three credits, the student may choose to make all corrections/changes before the first day of the following academic term and be eligible for a one-credit extension for the following term (instead of the mandatory three-credit registration term of graduation). Students who choose and are eligible for this option, will be certified to graduate the following term. If more time is needed beyond the first day of the following term, the student will be required to register for at least three credits to be eligible for graduation that term.

**Thesis approval requirements**

The thesis must meet all requirements set forth in The Graduate School ‘Guide for Preparation of Theses, Dissertations and Professional Papers’. Final authority for approval or rejection of a thesis or professional paper rests with the Graduate Vice Provost.

The Graduate School will require all students to submit the electronic version of their thesis or dissertation to The Graduate School instead of paper copies. These documents will be placed on the internet for worldwide access. Exceptions for reasons that have not been addressed within the Montana State University ETD initiative will be considered on an individual basis.

Internet access allows the student’s work to be viewed freely by anyone on the World Wide Web, restricted to only the MSU campus or a mixed restriction (where parts of the student’s thesis or dissertation may not be seen by the World Wide Web or MSU campus because of patent or publishing issues). Students may view the choices for restricting access by reading the Certificate of Approval form at [http://www.montana.edu/wwwdg/forms.shtml](http://www.montana.edu/wwwdg/forms.shtml). The ETD initiative also provides students with a unique opportunity to learn more about publishing. Please read about publisher issues at [www.montana.edu/etd/PublisherIssues.shtml](http://www.montana.edu/etd/PublisherIssues.shtml).

Copy quality, punctuation and spelling, as well as consideration of the subject researched and completeness of the research is the responsibility of the student’s department. The Graduate Vice Provost has authority to deny final approval of the thesis on grounds of unsatisfactory grammar, formatting, or overall quality of the thesis.

**Submission of the thesis to the MSU Library**

MSU has the authority to require graduate students to submit the graduate thesis to the MSU Library. The Graduate School will transmit all theses and dissertations to the MSU Library following approval of the document by the Graduate Vice Provost. A thesis is considered complete when accepted by the Library.

**Thesis Patent Policy**

Patent requests should be submitted to the U.S. Patent Office well ahead of submission of the thesis to The Graduate School. If a patent request is submitted late and the contents of the thesis or any part thereof is still in the process of being patented, the student, major professor and department head may submit a written request to The Graduate School to request withholding the thesis from the ETD website. This hold may be for a period of not more than six (6) months during which time the patent request may be submitted to the U.S. Patent office.

Upon receipt of notice from the Patent Office that the patent request has been received, the department head shall inform The Graduate School the thesis is to be released for public access on the ETD website.

If The Graduate School is not notified to release the thesis prior to the expiration of six (6) months, the thesis will automatically be released to the library at that time. Under special circumstances a request for an extension of time may be granted at the discretion of the GraduateVice Provost. The Graduate School will make every attempt to keep thesis information confidential.

**Master’s Qualifying Examination**

To test the student’s preparedness, a qualifying examination may be administered by the major department. The student usually takes the examination during the first year of attendance.
Master’s Comprehensive Examination

The major department may administer a comprehensive examination to assure that the student has attained sufficient mastery of their program of study, including sufficient knowledge of pertinent literature, academic background, training, and ability to conduct research. The student usually takes the examination during the second year of attendance.

Comprehensive examination and thesis defense

On thesis plans, the defense-of-thesis examination is also required. The comprehensive examination and the defense of thesis may be combined and offered at the same time.

Professional licensure/certification examinations

Examinations for professional licensure or certification may not be used for or in place of the comprehensive examination.

Comprehensive examination deadline

The last day to take the comprehensive examination or defend a thesis if you plan to graduate during the same semester is on or before the fourteenth (14th) business day prior to the end of the semester.

Minimum registration to take an examination

A student must be registered for a minimum of three (3) credits at MSU during the term in which an examination is taken.

If a student wishes to sit for the comprehensive exam during the intersession (i.e., the time between terms), a student must be registered for a minimum of three (3) credits in the term prior to the intersession or the term immediately following the intersession.

Grading of the comprehensive examination

The comprehensive examination is graded with either a passing or failing grade determined by a majority committee vote. The student officially passes the examination when all concerns and deficiencies have been met and are deemed satisfactory by all Committee members.

Notice of results of the comprehensive examination

The Committee and department head are responsible for submitting written notice of the results of the comprehensive examination to the student and to The Graduate School no later than one (1) week after the examination is held or after each section is administered. If the written and oral sections are given at separate times, the results of each section must be reported in writing to the student and to The Graduate School no later than one (1) week after each section is completed by the student.

Failed Examination

A failure on any portion of the examination is considered to be a failed exam. A failed examination may be repeated one (1) time. At least two (2) months must elapse before the second examination may take place. Failure to pass a second examination results in termination of graduate study and dismissal from the academic program. Students who are dismissed from the program due to a failed comprehensive examination are ineligible to reapply to the same degree program at any time.

Invalid Examination

Examinations held in the absence of the chair or both individuals in case of co-chairs will be considered invalid and the exam will have to be rescheduled. The chair and/or co-chairs must be present throughout the entire examination. All Committee members must be present at the comprehensive: Last minute Committee changes based on scheduling conflicts must be approved by The Graduate School.

If a student wishes to sit for the examination during the intersession (i.e., the time between terms), a student must be registered for a minimum of three (3) credits in the term prior to the intersession or the term immediately following the intersession.

Video conferencing during comprehensive exam

- The Graduate School allows for students to video conference with committee members using the following requirements:
  - Must be a two-way video
  - Conference process is initiated and completed by the student and/or department
  - All costs incurred are the responsibility of the department and/or student
  - If communication is broken during the examination and cannot be retrieved, the examination must be terminated and rescheduled to a later time/date
  - In the case of the student not being present with any other committee members, an approved proctor must be present at student’s location throughout the entire examination

Defense of Thesis

On thesis plans, the defense-of-thesis examination is required. The comprehensive examination and the defense of thesis may be combined and offered at the same time.

Minimum credit registration to defend the thesis

A student must be registered for a minimum of three (3) credits at MSU during the term in which the thesis is defended.

If a student wishes to sit for the thesis defense during the intersession (i.e., the time between terms), the student must be registered for a minimum of three (3) credits the term prior to the intersession or the term immediately following the intersession.

Scheduling the thesis defense

The last day to defend a thesis is on or before the published deadline (generally on or before the fourteenth 14th working day prior to the end of the semester.)

Advertising the defense

The following information may be published in The Graduate School’s “News and Announcements” Bulletin on The Graduate School website:

- the name of the candidate;
- title of the master’s thesis;
- time and place of defense; and
- the place where a copy of the thesis may be obtained for inspection.

Posting the above information is not mandatory for Master’s students.
Committee representation at the thesis defense
If a master’s student chooses to have more than the minimum of three members on his/her graduate Committee, all members must be present at the comprehensive and/or the defense of thesis. Last minute committee changes based on scheduling conflicts must be approved by The Graduate School.

Invalid Defense of Thesis
A defense of thesis held in the absence of the chair (or both individuals in case of co-chairs) will be considered invalid and the exam will have to be rescheduled. The chair and/or co-chairs must be present throughout the entire defense. Examinations held with only two Committee members present will be invalidated.

Grading of the thesis defense
The defense of thesis is graded with either a passing or failing grade—determined by a majority committee vote. The student officially passes the defense when all concerns and deficiencies have been addressed and are deemed satisfactory by all Committee members.

One week notice of results of the thesis defense
The graduate committee and department head are responsible for providing written notice of the results of the defense to the student and to The Graduate School no later than one (1) week after the defense is held.

Failed defense
A failed defense may be repeated one (1) time. At least two (2) months must elapse before the second defense takes place. Failure to successfully pass the defense of thesis results in termination of graduate study and dismissal from the academic program. Students who are dismissed from the program due to failure to pass the defense are ineligible to reapply to the same degree program at any time.

Video conferencing during defense of thesis
- The Graduate School allows for students to video conference with committee members using the following requirements:
- Must be a two-way video

- Conference process is initiated and completed by the student and/or department
- All costs incurred are the responsibility of the department and/or student
- If communication is broken during the examination and cannot be retrieved, the examination must be terminated and rescheduled to a later time/date
- In the case of the student not being present with any other committee members, an approved proctor must be present at student’s location throughout the entire examination.

Application for Advanced Degree
The semester of intended graduation, the student must file an ‘Application for Advanced Degree’ with The Graduate School. The deadline for filing the application is
- September 20 for Fall Semester
- February 5 for Spring Semester
- June 10 for Summer Semester.

The form is available at www.montana.edu/wwwgd/forms.html

“One Credit Registration”
If an ‘Application for Advanced Degree’ is submitted after the published deadline and the student is currently registered for three credits, the student may submit the application for graduation for the next term and be eligible for a one credit registration the following term (instead of the mandatory three-credit registration the term of graduation). To be eligible for the one-credit registration, the student must complete all degree requirements before the first day of the subsequent term. The student will be certified to graduate the following term. If more time is needed beyond the first day of the following term, the student will be required to register for at least three credits to be eligible for graduation that term.

Commencement
Diplomas are dated the last day of the semester in which the requirements for the degree are completed. Degrees are conferred once a year at May commencement.

Eligibility to participate in commencement
Montana State University allows only those graduate students who have completed all requirements for the degree (including all coursework, examinations, and final papers (including approval of the thesis or dissertation by the Graduate Vice Provost) and who have applied to graduate by the deadline to participate in commencement exercises. Graduate students who will finish the degree the following August may walk through the May ceremonies only if they are utilizing the one credit extension and have documentation from their major advisor of the student’s assured completion of degree requirements by the one credit extension deadline.

Students who are unable to attend commencement must make special arrangements with the Registrar to have their diplomas mailed to them. Students who participate in commencement must purchase academic robes and hoods. These may be purchased from the MSU Bookstore, usually in February.

Students listed in Montana State University’s commencement book are those candidates who have identified themselves as eligible to graduate. The degree will not be awarded until all requirements for the advanced degree are met and the candidate has been certified to graduate by The Graduate School. Being listed in the commencement book does not imply completion of the degree.

Doctoral Requirements

Doctor of Philosophy and Doctor of Education
The Doctor of Philosophy degree (Ph.D.) and Doctor of Education (Ed.D.) are awarded on evidence of a particular field of knowledge, evidence of ability to carry out independent research, and the ability to present the results of such research in a scholarly manner.

Course and residency requirements are secondary to these objectives, and the degree is not awarded solely for faithfully completing a number of courses over a prescribed period.
The Doctoral Degree Application Process

Application for all doctoral degrees at Montana State University is made using The Graduate School application. A student who is completing a master’s degree at Montana State University and who wishes to begin a doctoral program in the same department the immediate following term may submit a letter, co-signed by the department head, to the Graduate Vice Provost, requesting permission to continue graduate studies.

The Department of Education requires an entirely new application process for all Ed.D. applicants following completion of the master’s degree. Other departments may exercise this option as well. Please contact the academic department to which you are applying for current procedures.

General Credit Requirements for Doctoral Degrees

All Ph.D. candidates are expected to be familiar with both The Graduate School and their specific academic college and department degree requirements. All Ed.D. candidates are expected to be familiar with both The Graduate School and the Department of Education degree requirements.

Minimum Credit Requirement

All students earning a doctoral degree from Montana State University must complete a minimum of 60 credit hours post-baccalaureate, of which 18 – 28 of must be dissertation credits. A maximum of 30 credits from a previously earned master’s degree (from MSU or another accredited University) may be applied toward the 60 credit minimum required for the doctoral degree.

In some departments, a greater number of credits are required. In others, in addition to dissertation/research credits, the satisfactory completion of certain courses is stipulated. The student must check specific departmental requirements.

Course Limitations for Doctoral Degrees

1. Special Topics (591): Credits allowed toward degree requirements for Special Topics (591) courses may not exceed the number defined by each degree program.

2. Individual Problems (592): Not more than six credits of Individual Problems (592) courses may be included on a doctoral Program of Study.

3. Pass/Fail credits: A maximum of nine credits (excluding dissertation) may be included on a doctoral Program of Study.

4. 4XX level courses may be used on a Program of Study: a maximum of 9 credits are allowed.

5. Limit on Age of Courses: The age of courses at the time of graduation for a doctoral degree may not exceed 10 years.

6. Courses from a Master’s program: The Graduate ‘Program of Study’ lists those courses the student’s committee feels are required to earn the doctoral degree.

Courses taken while in a master’s degree program at M.S.U. beyond those listed on the graduate Program of Study, may be used on an additional master’s program or a doctoral program at a later time.

Dissertation Credit Requirements

All Ph.D. candidates are required to register for and complete a minimum of eighteen dissertation (690) credits. Fourteen credits of dissertation (690) are required for Ed.D. candidates. An unlimited number of 690 credits may...
be taken to finish a dissertation; however, only the 18-28 690 credits are applicable toward degree requirements.

**Foreign Language Requirement**
Individual departments determine the language requirement for their graduate programs.

**Residence Credit Requirements for Doctoral Degrees**
1. A minimum of thirty (30) credits applicable to the degree must be taken from MSU.
2. A student must be registered for a minimum of three (3) credits during the semester of a comprehensive examination, a defense of dissertation, and the semester of graduation.

**Doctoral Graduate Committee**
The graduate committee advises the student on academic matters and is the examining committee for the comprehensive examination and dissertation defense.

**Committee composition**
A graduate committee must include a minimum of four members excluding The Graduate School-assigned Graduate Representative. Due to the interdisciplinary nature of many degrees the committee does not have to be composed entirely of faculty from the same department. The major professor and the department head recommend the committee which must be approved by The Graduate School through the Program of Study.

The final member is the Graduate Representative, who is appointed by the Graduate Vice Provost. See “Graduate Representative” below.

The committee must have a majority of tenured or tenure-track faculty members from MSU. Exceptions and justification for a waiver from the majority may be requested in writing by the chair of the committee to The Graduate School. These will be reviewed on a case by case basis.

Committee members not holding faculty status at MSU must submit documentation of their qualifications, including a vita. Non-MSU individuals may not hold positions as committee chairs.

**Changes to the committee**
The student has the right to make faculty changes to their committee, using the Change of Committee form. Changes in committee composition may not be made due to examination scheduling problems.

**Faculty affiliates, faculty of other institutions, and nonacademic experts**
Faculty affiliates, faculty of other institutions, and nonacademic experts may serve as additional committee members, but may not serve as the committee chair.

**Committee size**
A maximum committee size is not stipulated. However, students are advised to keep the committee size to a reasonable number.

**Deadline to appoint the Committee**
The committee must be selected and appointed no later than the end of the student’s third semester of attendance. If committee appointments are not submitted by the end of the student’s third semester, the student is not seen as making satisfactory progress; s/he becomes ineligible for financial aid (including graduate assistantships, student work-study and student labor) and will be placed on college probation due to lack of identifiable satisfactory progress toward the degree.

**Major Professor (Committee Chair)**
As early as possible after admission, a student should secure a tenured or tenure-track faculty member to serve as the major professor. This professor is the student’s graduate advisor, chairperson of the student’s graduate committee, and acts as a channel of communication within the major department.

The department head or graduate coordinator may act as the advisor during the first term or until a major professor is selected. In the event that the student does not select a major professor within the first term of attendance as a doctoral student, the department head must appoint a temporary advisor. The faculty member will advise the student until a major professor is selected.

The selection of a major professor must be completed and approved by the department head and the Graduate Vice Provost no later than the third term the doctoral student is in attendance.

**The Graduate Representative**
The Graduate School appoints the Graduate Representative at the time the student submits their Program of Study. The Graduate School will notify, via e-mail, each committee member of the appointment within three weeks of receiving the proposed committee from the department.

**The Graduate Representative’s Responsibility**
The primary responsibility of the Graduate Representative is to monitor and insure compliance with the policies and procedures of The Graduate School as well as ensure that committee meetings are conducted in a fair and satisfactory manner. The Graduate Representative is to be advised of all committee meetings and is encouraged to attend these meetings.

**The Graduate Representative must attend the oral comprehensive and final examination (defense of dissertation.)** Written examinations are also to be made available to the Graduate Representative who must attend any committee meeting(s) held to discuss an examination or the results of an examination(s). At examinations that are open to faculty, the Graduate Representative has the same privileges to question and comment that are accorded to any other faculty member.

**Graduate Representative’s responsibility to file exam report**
Within five days after the examination, the Graduate Representative must file a brief written report with The Graduate School regarding the examination, stating whether it was conducted in a fair and satisfactory manner. Comments may also be made regarding the candidate’s performance. The Graduate School will carefully consider any written suggestions submitted by the Graduate Representative.

**Identifying a replacement Graduate Representative**
The student and the student’s advisor are responsible for arranging meeting times that allow the Graduate Representative to attend. If illness or
some other emergency will prevent the Graduate Representative from attending an examination, that individual is responsible for identifying a suitable replacement. If the Graduate Representative is unable to find his/her own substitute, then the chair of the committee may find a replacement. However, The Graduate School must be notified of any substitutions before the examination is held in order to approve the replacement Graduate Representative. In cases where a substitute Graduate Representative is not approved by The Graduate School, the exam must be postponed and rescheduled.

Examinations held in the absence of the graduate representative or a previously approved substitute will be considered invalid and will have to be repeated.

Doctoral Graduate Program of Study
The student’s graduate committee and the student complete a Program of Study that lists those courses that are required to earn the doctoral degree. It is not unusual for students to take classes beyond those listed on their Program of Study; however, courses used on a Program of Study to meet the degree requirements for a particular degree may not be used on a new program of study to be applied towards an additional graduate degree (master’s or doctoral.)

Transcripts of all transfer course work must be submitted with the Program of Study or when the student completes the course. If the student submitted those transcripts during the application process, The Graduate School will reuse the transcript for program auditing purposes.

Program approval
The Program of Study must be approved by each committee member, who will indicate approval by signature on the Program of Study form. Final approval for the Program of Study rests with The Graduate School.

Filing deadlines
A Program of Study must be submitted on official forms to The Graduate School by the end of the third semester of attendance. If a student’s Program of Study has not been submitted by the end of the student’s third semester of attendance at MSU, they become ineligible for financial aid (including graduate assistantships, student work-study and student labor), and will be placed on college probation for failing to make satisfactory progress toward the degree. Exceptions to this policy will be granted only for extraordinary reasons.

Filing final program changes
The deadline for filing final changes in a graduate Program of Study is the submission date for filing an Application for Advanced Degree.

Doctoral Dissertation
A dissertation is required for doctoral degrees. The dissertation must embody the results of extended research by the doctoral student, be an original contribution to knowledge, and include new material worthy of publication.

An outline or proposal for the doctoral dissertation should be submitted to and approved by the student’s graduate committee as early as possible. The final dissertation must be presented in an acceptable form and defended to the student’s graduate committee not later than five years after successful completion of the Comprehensive Examination.

When to register for dissertation (690) credits
Registration in appropriate 690 (Doctoral Dissertation) courses is required during those terms when the student is working on the dissertation, using faculty time or university facilities.

Submission of the final dissertation
The dissertation must be submitted as an electronic dissertation, in final form to The Graduate School not later than 14 working days before the end of the term in which graduate work is completed. The dissertation must meet all the requirements set forth in the most current Division of Graduate Education ‘Guide for Preparation of Theses, Dissertations and Professional Papers’. Final authority for approval or rejection of the dissertation rests with The Graduate School.

Dissertation quality
Printable quality, proper use of the English language, punctuation and spelling, as well as consideration of the subject researched, completeness of the research and overall, scholarly quality of the final product will be the responsibility of the student’s department.

Final dissertation approval
Approval of the dissertation will be defined by the signature of the Graduate Vice Provost only after the dissertation has been judged to meet all expectations. A dissertation is considered completed when accepted by the MSU Library in an electronic format.

MSU has the authority to require graduate students to submit the graduate dissertation to the MSU Library and to UMI for microfilming. Therefore, graduate students should submit a final electronic copy of the dissertation to The Graduate School following ETD (Electronic Theses and Dissertations) guidelines.

Doctoral Qualifying Examination
To test the student’s preparedness, a qualifying examination may be administered by the major department. The student usually takes the examination during the first year of attendance.

Doctoral Comprehensive Examination
The comprehensive examination is the major academic examination during doctoral study that assures that the student has attained sufficient mastery of their Program of Study, including sufficient knowledge of pertinent literature, academic background, training and ability to conduct research.

Written and oral comprehensive requirement
The comprehensive examination must be both written and oral. The comprehensive examination will be assessed by the committee formally approved as the student’s Graduate Committee by The Graduate School.

Minimum registration to take the comprehensive examination
A student must be registered for a minimum of three (3) credits at Montana State University during the term in which an examination or defense is taken.
If a student wishes to sit for the comprehensive exam during the intersession (i.e., the time between terms), the student must be registered for a minimum of three (3) credits the term prior to the intersession or the term immediately following the intersession.

**When to take the comprehensive examination**

Two-thirds (2/3) of the course work required for a degree must be completed prior to sitting for the comprehensive exam.

In certain instances, the graduate committee and department head may decide that the written and oral sections of the examination should be held on separate occasions.

The last day to take the comprehensive examination or defend a thesis if you plan to graduate during the same semester is on or before the fourteenth (14th) business day prior to the end of the semester.

**Reporting the results of the comprehensive examination**

The Committee and department head are responsible for submitting written notice of the results of the comprehensive examination to the student and to The Graduate School no later than one (1) week after the examination is held or after each section is administered. If the written and oral sections are given at separate times, the results of each section must be reported in writing to the student and to The Graduate School no later than one (1) week after each section is completed by the student.

**Acceptable age of the comprehensive examination**

The maximum time allowed between the comprehensive examination for the Ph.D. or Ed.D. and degree completion is five (5) years.

**Failed examination**

If the student fails the examination, at least six (6) months must elapse before the examination may be repeated. Failure to pass a second examination will result in termination of doctoral work and dismissal from the academic program. Students who are dismissed from the program are ineligible to reapply to the same degree program at any time.

**Invalid examination**

Written examinations not made available to the Graduate Representative or oral examinations held in the absence of the Graduate Representative and Chair(s) will be invalidated and must be rescheduled. The Graduate Representative must be included in the process as an impartial observer to ensure the examination is fair for the student, comprehensive in nature (e.g., includes both breadth and depth), and that it is conducted within the guidelines set by the university.

All committee members approved by The Graduate School must be present at the comprehensive examination. Last minute committee changes based on scheduling conflicts must be approved by The Graduate School. It is the student’s responsibility to ensure that all committee members are available when scheduling an exam.

**Video conferencing during comprehensive exam**

The Graduate School allows for students to video conference with committee members using the following requirements:

- Must be a two-way video
- Conference process is initiated and completed by the student and/or department
- All costs incurred are the responsibility of the department and/or student
- If communication is broken during the examination and cannot be retrieved, the examination must be terminated and rescheduled to a later time/date
- In the case of the student not being present with any other committee members, an approved proctor must be present at student’s location throughout the entire examination

**Defense of Dissertation**

A defense covering the dissertation must be taken by all doctoral candidates. The defense usually consists of a public presentation and an oral examination of the candidate’s research focus and background.

If a student wishes to sit for the dissertation defense during the intersession (i.e., the time between terms), the student must be registered for a minimum of three (3) credits the term prior to the intersession or the term immediately following the intersession.

**Notification of the defense date**

Each member of the examining committee must be given a minimum of one (1) week’s notification before the student’s final examination to read the draft of the dissertation. The dissertation defense will be arranged by the major professor and the graduate student, and is given before the final draft of the dissertation is completed. The defense is an oral examination only. Examinations in which any committee member has had insufficient time to prepare should not take place and may need to be rescheduled. The committee chair should discourage a student from defending if the chair (or the committee) feels the student is not adequately prepared.

**Registration during the semester of the defense**

A student must be registered for a minimum of three (3) credits at MSU during the term in which the defense is held.

**Defense of dissertation deadlines**

If a student wishes to hold their defense the semester of graduation, the defense must be held and passed at least fourteen (14) working days before the end of the term of graduation.

**The “open” and “closed” defense**

A portion of the defense must be open to the public. This is usually a presentation of the student’s research. Following the open portion of the defense, the committee chair will excuse all attendees other than committee members from the room. This begins the closed portion of the defense in which the student’s knowledge of the subject matter will be assessed by the committee.

**Advertising the dissertation defense**

The student and the academic department are responsible for supplying the following information for publication in The Graduate School “News
and Announcements” on The Graduate School website:
a) the name of the candidate,
b) title of the doctoral dissertation,
c) time and place of defense, and
d) the place where a copy of the dissertation may be obtained for inspection.

The defense date must be advertised at least one (1) week prior to the actual defense date.

**Reporting the defense results**

The Dissertation Defense report must be submitted to The Graduate School no later than one (1) week after the defense is held. Failure to submit the report of the defense may invalidate the examination.

**Failed defense of dissertation**

If the student fails the defense, at least two (2) months must elapse before the examination is repeated. Failure to pass a second examination will result in termination of doctoral work and dismissal from the academic program. Students who are dismissed from the program are ineligible to reapply to the same degree program at any future time.

**Invalid defense of dissertation**

An examination held in the absence of the Chair(s) and/or the Graduate Representative will be considered invalid and must be rescheduled. The Graduate Representative must be included in the process as an impartial observer to ensure the examination is fair for the student, comprehensive in nature (includes both breadth and depth), and that it is conducted within the guidelines set by the University.

It is the student’s responsibility to ensure that all Committee members are available when scheduling an exam. All Committee members approved by The Graduate School must be present at the defense of dissertation. Last minute committee changes based on scheduling conflicts must be approved by The Graduate School.

**Video conferencing during defense of dissertation**

- The Graduate School allows for students to video conference with committee members using the following requirements:
  - Must be a two-way video
  - Conference process is initiated and completed by the student and/or department
  - All costs incurred are the responsibility of the department and/or student
  - If communication is broken during the examination and cannot be retrieved, the examination must be terminated and rescheduled to a later time/date
  - In the case of the student not being present with any other committee members, an approved proctor must be present at student’s location throughout the entire examination

**Application for Advanced Degree**

Students expecting to receive a doctoral degree must file an ‘Application for Advanced Degree’ with The Graduate School for the intended semester of completion. The deadline for filing the application is on or before September 20 for Fall Semester, February 5 for Spring Semester, and June 10 for Summer Semester. If a student fails to meet semester deadlines, they must file an Application for Advanced Degree the next semester in which they expect to graduate.

**‘One Credit Registration’**

If the dissertation is submitted after the published deadline and the student is currently registered for three credits, the student may choose to make all corrections/changes before the first day of the following academic term and be eligible for a one-credit registration the following term (instead of the mandatory three credit registration the term of graduation). Students who choose and are eligible for this option will be certified to graduate the following term. If more time is needed beyond the first day of the following term, the student will be required to register for at least three credits to be eligible for graduation that term.

**Commencement**

Diplomas are dated the last day of the semester in which the requirements for the degree are completed. Degrees are conferred once a year at May commencement.

**Eligibility to participate in commencement**

Montana State University allows only those graduate students who have completed all requirements for the degree (including all coursework, examinations, and final papers (including approval of the thesis or dissertation by the Graduate Vice Provost) and who have applied to graduate by the deadline to participate in commencement exercises. Graduate students who will finish the degree the following August may walk through the May ceremonies only if they are utilizing the one credit extension and have documentation from their major advisor of the student’s assured completion of degree requirements by the one credit extension deadline.

Students who are unable to attend commencement must make special arrangements with the Registrar to have their diplomas mailed to them. Students who participate in commencement must purchase academic robes and hoods. These may be purchased from the MSU Bookstore, usually in February.

Students listed in Montana State University’s commencement book are those candidates who have identified themselves as eligible to graduate. The degree will not be awarded until all requirements for the advanced degree are met and the candidate has been certified to graduate by The Graduate School. Being listed in the commencement book does not imply completion of the degree.

**Satisfaction of Financial Obligations**

All candidates for degrees must fully satisfy their financial obligations to the University (or make arrangements with MSU for doing so) as a condition for completing their degree programs. Candidates failing to comply with this requirement shall not be eligible for graduation, diplomas, degrees or any transcripts of their records.
Auditing Credits

Graduate students may audit courses for zero credit with the permission of the instructor. The following policies apply to audited courses:
1. Audited courses will be designated on a graduate transcript as “Au” in place of the grade.
2. Audited courses may not be used on the Program of Study and do not count towards degree requirements.
3. Audited courses may not be covered by GTA/GRA tuition waivers.
4. Full tuition and fees apply to all audited courses.
5. Audited courses will not count towards the total credit load when considered for residency.
6. Audited courses may be changed to credit courses up to the 10th class day. After the 10th class day the audit status cannot be changed.

Challenging Courses

Challenge provides the opportunity to earn college credits and grade point without formal course enrollment. A graduate student accepted into a degree program may challenge a graduate course through their department or program. A student may challenge a course only if the prerequisites for the course have been met.

- Master’s students may challenge no more than a total of six (6) semester credit hours and apply those credits to a degree program.
- Doctoral students may challenge no more than a total of nine (9) semester credit hours, including those hours successfully challenged for a master’s degree.

Continuous Enrollment

To maintain graduate status, a student must be enrolled in three (3) or more credits (including thesis or dissertation) each semester, excluding summer semester.

Continuous enrollment policy is applicable for:

- Master’s students
  - after completion of required content course work on the approved graduate Program of Study (content coursework excludes thesis or dissertation credits)
  - OR
  - after the student passes any portion of the comprehensive examination.
- Doctoral students
  - after passing any portion of the comprehensive examination.

Students to whom continuous enrollment applies may be absent from the university for a maximum of three semesters, excluding summer term, without penalty. This leave of absence may be taken as consecutive or individual semesters. No form or approval from The Graduate School is required to be absent. As a courtesy, we ask that you discuss the absence with your department.

Students taking a semester off who require access to MSU library resources may register for less than three (3) credits during the semester of employment. Failure to maintain continuous enrollment constitutes evidence that the student has resigned from the degree program and Montana State University.

Additional absences may be approved for documented medical reasons or military duty.

Registration following a “Leave of Absence”

Students wishing to register for coursework following one or more semesters off must file the Intent to Register form with the Office of the Registrar 30 days prior to registration for an intended semester.

Readmission to Graduate Standing

Students absent for more than three semesters while in continuous enrollment must:

- Reapply to the degree program and to The Graduate School by completing the Application for Graduate Admission including the $50 application fee and official transcripts of any academic work completed during the absence. The application must be reviewed and approved by the student’s department and The Graduate School prior to the beginning of the intended semester;
- Submit a revised Program of Study to The Graduate School. Outdated coursework (any course work older than six years for master’s students or older than ten years for doctoral students) cannot be included in the revised Program of Study;
- Retake the comprehensive examination and be registered for a minimum of three (3) credits during the semester the examination is taken;
- Maintain continuous enrollment through completion of the degree.

Credit Requirements

It is the student’s responsibility to enroll for the number of credits needed to satisfy all department, college, and university criteria. The following list is to be used only as a guide; other credit restrictions may apply.

- Graduate Teaching or Research Assistants (GTAs/GRAs) may not enroll in more than twelve (12) semester credits if appointed to work more than fifteen (15) hours per week. Graduate Assistants appointed to work fifteen (15) or fewer hours per week may carry up to fifteen (15) semester credits. GTA or GRA stipends require enrollment of at least six (6) credits each semester during the academic year.
- Graduate Student Assistants (GSAs) may be enrolled 3-5 credits during the academic year. They may be enrolled for less than six credits during the summer and can be at zero credits if they are continuing from spring semester.
- Social Security exemption requires a minimum of six (6) credits for the semester of employment.
- Graduating students must be registered for a minimum of three (3) credits during the semester of graduation.
- Students taking qualifying/comprehensive exams must be registered for a minimum of three (3) credits during the semester of the exam.
**Summary of Procedures for Doctor of Education and Doctor of Philosophy Degree**

<table>
<thead>
<tr>
<th>What</th>
<th>When</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-application form.</td>
<td>If required by the academic department, the pre-application must be submitted before obtaining application packet.</td>
<td>Send pre-application form to appropriate department.</td>
</tr>
<tr>
<td>2. Graduate Record Examination</td>
<td>May be required for admission.</td>
<td>Take exam at the designated testing center in your area and have results sent to MSU-Bozeman (code 4488).</td>
</tr>
<tr>
<td>3. Admission to degree program and The Graduate School</td>
<td>Per departmental deadlines.</td>
<td>Request application packet from appropriate department or apply online.</td>
</tr>
<tr>
<td>4. Qualifying examination.</td>
<td>If required, during the first year.</td>
<td>If required, will be arranged by the major department.</td>
</tr>
<tr>
<td>5. Selection of major professor and advisory committee.</td>
<td>As early as possible, but not later than the end of the third semester of registration.</td>
<td>See department head; submit the committee form to the Division of Graduate Education.</td>
</tr>
<tr>
<td>6. Program of Study. (Extra fees apply for this form.)</td>
<td>By the end of the third semester of registration.</td>
<td>Consult major professor; submit the program in official format to The Graduate School.</td>
</tr>
<tr>
<td>7. Foreign Language.</td>
<td>If required, as early as possible.</td>
<td>See department head.</td>
</tr>
<tr>
<td>9. Comprehensive examination.</td>
<td>After at least two-thirds of the content coursework has been completed. Doctoral students usually sit for the comprehensive exam near the end of their ‘content’ coursework.</td>
<td>Make arrangements with major professor.</td>
</tr>
<tr>
<td>10. Application for Advanced Degree. (Extra fees apply for this form.)</td>
<td>Submit on or before the third Friday of the semester of completion of degree requirements.</td>
<td>Complete form obtained from major department.</td>
</tr>
<tr>
<td>11. Final changes in program.</td>
<td>Submit on or before the third Friday of the semester of completion of degree requirements.</td>
<td>Submit form to the Division of Graduate Education.</td>
</tr>
<tr>
<td>12. Defense of dissertation.</td>
<td>When the dissertation is complete, but not more than five years after passing the comprehensive examination. Must be passed at least 14 days before the end of the semester in which graduate work is completed.</td>
<td>Make arrangements with major professor. Be sure examination is announced in the What’s New Bulletin in the The Graduate School web pages.</td>
</tr>
<tr>
<td>13. Approval of dissertation.</td>
<td>After the defense and at least 14 working days before the end of semester in which graduate work is completed.</td>
<td>Approval by the Graduate Vice Provost.</td>
</tr>
</tbody>
</table>

- **Office of International Programs** require registration of nine (9) credits per semester. Contact the Office of International Programs for policies about registration for fewer than nine (9) credits.

- **Family and Graduate Housing** requires five (5) credits during the academic year; no credit minimum in the summer term as long as the student is pre-registered for the upcoming semester.

- **Residence Halls** requires nine (9) credits during the academic year; no credit minimum in the summer term as long as the student is pre-registered for the upcoming fall semester.

- **Financial Aid** usually requires a minimum of six (6) credits each semester during the academic year.

- **Montana Residency:** An individual who is enrolled for more than half-time status (At Montana State University, 6 credits is considered half-time enrollment status for both undergraduate and graduate students.) at a post-secondary school during any semester that falls within the 12-month period is presumed to be present in the state primarily for educational purposes, and such periods will not generally be considered as part of the 12-month period of the policy.

**Grades, Course Loads, and Special Courses**

**Grades**

Grade Point Average (GPA) standards: A student must maintain a minimum 3.0 semester GPA, a minimum 3.0 GPA in the entire Program of Study and a cumulative 3.0 GPA overall. Any student whose cumulative or Program of Study grade point average is less than 3.0 at the end of any semester may be placed on probation or suspended from their degree program. (Refer to the section on Academic Probation and Suspension.)

Courses in which the student receives any grade lower than a “C-” and is not offered for either of the two subsequent semesters may be
substituted by another course to fulfill the degree requirement. The original course will remain on the program of study but will be noted by The Graduate School as a substituted course. The original course must be retaken if offered in either of the following two semesters, regardless of intended semester of graduation. A memo from the department head will be sufficient to clarify the intent of the additional course work.

Incomplete Grades: Unless a specified earlier time is given by the instructor, an “I” grade shall be made up no later than the end of the following semester (excluding summer session). The instructor may extend the time given to fulfill an “I” grade; however an “I” grade may not be extended beyond one calendar year. An “I” grade not made up in the prescribed length of time or within one calendar year lapses to a failure (F).

Course removal: A course listed on the Program of Study may not be removed once a grade has been posted. Pass/Fail grades: In all pass/fail grading, passing work receives a “P” grade on a student’s transcript but does not count in the grade point average. However, the course credit may count toward the number of credits required for degree completion.

Please Note: Failing work will receive an “F” grade and will count in the grade point average.

Course Loads
1. Nine (9) semester credits are considered a full-time graduate load.
2. International students are generally required to take a minimum of nine (9) credits per semester. International Students must contact the Office of International Programs for current policies.
3. To be considered a full-time student during the summer semester a student must be registered for at least nine (9) credits for any one or a combination of summer sessions.

Individual Problems Course (592)
Individual Problems (592) courses may be included in the Program of Study. The allowable number of 592 credit hours is limited as follows:

- Master’s (thesis) four (4) credits total.
- Master’s (non-thesis) six (6) credits total.
- Doctoral, no more than six (6) credits total.

Students who register for a 592 without an approved “Request for Individual Problems” form may be dropped from course.

Special Topics Course (580)
Special Topics (580) courses may be included in a master’s or doctoral Program of Study. The total number of Special Topics courses that may be taken during a graduate student’s tenure varies by degree program.

Professional Development (588)
Professional Development (588) courses are not applicable to degree programs and may not be used toward graduate degree requirements. Graduate programs approved prior to September 1, 2000 may use a maximum of three credits of Professional Development.

Graduate Consultation Course (589)
This course is permitted only for master’s degree students who have completed all of their coursework and the thesis or the professional paper, but who need additional faculty or staff time. This course may not be used for degree credit requirements.

Undergraduate Courses (4XX)
The following 4XX courses will NOT be approved for use on a graduate Program of Study:

- 494 (Undergraduate seminars),
- 492 (Undergraduate Independent Study)
- 498 (Undergraduate Internship)
- 482 (Undergraduate Research/Creative Activity Instruction)
- 490 (Undergraduate Research/Creative Activity)

Internships
Program Requirements
Internships provide an opportunity for graduate students to work closely with a professional gaining experience in a business or professional setting. Establishment of the intern’s goals prior to participation in the internship will make the experience more meaningful and will help develop a stronger commitment from the supervisor and the student.

All departments offering graduate internship programs must address numbers 1-5 below. In addition, the university supervisor and agency supervisor must develop the specific internship criteria by considering and stating responses to the following, in writing:

1. Objectives
2. Eligibility and prerequisites for the internship
3. Application procedure
4. Procedure for selecting interns
5. Procedure for selection of cooperating offices, agency or institution
6. Due dates for final reports by agency and university supervisor.

The university supervisor, agency supervisor and intern must discuss and develop the following in writing:

1. Educational goals and objectives of the experience;
2. Specific expectations/duties of the intern duration, amount of effort, credits, stipend, responsibilities, etc.);
3. Credit requirements of the intern (daily logs, final reports, seminars, etc.);
4. Evaluation criteria and grading responsibilities of the university supervisor and agency supervisor;
5. Date by which the student must have completed all requirements for the internship credit;
6. Signatures of agency supervisor, student and university supervisor.

Permanent documentation includes agreement forms, logs, reports and all other items used in the evaluation process which become a part of the student’s permanent file in the department. This documentation is to be available for review at the request of the Graduate Vice Provost.
Pass/Fail Course Limitations
- Pass/Fail credits, excluding thesis/dissertation (590/690) and professional paper (575), may be allowed up to a maximum of three (3) pass/fail credits in all graduate programs

Transfer of Pass/Fail Credits
- Pass/fail and other non-traditionally graded courses may not be transferred from another institution.

Registration

General Guidelines
Graduate students must register each semester in which faculty time or University facilities are used for any purpose.
Late fees will be assessed after published deadlines for registration.
Students must register on or before the 10th class day of instruction as set forth by the Office of the Registrar’s Schedule of Classes.
The Graduate School reserves the right to deny class registration to any student after the 10th class day of instruction

Immunization Requirements
Students are required to show proof of current immunization against measles, mumps and rubella, (MMR). A current skin test for tuberculosis may also be required. Students will not be permitted to register for classes until Student Health Service receives the immunization verifications. Contact MSU Student Health Service at (406) 994-2511.

Final Semester Registration:

One Credit Extension
All students are required to be registered for a minimum of 3 credits the semester of graduation. If a student is not able to meet the deadline within that semester, typically the student is required to apply to graduate the following semester and register for 3 credits. However, if the student does not need an entire semester to complete degree requirements, but rather a short extension on the original intended semester of graduation, a One Credit Extension may be applicable.
**Petitions, Appeals & Grievances**

**Graduate Student Academic Appeals**

Appeals by graduate students seeking waivers from established University academic policies such as admission, retention, or graduation requirements must be made in writing by the student. Student appeals must include a letter from the student as well as approvals (signature and/or letter) from the advisor and department head prior to submission to The Graduate School. In instances where the advisor and/or department head choose not to endorse the request, this must be noted and the student may then forward the appeal directly to The Graduate School.

**Academic Appeal Process**

Students may appeal an academic policy or decision by following this process:
1. State in writing, the policy or decision that is being appealed;
2. Note the reasons you believe the decision should be changed or policy be waived;
3. Include your advisor and department head’s approval statements or signatures with the appeal.

**Graduate Student Academic Grievance Procedure**

A copy of the current academic grievance procedures is available upon request from The Graduate School, 108 Montana Hall or the office of the Dean of Students, Room 120, Strand Union Building.

Please see: www2.montana.edu/policy/student_conduct/student_conduct_code.htm

**Academic Probation and Dismissal**

**Good Standing**

The student has a cumulative and semester GPA of 3.0 or higher and has met the provisions of admission as stated in The Graduate School admission letter, the student is in good standing.

**Scholastic Probation**

A student will be placed on College Probation if the semester GPA falls below a 3.0, even though the cumulative GPA remains above a 3.0. Students are placed on College Probation to maintain satisfactory progress for degree completion.

**University Probation**

A student may be placed on University Probation for any of the following:
- The student’s semester and cumulative GPA or graduate program GPA have fallen below a 3.0.
- The student fails to successfully complete (“B” or better) a majority of the courses each semester.
- The student did not meet The Graduate School or academic department provisions of admission.

**Dismissal (Suspension)**

A student may be suspended from Degree Program and The Graduate School for any of the following:
- The student’s cumulative or program GPA falls below a 3.0 after University Probation status.
- The student did not meet the provisions of admission.
- The student failed to make satisfactory progress toward their degree program.
- The student failed to maintain a cumulative or program GPA for two (not necessarily consecutive) semesters.

**University Withdrawals**

All University withdrawals by graduate students must originate in The Graduate School.

**Readmission to Graduate Degree Standing**

Following suspension, consideration for readmission to degree seeking status within The Graduate School may be requested after the student has completed a minimum of nine (9) semester credits in non-degree status. The student must also achieve at a 3.0 GPA in 4XX-level and higher courses taken during non-degree status.

**Transferring Credits**

Transfer credits are defined as credits coming from an outside institution, credits taken in the non degree status at MSU, and credits reserved for graduate credit at MSU while pursuing a bachelor’s degree. A total of nine (9) transfer credits as defined can be applied to a degree seeking graduate Program of Study. Individual departments may have stricter standards on the number of credits to be transferred.

All eligible credits to be transferred are subject to approval by the student’s graduate committee, graduate department, and The Graduate School. Official transcripts of any proposed transfer credit coming from an outside institution to be used on a Program of Study must be sent to The Graduate School. If The Graduate School approves a Program of Study which includes transfer credits that have not been taken, this approval is based on the understanding that the transfer credits will meet all standards of transfer credit eligibility.

**The following are credits that cannot be transferred to MSU:**
- Credits awarded by postsecondary institutions in the United States that lack regional accreditation;
- Courses with a grade of pass, credit, or satisfactory (non-traditionally graded);
- Courses older than six (6) years for master’s students and ten (10) years for doctoral students;
- Courses with a grade below a “B”; (including non degree courses and reserved credits taken at MSU);
- Credits awarded by postsecondary institutions for life experience;
- Credits awarded by postsecondary institutions for courses taken at non-collegiate institutions (e.g. government agencies, corporations, and industrial sponsored agencies);
- Credits awarded by postsecondary institutions for noncredit courses, workshops, and seminars offered by other postsecondary institutions as part of continuing education or professional development programs;
- Credits on an undergraduate transcript (undergraduate status);
- Credits used for completion of a degree at another institution.
Master's Examinations

Master’s Qualifying Examination
To test the student’s preparedness, a qualifying examination may be administered by the major department. The student usually takes the examination during the first year of attendance.

Master’s Comprehensive Examination
The major department may administer a comprehensive examination to assure that the student has attained sufficient mastery of their program of study, including sufficient knowledge of pertinent literature, academic background, training, and ability to conduct research. The student usually takes the examination during the second year of attendance.

Comprehensive examination and thesis defense
On thesis plans, the defense-of-thesis examination is also required. The comprehensive examination and the defense of thesis may be combined and offered at the same time.

Professional licensure/certification examinations
Examinations for professional licensure or certification may not be used for or in place of the comprehensive examination.

Minimum registration to take an examination
A student must be registered for a minimum of three (3) credits at MSU during the term in which an examination is taken.

If a student wishes to sit for the comprehensive exam during the intersession (i.e., the time between semesters), a student must be registered for a minimum of three (3) credits in the term prior to the intersession or the term immediately following the intersession.

Grading of the comprehensive examination
The comprehensive examination is graded with either a passing or failing grade determined by a majority committee vote. The student officially passes the examination when all concerns and deficiencies have been met and are deemed satisfactory by all Committee members.

Notice of results of the comprehensive examination
The Committee and department head are responsible for submitting written notice of the results of the comprehensive examination to the student and to The Graduate School no later than one (1) week after the examination is held or after each section is administered. If the written and oral sections are given at separate times, the results of each section must be reported in writing to the student and to The Graduate School no later than one (1) week after each section is completed by the student.

Failed Examination
A failure on any portion of the examination is considered to be a failed exam. A failed examination may be repeated one (1) time. At least two (2) months must elapse before the second examination may take place. Failure to pass a second examination results in termination of graduate study and dismissal from the academic program. Students who are dismissed from the program due to a failed comprehensive examination are ineligible to reapply to the same degree program at any time.

Invalid Examination
Examinations held in the absence of the chair or both individuals in case of co-chairs will be considered invalid and the exam will have to be rescheduled. The chair and/or co-chairs must be present throughout the entire examination.

All Committee members must be present at the comprehensive: Last minute Committee changes based on scheduling conflicts must be approved by The Graduate School.

It is the student’s responsibility to ensure that all Committee members are available when scheduling an exam. Examinations held with only two Committee members present will be invalidated.

Video conferencing during comprehensive exam
The Graduate School allows for students to video conference with committee members using the following requirements:

- Must be a two-way video
- Conference process is initiated and completed by the student and/or department
- All costs incurred are the responsibility of the department and/or student
- If communication is broken during the examination and cannot be retrieved, the examination must be terminated and rescheduled to a later time/date
- In the case of the student not being present with any other committee members, an approved proctor must be present at student’s location throughout the entire examination.

Defense of Thesis
On thesis plans, the defense-of-thesis examination is required. The comprehensive examination and the defense of thesis may be combined and offered at the same time.

Minimum credit registration to defend the thesis
A student must be registered for a minimum of three (3) credits at MSU during the term in which the thesis is defended.

If a student wishes to sit for the thesis defense during the intersession (i.e., the time between semesters), the student must be registered for a minimum of three (3) credits prior to the intersession or the term immediately following the intersession.

Scheduling the thesis defense
The last day to defend a thesis is on or before the published deadline (generally on or before the fourteenth 14th working day prior to the end of the semester.)

Advertising the defense
The following information may be published in The Graduate School “News and Announcements” Bulletin on The Graduate School website:

- a) the name of the candidate;
- b) title of the master’s thesis;
- c) time and place of defense; and
- d) the place where a copy of the thesis may be obtained for inspection.

Posting the above information is not mandatory for Master’s students.
Committee representation at the thesis defense
If a master’s student chooses to have more than the minimum of three members on his/her graduate committee, all members must be present at the comprehensive and/or the defense of thesis. Last minute committee changes based on scheduling conflicts must be approved by The Graduate School.

Invalid Defense of Thesis
A defense of thesis held in the absence of the chair (or both individuals in case of co-chairs) will be considered invalid and the exam will have to be rescheduled. The chair and/or co-chairs must be present throughout the entire defense. Examinations held with only two Committee members present will be invalidated.

Grading of the thesis defense
The defense of thesis is graded with either a passing or failing grade—determined by a majority committee vote. The student officially passes the defense when all concerns and deficiencies have been addressed and are deemed satisfactory by all Committee members.

One week notice of results of the thesis defense
The graduate committee and department head are responsible for providing written notice of the results of the defense to the student and to The Graduate School no later than one (1) week after the defense is held.

Failed defense
A failed defense may be repeated one (1) time. At least two (2) months must elapse before the second defense takes place. Failure to successfully pass the defense of thesis results in termination of graduate study and dismissal from the academic program. Students who are dismissed from the program due to failure to pass the defense are ineligible to reapply to the same degree program at any time.

Video conferencing during defense of thesis
The Graduate School allows for students to video conference with committee members using the following requirements:

- Must be a two-way video
- Conference process is initiated and completed by the student and/or department
- All costs incurred are the responsibility of the department and/or student
- If communication is broken during the examination and cannot be retrieved, the examination must be terminated and rescheduled to a later time/date
- In the case of the student not being present with any other committee members, an approved proctor must be present at student’s location throughout the entire examination

Doctoral Examinations

Doctoral Qualifying Examination
To test the student’s preparedness, a qualifying examination may be administered by the major department. The student usually takes the examination during the first year of attendance.

Doctoral Comprehensive Examination
The comprehensive examination is the major academic examination during doctoral study that assures that the student has attained sufficient mastery of their Program of Study, including sufficient knowledge of pertinent literature, academic background, training and ability to conduct research.

Written and oral comprehensive requirement
The comprehensive examination must be both written and oral. The comprehensive examination will be assessed by the committee formally approved as the student’s Graduate Committee by The Graduate School.

Minimum registration to take the comprehensive examination
A student must be registered for a minimum of three (3) credits at Montana State University during the term in which an examination or defense is taken.

Failed examination
If a student wishes to sit for the comprehensive exam during the intersession (i.e., the time between semesters), the student must be registered for a minimum of three (3) credits the term prior to the intersession or the term immediately following the intersession.

When to take the comprehensive examination
Two-thirds (2/3) of the course work required for a degree must be completed prior to sitting for the comprehensive exam.

Reporting the results of the comprehensive examination
The Committee and department head are responsible for submitting written notice of the results of the comprehensive examination to the student and to The Graduate School no later than one (1) week after the examination is held or after each section is administered. If the written and oral sections are given at separate times, the results of each section must be reported in writing to the student and to The Graduate School no later than one (1) week after each section is completed by the student.

Acceptable age of the comprehensive examination
The maximum time allowed between the comprehensive examination for the Ph.D. or Ed.D. and degree completion is five (5) years.

Failed examination
If the student fails the examination, at least six (6) months must elapse before the examination may be repeated. Failure to pass a second examination will result in termination of doctoral work and dismissal from the academic program. Students who are dismissed from the program are ineligible to reapply to the same degree program at any time.
Invalid examination

Written examinations not made available to the Graduate Representative or oral examinations held in the absence of the Graduate Representative and Chair(s) will be invalidated and must be rescheduled. The Graduate Representative must be included in the process as an impartial observer to ensure the examination is fair for the student, comprehensive in nature (e.g., includes both breadth and depth), and that it is conducted within the guidelines set by the university.

Video conferencing during comprehensive exam

The Graduate School allows for students to video conference with committee members using the following requirements:

- Must be a two-way video
- Conference process is initiated and completed by the student and/or department
- All costs incurred are the responsibility of the department and/or student
- If communication is broken during the examination and cannot be retrieved, the examination must be terminated and rescheduled to a later time/date
- In the case of the student not being present with any other committee members, an approved proctor must be present at student’s location throughout the entire examination
- All committee members approved by The Graduate School must be present at the comprehensive examination. Last minute committee changes based on scheduling conflicts must be approved by The Graduate School. It is the student’s responsibility to ensure that all committee members are available when scheduling an exam.

Defense of Dissertation

A defense covering the dissertation must be taken by all doctoral candidates. The defense usually consists of a public presentation and an oral examination of the candidate’s research focus and background.

Notification of the defense date

Each member of the examining committee must be given a minimum of one (1) week’s notification before the student’s final examination to read the draft of the dissertation. The dissertation defense will be arranged by the major professor and the graduate student, and is given before the final draft of the dissertation is completed. The defense is an oral examination only. Examinations in which any committee member has had insufficient time to prepare should not take place and may need to be rescheduled. The committee chair should discourage a student from defending if the chair (or the committee) feels the student is not adequately prepared.

Registration during the semester of the defense

A student must be registered for a minimum of three (3) credits at MSU during the term in which the defense is held.

Defense of dissertation deadlines

If a student wishes to hold their defense the semester of graduation, the defense must be held and passed at least fourteen (14) working days before the end of the term of graduation.

The “open” and “closed” defense

A portion of the defense must be open to the public. This is usually a presentation of the student’s research. Following the open portion of the defense, the committee chair will excuse all attendees other than committee members from the room. This begins the closed portion of the defense in which the student’s knowledge of the subject matter will be assessed by the committee.

Advertising the dissertation defense

The student and the academic department are responsible for supplying the following information for publication in The Graduate School “News and Announcements” on The Graduate School website:

- the name of the candidate,
- title of the doctoral dissertation,
- time and place of defense, and
- the place where a copy of the dissertation may be obtained for inspection.

The defense date must be advertised at least one (1) week prior to the actual defense date.

Reporting the defense results

The Dissertation Defense report must be submitted to The Graduate School no later than one (1) week after the defense is held. Failure to submit the report of the defense may invalidate the examination.

Failed defense of dissertation

If the student fails the defense, at least two (2) months must elapse before the examination is repeated. Failure to pass a second examination will result in termination of doctoral work and dismissal from the academic program. Students who are dismissed from the program are ineligible to reapply to the same degree program at any future time.

Invalid defense of dissertation

An examination held in the absence of the Chair(s) and/or the Graduate Representative will be considered invalid and must be rescheduled. The Graduate Representative must be included in the process as an impartial observer to ensure the examination is fair for the student, comprehensive in nature (includes both breadth and depth), and that it is conducted within the guidelines set by the University.

It is the student’s responsibility to ensure that all Committee members are available when scheduling an exam. All committee members approved by The Graduate School must be present at the defense of dissertation. Last minute committee changes based on scheduling conflicts must be approved by The Graduate School.

Video conferencing during defense of dissertation

The Graduate School allows for students to video conference with committee members using the following requirements:

- Must be a two-way video
- Conference process is initiated and completed by the student and/or department
- All costs incurred are the responsibility of the department and/or student
If communication is broken during the examination and cannot be retrieved, the examination must be terminated and rescheduled to a later time/date.

In the case of the student not being present with any other committee members, an approved proctor must be present at student’s location throughout the entire examination.

Commencement

Diplomas are dated the last day of the semester in which the requirements for the degree are completed. Degrees are conferred once a year at May commencement.

Eligibility to participate in commencement

 Montana State University allows only those graduate students who have completed all requirements for the degree (including all coursework, examination, and final papers) and who have applied to graduate by the deadline to participate in commencement exercises. Graduate students who will finish the degree the following August may walk through the May ceremonies only if they are utilizing the one credit extension and have documentation from their major advisor of the student’s assured completion of degree requirements by the one credit extension deadline.

Students who are unable to attend commencement must make special arrangements with the Registrar to have their diplomas mailed to them. Students who participate in commencement must purchase academic robes and hoods. These may be purchased from the MSU Bookstore, usually in February.

Students listed in Montana State University’s commencement book are those candidates who have identified themselves as eligible to graduate. The degree will not be awarded until all requirements for the advanced degree are met and the candidate has been certified to graduate by The Graduate School. Being listed in the commencement book does not imply completion of the degree.

Research at Montana State University

Research is one of the fundamental building blocks of the majority of the graduate work conducted at Montana State University. Most of the graduate degrees awarded require students to conduct original research which is then presented in theses, dissertations, or published articles. The Graduate School is fortunate to be associated with a number of outstanding research centers and programs on the Bozeman campus and beyond. The availability of faculty and facilities through the various centers and programs allows graduate students the opportunity to conduct research at the high level, in depth investigation of their subject of interest. The Research, Creativity & Technology Transfer website can be found at http://www.montana.edu/wwwv

- Brief descriptions of MSU’s Research Centers & Programs are available through the Research Creativity & Technology Transfer website at www.montana.edu/wwwvr/centers_programs.html.

Electronic Theses and Dissertations (ETDs):

- Students have had the option to post their theses and dissertations on the world wide web http://etd.lib.montana.edu/etd/view/ since Fall 2003. The Graduate School highly recommends that students submit their work in the electronic format for possible posting on the world wide web. The ETD initiative website is at www.montana.edu/etd/

- Complete copies of all MSU dissertations produced since 1996 are available in electronic format from http://wwvilb.umi.com/cr/montana/main/. This service is only available from computers with an appropriate MSU IP address.

Graduate Assistantships

General Information

Graduate assistantships are available in many academic departments. Prospective graduate students should contact their department of choice for information regarding assistantship availability. Non-degree graduate students are not eligible for graduate assistantships or tuition waivers.

Graduate Assistantship Appointment Forms do not constitute a contract of employment. Final appointment and continuation authority resides with The Graduate School.

Academic Year Guidelines:

- Graduate teaching and research assistants (GTA, GRA) must be enrolled for at least 6 credits/pay period.
- Graduate Student Assistants (GSA) must be enrolled in 3-5 credits per semester during the academic year.
- GSAs are not exempt from payroll taxes and must meet the same deadlines as GTAs and GRAs.
- Graduate Assistants work a minimum of 10 hours per week and a maximum of 20 hours per week during Fall and Spring semester.
- All GTAs and GRAs must carry a minimum of six credits during each semester they receive an assistantship.
- Graduate assistants may enroll in no more than twelve (12) semester credits if appointed to work more than fifteen (15) hours per week.
- Graduate assistants may enroll in up to fifteen (15) semester credits if appointed to work fifteen (15) or fewer hours per week.

Summer Guidelines:

- GRAs and GTAs must be enrolled in a minimum of six (6) credits during the summer sessions.
- GSAs can be enrolled in 0-5 credits during the summer session as long as they are continuing their graduate program from the spring semester.
- Summer Graduate Assistants appointed as GRAs, GTAS, or GSAs may work up to 40 hours per week. The minimum appointment is 10 hours per week.

Graduate Teaching Assistants (GTA)

Graduate Teaching Assistants are those graduate students who are involved in instruction, usually of undergraduates. Qualified GTAs perform instructional duties in an area of their expertise, most often within their home departments, although qualified GTAs may perform teaching duties outside their departments.
**General Duties Include:**
- Actual instruction in a classroom setting.
- Instruction in recitation sections.
- Conducting help sessions and holding office hours to advise students on class assignments.
- Assisting with laboratory setup.
- Grading papers, exams, laboratory reports, and homework, and
- Other duties pertaining to the instructional mission of MSU.

MSU faculty members oversee all GTA teaching duties. GTAs are usually assigned to work from 15 to 20 hours per week.

**GTA Requirements for International Graduate Students**
- The student must earn the minimum scores outlined below;
- The department also must certify that it has evaluated each student’s ability to successfully carry out teaching assignments.

**Minimum Scores**
- International students must also meet the minimum score requirements for the TOEFL or IELTS as listed below:
- Classroom teacher in charge of a class/section:
  - 580 TOEFL paper-based test or;
  - 237 TOEFL computer-based test or;
  - 93 TOEFL internet based test or;
  - 7.0 IELTS total band score.
- Lab assistant or discussion leader with another qualified GTA, or with a regular faculty member present in the classroom:
  - 565 TOEFL paper-based test or;
  - 225 TOEFL computer-based test or;
  - 86 TOEFL internet based test or;
  - 7.0 IELTS total band score.
- Test/paper grader, assisting with lab setup, or other non-student contact duties:
  - 550 TOEFL paper-based test or;
  - 213 TOEFL computer-based test or;
  - 80 TOEFL internet based test or;
  - 7.0 IELTS total band score
- International students must meet minimum English speaking scores:
  - Classroom teacher in charge of a class/section; lab assistant or discussion leader with another qualified GTA, or regular faculty member present in the classroom:
    - 50 TSE/SPEAK score or;
    - 26 TOEFL internet based speaking score or;
    - 7.0 IELTS speaking score.

**Graduate Research Assistants (GRAs)**
Research conducted by Graduate Research Assistants (GRAs) is a significant portion of the total sponsored research at MSU. GRAs often conduct research in a relevant area of their major course of study under the direction of a faculty member. GRAs are expected to work 15 to 20 hours per week.

The research is usually a component of the faculty advisors research that is directly supported by external funding. GRAs are generally expected to carry out a specific research project which often forms the basis for a thesis or dissertation.

**General Duties Include:**
- Performing experiments, calculations, and analyzing the results and disseminating new knowledge orally or in written publications.
- Reflecting on the state of the field and proposing new research problems.
- Attending conferences to present results and collaborate with other researchers.
- Training and supervising less experienced research personnel.

**Graduate Student Assistants (GSA)**
Graduate students appointed as Graduate Student Assistants may be involved in instruction and/or research usually in their area of expertise. GSAs assist faculty, departments, or other units in a variety of activities that are closely related to the student’s area of academic study and interest. Specific duties of GSAs may be similar or identical to GTAs and GRAs.

**Tuition Waiver General Information**
- Tuition Waivers do not waive the various fees attached to a student’s tuition and fee statement.
- Tuition waivers are available on a limited basis, and eligibility does not guarantee a tuition waiver.
- The Graduate School is not obligated to award tuition waivers based on promises made by departments.

**Student Deadlines for Tuition Waivers Awarded**
- Must be enrolled for all credits that will be waived no later than 5th class day.
- Must confirm attendance with student accounts no later than 5th class day, http://www.montana.edu/wwb/tstudentaccts.html

**Late Awarding Waivers**
- Tuition waivers awarded after the fifth class day are not guaranteed, and students may have to pay full tuition.

**Other Student Employment**
Graduate students may also hold employment in other capacities (i.e., student employment such as custodial, cafeteria help, tutoring, as well as classified, professional or adjunct positions). An individual who comes to MSU as a student may be employed primarily through a graduate teaching or research assistantship. However, students may also work as a student employee at Residence Life, University Food Services, ASMSU Tutoring, or apply for classified, professional and adjunct positions.

**Ethical and Professional Standards**
Faculty, administrators, supervisors, and others in positions of authority shall take care to maintain the highest ethical and professional standards in their interactions with students and employees.

For more information, contact the Affirmative Action office.
“Spirit.” Photo by Kelly Gorham.
COURSE DESCRIPTIONS

For the most up-to-date catalog information:
www.montana.edu/wwwcat

COURSE DESCRIPTION INFORMATION

Course offerings are subject to the availability of staff and adequate enrollment. Check the Schedule of Classes for the courses actually offered each semester.

Note: All of the public colleges and universities in Montana are participating in a common course numbering project. Ultimately, we will all use the same course numbers. During the transition period, the many of our course numbers and subject designations (rubrics) are changing. This will inevitably cause our printed catalog to become out of date as the rubrics and course numbers change. For current information, please refer to the online catalog available at www.montana.edu/wwwcat.

Numbering System
- 001-099 - courses below college level.
  No college credit given. Credits may not be counted toward a degree.
- 100-199 - Freshman - Lower Division
- 200-299 - Sophomore - Lower Division
- 300-399 - Junior - Upper Division
- 400-499 - Senior - Upper Division
  (Graduate courses with approval of student’s program committee)
- 500-599 - Graduate Courses
- 600-699 - Graduate Courses

Core 2.0 Courses
Core 2.0 courses are designated by a letter following the course number (e.g. CLS 101US). The following letters are used to specify the core groups:
- US - University Seminar
- W - College Writing
- Q - Quantitative Reasoning
- D - Diversity
- CS - Contemporary Issues in Science
- IA - Inquiry Arts
- IH - Inquiry Humanities
- IN - Inquiry Natural Science
- IS - Inquiry Social Science
- R - Research
- RA - Research Arts
- RH - Research Humanities
- RN - Research Natural Science
- RS - Research Social Science

Classification of Courses
In the second line of each course description, following the number of credits for the course, there appears a course classification designation which indicates the mode of instruction for that course. In some cases two classifications are listed along with the number of credits in each.

Following is an explanation of course classifications.
- LEC - Lecture: Presentation of course material by the instructor, utilizing the lecture method.
- LAB - Laboratory: Instructing and supervising students in laboratory investigations.
- STU - Studio: Instructing and supervising students in studio investigations.
- RCT/DIS - Recitation-Discussion: Presentation of course materials designed to involve students in recitation and/or discussion.
- SEM - Seminar: Students share, with the instructor, responsibility for preparation and presentation of course material.
- IND - Independent Study: Directed study and/or research on an individual basis, under supervision of instructor.

Graduate Credit
Courses which may be taken for graduate credit are designated by a 500 or 600 number. 400 level courses may also be for graduate credit with the approval of student’s program committee.

Uniform Course Numbers
Uniform numbers are used in all departments at the graduate level.
- 570 - Independent Study
- 575 - Graduate Research - Paper (professional paper or professional project)
- 576 - Internship
- 580 - Special Topics
- 588 - Professional Development
- 589 - Graduate Consultation
- 590 - Master’s Thesis
- 689 - Reading and Research
- 690 - Doctoral Thesis

Undergraduate and graduate courses may be repeated for credit. Specific titles of Special Topics courses are listed in the Schedule of Classes, on the Class Rolls and the student’s permanent record. Courses such as Special Topics, Independent Study and Internship are offered for varying amounts of credit, e.g. 1-5. A maximum number of credits is also imposed e.g., Maximum 6 cr. A student may repeat such courses to earn the maximum number of credits by registering for two or more projects with the credits for each project totaling the maximum allowed. If there is no stated maximum for Internship, then all earned credits will count toward graduation, but these credits will only count toward meeting degree requirements as determined by the student’s department. Credits earned beyond the stated maximum cannot be applied toward graduation.

Special Topics and Independent Study Courses
The maximum number of credits allowed toward graduation in special topic courses in each rubric is 12, and the maximum number of independent study credits in each rubric is six. Some departments have established lower limits than these, and the student is responsible for checking the specific course listings to see that he or she does not exceed the allowable number of credits. The maximum number of graduate independent study credits is applicable to a graduate degree depends upon the degree. No undergraduate independent study credits are applicable to a graduate degree.
COURSES OFFERED ON DEMAND

A course designated as “On demand” with a specific semester (i.e., F, S, Su) preceding this phrase means that the course will be offered that semester if there is sufficient demand.

Undergraduate courses designated as given “On demand” may be offered any semester in which there is a sufficient number of students who wish to register for the course. Usually undergraduate courses are offered at the request of 10 or more students.

Graduate courses listed “On demand” will be offered when a sufficient number of students have requested the course and faculty availability and budgets permit.

COURSES OFFERED ALTERNATE YEARS

Certain courses for which there is a small demand are offered every other year. The designation for such a course is: Semester (Alternate years, will be offered... dates...).

COURSE PREREQUISITES

Courses beyond the freshman year usually have “prerequisites.” This means that certain lower-level courses must be taken before the student may register for the advanced course. A grade of “C-” or better must be earned in all prerequisite courses to satisfy the requirement.

The prerequisite for undergraduate courses may be “consent of instructor.” The student must secure the consent of instructor of the course before registering for it. “Consent of instructor” is usually required for courses in which there is limited laboratory space and/or skills are required.

The Department of Mathematical Sciences enforces prerequisites. By University policy, in order for any course to serve as the prerequisite you must earn a “C-” or better. In addition to the specific prerequisite courses listed, students in 100 level math courses may also meet the prerequisite with the appropriate Math ACT, Math SAT, or Math Placement Exam score. Specific levels and scores for these courses can be found at: www.math.montana.edu/undergrad/documents/MHierarchy.pdf.

GRADUATE COURSE PREREQUISITES

Courses at the 500 and 600 levels may be taken only by qualified students.

Unless otherwise stated the courses are open only to:

1. Students with graduate standing (post baccalaureate students admitted to the College of Graduate Studies, enrolled in non-degree status or second bachelor’s degree candidates).

2. Seniors with a cumulative grade-point average of 3.25 or higher, and

3. Other seniors who have a petition approved by the head of the student’s major department, and the Dean of the College of Graduate Studies.

Some courses are limited to students with graduate standing or certain levels of graduate standing. These specific conditions are indicated within the course prerequisite or description statements.

Students below senior standing are not eligible to take graduate-level courses.

DEPARTMENTAL COURSE OFFERINGS

Find what courses each department offers. In addition to an actual description of the course, each listing includes course credit, mode of instruction and prerequisite, if any. While the semesters each course is offered are also shown (F-Fall Semester, S-Spring Semester, Su-Summer Session), consult the Schedule of Classes for the most up-to-date information on course availability.

COURSE EQUIVALENCY TOOL

(MONTANA UNIVERSITY SYSTEM COMMON COURSE CHANGES)

You can access the Course Equivalency tool at https://atlas.montana.edu:9000/pls/bzagent/msu_pk_sbw_cunint.P_DisP_CCNcw.

AGRICULTURAL ECON AND ECON

- courses in AGEC, ECNS

AGRICULTURAL EDUCATION

- courses in AGED, AGTE

AGRICULTURE

- courses in AGSC

ANIMAL AND RANGE SCIENCES

- courses in ANSC, ARNR, EQUH, EQUS, NRSM, WILD

ARCHITECTURE

- courses in ARCH

ART

- courses in ART, ARTH, ARTZ, GDSN

BIG SKY INSTITUTE

- courses in BSI

BIOLOGY

- courses in BIOB, BIOL, HORT, WILD

BUSINESS

- courses in ACTG, BFIN, BUS, FIN, MGMT, MKTG

CELL BIOLOGY AND NEUROSCIENCE

- courses in BIOC, BIOH, BIOO

CHEMICAL AND BIOLOGICAL ENGINEERING

- courses in CHBE, EBOI, ECHM, EGEN, EMAT

CHEMICAL ENGINEERING

- courses in EBOI, ECHM

CHEMISTRY AND BIOCHEMISTRY

- courses in BCH, CHMY

CIVIL ENGINEERING

- courses in CE, CET, ECIV, EENV, EGEN, EM, ENVE, ETC

COLLABORATIVE RESEARCH

- courses in CAA

COMPUTER SCIENCE

- courses in CAPP, CS, CSCI, SE

EARTH SCIENCES

- courses in BIOO, ERTH, GEO, GPHY

ECOLOGY

- courses in BIO, BIOE, BIOL, BIOUS, WILD

EDUCATION

- courses in EDCI, EDEL, EDLD, EDSD, EDU, HDCC, TE

ELECTRICAL AND COMPUTER ENGINEERING

- courses in EELE

ENGINEERING

- courses in EGEN, ENGR
COURSE DESCRIPTIONS: ACTG

English
- courses in ENGL, LIT, WRIT

Entomology
- courses in ENTO

Gallatin College Developmental Courses
- courses in COLS, M, WRIT

Gallatin College Workforce Program
- courses in ACTG, AH, AHMA, AHMS, AST, BIOH, CAPP, COMM, DE, DRFT, ETCC, ITS, M, MFTG, WLDG, WRIT

The Graduate School
- courses in DGED, MBSP, MSSE

Health and Human Development
- courses in DANC, EDEC, HDCF, HDCO, HDFP, HDHI, HDPE, HHD, LAC, NUTR, SFBS

Health Professions Advising
- courses in HIST

History and Philosophy
- courses in HIST, HSTA, HSTR, HUM, NASX, PHL, RLST, WS

Immunology and Infectious Diseases
- courses in ANSC, BIOB, BIOE, IMID, NRSM

International Programs
- courses in ICS

Land Resources and Environmental Sciences
- courses in AGSC, BIOM, BIOE, ENSC, GPHY, LRES, NRSM

Letters and Science
- courses in CLS, ICS, MOR, UNIV

Liberal Studies
- courses in AMST, LS

Libraries
- courses in LIBR

Mathematical Sciences
- courses in M, STAT

Mechanical and Industrial Engineering
- courses in EGEN, EIND, EMAT, EMEC, ETME, IG&ME

Microbiology
- courses in BIOB, BIOH, BIOM, MB, MBEH

Military Aerospace Studies
- courses in MAS

Military Science, Army
- courses in MSG

Modern Languages and Literatures
- courses in ARAB, CHIN, FRCH, GRMN, JPNS, ML, SPNS

Music
- courses in MUSE, MUSI, MUST

Native American Studies
- courses in NASX

Nursing
- courses in NRSG

Physics
- courses in ASTR, PHSX

Plant Sciences & Plant Pathology
- courses in AGSC, BIOB, BIOE, BIOL, BIOM, BIOO, HORT, PSPP, SFBS

Political Science
- courses in PSCI

Psychology
- courses in PSYX

School of Film and Photography
- courses in FILM, PHOT, THTR, MUST

Sociology and Anthropology
- courses in ANTY, RLST, SOCI

University Honors
- courses in UH

University Studies
- courses in COM, UC, US, USP

WWAMI/Medical Science
- courses in MEDS

COURSES SORTED BY SUBJECT CODES/RUBRICS

Courses are listed alphabetically by subject code. In addition to an actual description of the course, each listing includes course credit, mode of instruc-
tion and prerequisite, if any. While the semesters each course is offered are also shown (F-Fall Semester, S-Spring Semester, Su-Summer Session), consult the Schedule of Classes for the most up-to-date information on course availability.

ACTG

Accounting
formerly ACCT

ACTG 101 ACCOUNTING PROCEDURES I
Department of Workforce Programs
F 3 cr.
- The complete accounting cycle including creating source documents, journalizing transactions, posting to ledgers, preparing worksheets and basic financial statements including the income statement and balance sheet, end-of-period closing activities, payroll and special journals for both service and merchandising businesses.

ACTG 102 ACCOUNTING PROCEDURES II
S 4 cr.
- Continuation of Accounting Procedures I, additional topics covered include notes payable and notes receivable, valuation of receivables and uncollectible accounts, valuation of inventories, plant assets and depreciation, partnership accounting, corporate organization, capital stock, worksheets, taxes, dividends, and corporate bonds, statement of cash flows, and comparative financial statements.

ACTG 122 ACCOUNTING AND BUSINESS DECISIONS
S 3 cr.
PREREQUISITE: ACTG 101.
- Introduces the use of accounting information by managers to make operational and financial decisions in a business entity. Topics covered include selecting a financial entity, registering with the tax authorities, applying ethical behavior to professional situations, financial statement analysis, product cost allocation, cost behavior, and budgeting. The planning, organizing, and control functions of management will be consistently addressed throughout the course.

ACTG 125 QUICKBOOKS
S 3 cr.
- Studies QuickBooks, an accounting system for small-business owners and bookkeepers. Topics include creating a company, setting up company lists, editing a preset chart of accounts, entering opening balances, entering sales and invoices, receiving payments and making deposits, handling expenses and bills, working with bank accounts, analyzing financial data, tracking and paying sales tax, managing inventory, and preparing payroll.

ACTG 180 PAYROLL ACCOUNTING
F 4 cr.
Department of Workforce Programs
- Students will become knowledgeable in the payroll records required to comply with various federal and state laws affecting payroll. The Federal Fair Labor Standards Act and the Montana Wage/Hour laws are studied. Students will develop skills in actual payroll preparation. Activities include computing gross salaries, social security, federal and state income tax deductions, journalizing payroll transactions, posting to ledgers and preparation of federal and state payroll tax returns, and reports.
COURSE DESCRIPTIONS: ACTG

ACTG 201 PRINCIPLES OF FINANCIAL ACCOUNTING
F, S, Su 3 cr. LEC 3
PREREQUISITE: M 121 or M Placement Test.
- An introduction to the principles of financial accounting for students of all business curricula.
- Specific topics include key accounting concepts, accounting transaction recording, financial statement preparation, accounting systems overview, business entity structures and financial statement analysis.

ACTG 202 PRINCIPLES OF MANAGERIAL ACCOUNTING
F, S, Su 3 cr. LEC 3
PREREQUISITE: ACTG 201, and BMIS 211 as pre- or corequisite.
- An introduction to the principles of managerial accounting. The majority of the semester will address managerial accounting, the process of providing information to managers for use in planning, control and decision making. Managerial accounting topics include product costing, cost-volume-profit analysis, budgeting, variance analysis, and decision analysis tools. The managerial accounting coverage will be preceded by a brief continuation of study of selected principles of financial accounting.

ACTG 205 COMPUTERIZED ACCOUNTING
S 3 cr.
- Studies how computers are used in today's accounting environments through the use of an integrated accounting software package. Uses a hands-on approach to complete the accounting cycle for merchandise or service businesses as well as entries for voucher systems, departmentalized accounting, financial statement analysis, depreciation, inventory, and payroll.

ACTG 220 SURVEY OF ACCOUNTING
On Demand 3 cr. LEC 3
- A survey of the basic accounting model, accounting records, recording business transactions, preparation and analysis of financial statements, and elementary income tax issues in a small business environment. This course is intended for non-business majors and may not substitute for any required business course.

ACTG 223 PRINCIPLES OF FINANCIAL ACCOUNTING II
F, S 3 cr. LEC 3
PREREQUISITE: ACTG 201.
- A continuation of the financial accounting topics introduced in ACTG 201. The course helps students learn how to prepare and analyze financial statements, and understand the role that accounting plays in business decisions. Additional topics include: stock and bond investments, cash flow reporting, and a study of the conceptual framework and process by which accounting standards are established.

ACTG 290R UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F, S 1-6 cr. IND. May be repeated.
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

ACTG 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering.
- Course(s) not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ACTG 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND. Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of Associate Dean.
- Directed research and study on an individual basis. Not to be used as a substitute for a required course.

ACTG 321R ACCOUNTING INFORMATION SYSTEMS
S 3 cr. LEC 3
PREREQUISITE: ACTG 223 or consent of instructor.
- For business majors: Formal admission to the College of Business.
- A study of how organizations capture, record, store, protect, analyze, and report accounting information. Topics include business processes, transaction processing, internal controls, data security, system documentation, information technology, and software applications.

ACTG 327 INTERMEDIATE FINANCIAL ACCT & REPORTING I
F, S 3 cr. LEC 3
PREREQUISITE: ACTG 223 or consent of instructor.
- For business majors: Formal admission to the College of Business.
- An in-depth study of the theory of financial accounting and reporting and its application to: cash, current and long-term receivables, inventories, plant assets, natural resources, intangible assets, asset impairments, current liabilities, long-term debt, and contingencies. Fair value concepts, present value measurements, and comparisons between US and international accounting standards will be incorporated.

ACTG 328 INTERMEDIATE FINANCIAL ACCT & REPORTING II
F, S, 3 cr. LEC 3
PREREQUISITE: ACTG 327. For business majors: Formal admission to the College of Business.
- The theory and practice of financial accounting and reporting. A study of stockholders' equity, dilutive securities, earnings per share, investments, revenue recognition, deferred income taxes, pensions, leases, accounting changes, error analysis, the statement of cash flows and full disclosure in financial accounting.

ACTG 401 PRINCIPLES OF FED TAXATION-INDIVIDUALS
F 3 cr. LEC 3
PREREQUISITE: ACTG 202 or ACTG 223.
- For business majors: Formal admission to the College of Business.
- Federal income taxes as applied to individuals and their businesses with emphasis on income and expense recognition, individual taxation, property transactions, investments, compensation, retirement, home ownership, tax research and tax return preparation.

ACTG 410 COST/ MGMT ACCT I
F 3 cr. LEC 3
PREREQUISITE: ACTG 327 and ACTG 292. For business majors: Formal admission to the College of Business.
- Focus on cost accounting concepts, with emphasis on developing and evaluating information that management needs to plan, make key decisions, and monitor business performance. Key topics include cost typology and behavior and how each impacts decision-making process and product costing, cost-volume-profit analysis, flexible budgeting, incremental decision analysis, and performance evaluation.

ACTG 411 AUDITING I
F 3 cr. LEC 3
PREREQUISITE: ACTG 328 or consent of instructor.
- For business majors: Formal admission to the College of Business.
- Practice and theory of auditing financial statements. A study of most of the major activities performed during the conduct of a financial statement audit, from client acceptance to issuance of an audit report.

ACTG 415 GOVERNMENT & NONPROFIT ACCOUNTING I
S 3 cr. LEC 3
PREREQUISITE: ACTG 328. For business majors:
- Formal admission to the College of Business.
- A study of the accounting principles and financial reporting unique to the governmental and not-for-profit sectors of the U.S. economy.

ACTG 420 COST/ MGMT ACCT II
S 3 cr. LEC 3
PREREQUISITE: ACTG 410. For Business majors:
- Formal admission to the College of Business.
- Advanced topics in cost/managerial accounting. This course examines cost and managerial accounting issues from both technical and applied perspectives. Students will utilize cost accounting and decision analysis tools to evaluate the impacts of managerial decision making.

ACTG 421 ACCOUNTING INFORMATION SYSTEMS II
On Demand 3 cr. LEC 3
PREREQUISITE: Junior standing and completion of ACTG 321R or BMIS 311. For business majors:
- Formal admission to the College of Business.
- Contemporary issues in information systems. Emphasis on the practical application of information technology to improve business efficiency and effectiveness.

ACTG 431 TAX ASSISTANCE
S 1 cr. LAB 1
PREREQUISITE: ACTG 401. For business majors:
- Formal admission to the College of Business.
- Development of knowledge, skills, and organizational methods needed to prepare Federal and State income tax returns. Preparation of income tax returns for low-income clients through the Volunteer Income Tax Assistance Program.

ACTG 436 ADVANCED ACCOUNTING
On Demand 3 cr. LEC 3
PREREQUISITE: ACTG 328. For business majors:
- Formal admission to the College of Business.
- The theory and practice of financial accounting and reporting pertaining to business combinations and consolidated financial statements, accounting for partnerships and related business forms, foreign currency transactions and financial statement translations, and other advanced accounting topics.

ACTG 441 FINANCIAL STATEMENT ANALYSIS
F 3 cr. RCT 3
PREREQUISITE: ACTG 327. For business majors:
- Formal admission to the College of Business. Cross-listed with BFN 441.
- Analysis with emphasis on how managers' investing and financing decisions have financial statement implications. Coverage includes: revenue-recognition methods, cash flow analysis, ratios, inventory analysis, capitalizing vs. expensing, depreciation, leasing vs. buying, and overall financial health and earnings quality of the firm.
ACTG 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

ACTG 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering. For business majors: Formal admission to the College of Business.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ACTG 492 INDEPENDENT STUDY
On Demand 1-6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: For business majors: Formal admission to the College of Business.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Not to be used as a substitute for a required course.

ACTG 494 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering. For business majors: Formal admission to the College of Business.
- Topics offered at the upper division level that are not covered in regular courses. Students participate in preparing and presenting discussion material.

ACTG 498 INTERNSHIP
On Demand 2 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: Formal admission to the College of Business and consent of the instructor.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

ACTG 514 FRAUD EXAMINATION
On demand 3 cr. LEC 3
PREREQUISITE: ACTG 411 and admission to MPAc Program or consent of instructor.
- An overview of fraud examination, including the extent and nature of fraud, motivations of perpetrators, fraud symptoms, legal issues, as well as methods of detection, investigation, and prevention of various asset misappropriation schemes and fraudulent financial statements.

ACTG 515 PROFESSIONAL SERVICES MANAGEMENT
On demand 3 cr. LEC 3
PREREQUISITE: Admission to the MPAc program or consent of instructor.
- This course is designed to expose students to the internal operations and client management efforts of professional service organizations and providers, with a particular focus on accounting firms. Topics include managing service relationships, service firm structure and the service-profit chain.

ACTG 521 ADVANCED AUDITING
S 5 cr. LEC 3
PREREQUISITE: ACTG 411 and admission to MPAc Program.
- An in-depth analysis of contemporary auditing and assurance theory, statistical sampling, internal control, and audit evidence.

ACTG 524 INTERNATIONAL ACCOUNTING
On Demand 3 cr. LEC 3
PREREQUISITE: ACTG 328 and admission to MPAc Program.
- Introduction to international accounting with special emphasis on four major topics: 1) accounting systems as expressions of cultural, political, and ideological forces, 2) comparative international accounting patterns, 3) efforts to harmonize international accounting standards world wide, and 4) accounting issues faced by multinational corporations.

ACTG 525 ACCOUNTING THEORY AND COMPLEX ISSUES IN ACCOUNTING
F 3 cr. LEC 3
PREREQUISITE: ACTG 328 and Admission to MPAc Program.
- A study of complex financial accounting issues and the underlying theoretical rationale. Key topics include derivative financial instruments, hedge accounting, elements of the other comprehensive income, sale-leaseback transactions, consignment accounting, and troubled debt restructurings.

ACTG 526 ADVANCED TAXATION
S 3 cr. LEC 3
PREREQUISITE: ACTG 401 and admission to MPAc Program or consent of instructor.
- Study of the federal tax law and its application to business entities. Emphasis is placed upon planning techniques for minimizing estate and gift taxes and providing liquidity for their payment.

ACTG 527 ESTATE & GIFT TAXATION
On Demand 3 cr. LEC 3
PREREQUISITE: ACTG 401 and admission to MPAc Program or consent of instructor.
- Study of the federal estate and gift tax laws and their application to individuals, partnerships, limited liability companies, and other business entities. In addition, the laws applicable to estates and trusts, state taxes and multi-jurisdictional issues are explored. Tax reporting, tax planning, and tax research skills are emphasized.

ACTG 528 LEGAL ISSUES FOR ACCOUNTANTS
S 3 cr. LEC 3
PREREQUISITE: EGEN 361 or equivalent and admission to MPAc Program.
- Analysis of legal issues for accounting students, including debtor/creditor law, bankruptcy, securities regulation, antitrust, employment regulation, uniform commercial code and real property. Course includes significant written work and oral presentations.

ACTG 529 RESEARCH IN ACCOUNTING
F 3 cr. LEC 3
PREREQUISITE: ACTG 328 and admission to MPAc Program.
- A project-oriented seminar that focuses on developing tools for researching, developing and communicating defensible solutions to accounting issues and problems of the type likely to be encountered throughout a professional career in accounting.

ACTG 530 TAX RESEARCH AND PLANNING
F 5 cr. LEC 3
PREREQUISITE: ACTG 401 and admission to MPAc program or consent of instructor.
- Tax problem solving through study and application of tax research, planning methods, and techniques, as well as, development of tax practitioner communication skills.

ACTG 531 TAX PRACTICUM
S 3 cr. LEC 3
PREREQUISITE: ACTG 401 and concurrent enrollment in ACTG 526 or consent of instructor.
- How the broad principles of taxation affect individuals, corporations, partnerships, Scorporations, estates, and trusts. Students apply their knowledge by assisting low income individuals with their tax returns as part of the Volunteer Income Tax Assistance Program.

ACTG 532 GOVERNMENT AND NONPROFIT ACCOUNTING II
On Demand 3 cr. LEC 3
PREREQUISITE: ACTG 415 and admission to MPAc Program or consent of instructor.
- An in-depth study of the uniquely different characteristics of accounting and financial reporting for the governmental and not-for-profit sectors of the U.S. economy.

ACTG 536 ADVANCED ACCOUNTING
F 3 cr. LEC 3
PREREQUISITE: ACTG 328 and admission to MPAc Program or consent of instructor.
- The theory and practice of financial accounting and reporting pertaining to business combinations and consolidated financial statements, accounting for partnerships and related business forms, foreign currency transactions and financial statement translations, and other advanced accounting topics.

ACTG 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
On Demand 1 - 4 cr. IND
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

ACTG 589 GRADUATE CONSULTATION
F, S, Su 1-3 cr. IND
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their course work (and Thesis if on a Thesis Plan) but who need additional faculty or staff time or help.

ACTG 591 SPECIAL TOPICS
On Demand 1 - 4 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ACTG 592 INDEPENDENT STUDY
On Demand 1-5 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of Associate Dean and Dean of Graduate Studies.
- Directed research and study on an individual basis.

ACTG 594 SEMINAR
On demand 1 cr. SEM 1
PREREQUISITE: Admission to the MPAc program.
- Topics offered at the graduate level that are not covered in regular graduate courses. Students participate in preparing and presenting discussion material.
ACTG 598 INTERNSHIP
On Demand 1-3 cr. IND
PREREQUISITE: Graduate standing and consent of instructor.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

AGBE
Agricultural Business & Economics
undergraduate level only; see AGEC for graduate

AGBE 210S THE ECONOMICS OF AGRICULTURAL BUSINESS
S 3 cr. LEC 3
PREREQUISITE: ECNS 101.
- This course provides an introduction to marketing, trade, risk, strategic resource, and financial management of farms/ranches and agribusiness firms in the domestic and global economy. Basic economic principles will be applied to farm/ranch and agribusiness management, marketing, and international agricultural trade issues.

AGBE 290R UNDERGRADUATE RESEARCH
F, S, Su 1-8 IND
PREREQUISITE: AGEC 204 and consent of instructor.
- Intended for lower division undergraduate research/undergraduate scholars program. The student will work closely with the supervising faculty. Course will address responsible conduct of research.

AGBE 291 SPECIAL TOPICS
F, S 1-3 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

AGBE 292 INDEPENDENT STUDY
On Demand 1-3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

AGBE 295S AGRICULTURAL LAW
F, S 3 cr. LEC 3
PREREQUISITE: Junior standing.
- Application of general principles of law to ownership and operation of farming business and its relationship with other agribusiness firms, government agencies and people.

AGBE 319A FARM & RANCH MANAGEMENT
S 3 cr. LEC 3
PREREQUISITE: ECNS 204 or ECNS 251 and ECNS 309.
- Basic tools of economic decision making useful to farm and ranch managers are examined.

AGBE 345 AGRICULTURAL FINANCE & CREDIT ANALYSIS
F 3 cr. LEC 3
PREREQUISITE: ECNS 204 or ECNS 251.
- Alternatives available to farmers for acquiring and maintaining control over resources used in agriculture. Emphasis is on the management of cash, credit, debt, taxes, and interest in relation to agricultural price levels and general economic conditions. Cross-listed with ECNS 345.

AGBE 394 SEMINAR
F, S 1-2 cr. SEM 1-2
PREREQUISITE: Junior standing.
- Current agricultural problems and writings of people in the profession. Topics vary each semester; check with the department before registering.

AGBE 412 ADVANCED AGRICULTURAL MARKETING
S, to be offered alternate years, starting 2012 3 cr. LEC 3
PREREQUISITE: AGBE 321.
- Economic analysis of current issues in agricultural marketing including market structure, risk, and efficiency; commodity promotion; futures and options markets; price forecasting; and retained ownership options.

AGBE 445 AGRIBUSINESS MANAGEMENT
S, to be offered alternate years, starting 2013 3 cr. LEC 3
PREREQUISITE: ECNS 301, STAT 216, and either ABGE 345 or FIN 352.
- Senior capstone course. Students are expected to use tools and concepts developed in earlier course work to address typical problems faced by agribusiness and agricultural producers. Case studies modified from actual situations are used extensively.

AGBE 591 SPECIAL TOPICS
On Demand 1-4 cr. LEC Maximum 12 cr.
PREREQUISITE: Graduate standing and consent of instructor.
- Directed research and study on an individual basis.
AGED 253 AGRICULTURAL EDUCATION IN PUBLIC SCHOOLS
S 3 cr. LEC 3
PREREQUISITE: AGED 140/US and HADC 150BS
- Establish a philosophy of agricultural education at the secondary, middle school, and elementary level. Instructional content in agricultural science, mechanics, and leadership will be identified. Principles needed in developing agricultural experiences associated with agricultural education will be presented.

AGED 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND. May be repeated.
PREREQUISITE: Consent of instructor.
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

AGED 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Consent of instructor.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

AGED 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

AGED 294 SEMINAR
On Demand 1-2 cr. SEM 1 Maximum 6 cr.
PREREQUISITE: Consent of instructor.
- Topics offered at the lower division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

AGED 301 RURAL ELECTRIFICATION
S 3 cr. LEC 2 LAB 1
- This course will cover the basic wiring requirements for farm buildings and agricultural electrical motors. An emphasis is placed on application and trouble shooting. Alternative power generation methods are also discussed.

AGED 307 NON FORMAL TEACHING METHODS IN AGRICULTURE
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EDU 223.
- Designed to introduce prospective county extension educators to fundamental philosophy, activities, and educational and planning methods under girding the Cooperative Extension Service. Identification of educational and program needs in order to provide instructional programs for rural and urban youth and adults.

AGED 312R COMMUNICATING AGRICULTURE
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: AGED 140, and WRIT 101W.
- Designed to serve students in Agricultural Education, Relations Option and related fields, or any agricultural student who may have a communication component as part of their career.

AGED 333 CONSTRUCTION TECHNOLOGY
F 3 cr. LEC 1 LAB 2
- Various construction systems that are used to construct structures on site. Includes all aspects of the construction industry such as basic planning, materials, estimating, building techniques, managing, and the actual construction of building projects.

AGED 353 COOPERATIVE BUSINESS PRINCIPLES AND PRACTICES
F 3 cr. LEC 3
- The course will acquaint students with cooperatives and the cooperative way of doing business. Students will learn the role of cooperatives in marketing, bargaining, purchasing, and service. Cooperative business decision making will be emphasized throughout the course.

AGED 397 EDUCATIONAL METHODS IN AGRICULTURE
F 1 cr. LAB 1
COREQUISITE: To be taken concurrently with EDU 497.
- Provides additional experience in planning, teaching, and evaluating lessons in agricultural education.

AGED 422 INTERNATIONAL EXTENSION SYSTEMS
S 3 cr. LEC 3
PREREQUISITE: Consent of instructor and approval of department head.
- Designed to introduce prospective county extension educators to fundamental philosophy, activities, and educational and planning methods under girding the Cooperative Extension Service. Identification of educational and program needs in order to provide instructional programs for rural and urban youth and adults.

AGED 426 INTERNATIONAL EXTENSION SYSTEMS-STUDY ABD
S 1 cr. SEM 1
- Optional one-credit study abroad component to accompany AGED 462. Students must be enrolled in AGED 462 in the same semester.

AGED 475 PROFESSIONAL PAPER
On Demand 1 - 4 cr. IND
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

AGED 482 NON FORMAL TEACHING METHODS IN AGRICULTURE
F 3 cr. LEC 2 LAB 1
PREREQUISITE: Junior standing.
- Non-Formal Teaching Methods in Agricultural education is a course designed for senior and graduate level students in Agricultural Relations and other majors who will be designing, implementing and evaluating learning through Cooperative Extension and/or other careers. Graduate teaching assistants may also take this course to aid in developing their teaching skills. The course covers theories, principles and practices associated with effective non-formal teaching and learning for adult education as well as non-adult educational settings such as 4-H meetings, conferences, and conventions. The lab provides additional experience in planning, teaching, and evaluating lessons/seminars in the non-formal educational setting.

AGED 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

AGED 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

AGED 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

AGED 494 SEMINAR
On Demand 1 - 2 cr. SEM Maximum 6 cr.
PREREQUISITE: Junior standing and as determined for each offering and consent of instructor.
- Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

AGED 498 INTERNSHIP
On Demand 2 - 8cr, IND
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field of Agricultural Education.

AGED 506 RESEARCH METHODS
F 5 cr. LEC 5
PREREQUISITE: Consent of instructor and approval of department head.
- Principles and techniques of research appropriate for planning, conducting and reporting agricultural and extension education research.

AGED 507 PROGRAM PLANNING & EVALUATION
S,Su 5 cr. LEC 5
PREREQUISITE: Graduate standing.
- A study of the literature on specific facets of program planning and evaluation applicable to agricultural and extension education. Application of program planning and evaluation concepts through individual and class projects.

AGED 510 THE SCIENCE OF NUTRITION: AGRICULTURAL LITERACY IN MONTANA SCHOOLS
Su 2 cr. LEC 2 Maximum credits unlimited.
PREREQUISITE: Montana Teacher Certification.
- Integrating factual and scientific educational material from all areas of agriscience into the Montana elementary and middle school curriculum.

AGED 562 INTERNATIONAL EXTENSION SYSTEMS
S 3 cr. LEC 3
PREREQUISITE: Graduate standing and permission of instructor.
- This course focuses on a broad range of extension education topic areas which impact agriculture and rural community development. The primary purpose is to further students’ understanding about extension systems influence on agricultural and rural development in the world. An analysis of case studies in International Extension will be a focus of this graduate course.

AGED 575 PROFESSIONAL RESEARCH PAPER
On Demand 1-4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate Standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student, the major advisor, and graduate committee.

AGED 589 GRADUATE CONSULTATION
F, S, Su 3 cr. IND
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their coursework (and thesis, if on a thesis plan), but who need additional faculty or staff time or help.
AGED 590 - MASTER'S THESIS
S,F,SU 1-10 cr.
PREREQUISITE: Master’s Standing.

AGED 591 - SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

AGED 592 - INDEPENDENT STUDY
S,F,SU 1-6 cr. IND 1-6
PREREQUISITE: Graduate Standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Direct research and study on an individual basis.

AGED 594 - SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

AGED 598 - INTERNSHIP
S,F,SU 2-12 cr. IND 2-12
PREREQUISITE: Graduate Standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

AGSC
Agricultural Science
formerly parts of AG, LRES, & PSPP

AGSC 101 - INTRODUCTION TO AGRICULTURAL & ENVIRONMENTAL RESOURCES
Department of Agriculture
F 1 cr. LEC
PREREQUISITE: Freshman or New Transfer Students
- This course is optional but all freshmen in the College of Agriculture are strongly encouraged to enroll. Students taking this course will be introduced to all areas of the very broad field of agriculture, including all department programs and areas of specialty, career opportunities, professionalism, history, and ethics.

AGSC 291 - SPECIAL TOPICS
Department of Agriculture
On Demand Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

AGSC 292 - INDEPENDENT STUDY
Department of Agriculture
On demand 1-5 cr IND
PREREQUISITE: Consent of instructor and approval of department head.

AGSC 341 - FIELD CROP PRODUCTION
Department of Plant Sciences & Plant Pathology
S 3 cr. LEC, even years only
PREREQUISITE: BIOL 1100CS.
- Production of field crops using practical and applied crop management principles. Emphasis includes understanding of crop management principles and application of problem solving capabilities to field crop management situations.

AGSC 342 - FORAGES
Department of Plant Sciences & Plant Pathology
F 3 cr. LEC
PREREQUISITE: BIOL 1100CS.
- Principles of applied forage crop management including establishment, irrigation, fertilization, pests, harvesting, and forage integration of many legume and grass species.

AGSC 401 - INTEGRATED PEST MANAGEMENT
Department of Land Resources & Environmental Sciences
F 3 cr. LEC
PREREQUISITE: BIOL 262; and one of the following: BIOL 100 or BIOL 170 or consent of instructor.
- This course focuses on conceptual approaches to integrated pest management. The overall framework will be the effective production of foodstuffs to meet increasing demands for safe and healthy commodities for consumers. By integrating multiple tactics, the production of food can be optimized given the current limitations to traditional “silver bullet” pest management. Material covered will include the definitions of IPM terminology as applied to weed, arthropod, and microbial pests; management tactics including biological, cultural, and chemical controls; host plant resistance and genetic modifications; sample case studies; applicability to specialized production systems.

AGSC 428 - SUSTAINABLE CROPPING SYSTEMS
Department of Land Resources & Environmental Sciences
S 3 cr. LEC, odd years only
PREREQUISITE: ENV 245 and either AGSC 341 or AGSC 342, or consent of instructor.
- The course goal is to elevate agricultural students’ awareness of peer-reviewed literature that demonstrates application of principles to address issues of sustainability in agriculture. The course will use a student-led discussion format to highlight issues and principles in review of a series of papers that the class will read. The course will focus on the interaction among agronomy, ecology, economics, and sociology to create an awareness of the interdisciplinary issues associated with sustainability in agriculture. Students will explore causes and solutions to rural, economic poverty holistically by discovering the interconnections of health, agriculture, and governance. Students will gain skills appropriate to their own academic major to provide leadership in alleviating poverty worldwide. Students will conduct service-learning, community-based research with guided mentoring using the holistic process.

AGSC 492 - INDEPENDENT STUDY
Department of Agriculture
On demand 1-3 cr. IND; max 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

AGTE
Agricultural Technology
formerly part of AGED

AGTE 355 - POWER SYSTEMS OPERATIONAL CONTROL
Department of Agriculture Education
F 3 cr. LEC LAB
PREREQUISITE: Te 207 or equivalent.

AH
Applied Health

AH 140 PHARMACOLOGY
F 2 cr. LEC 2
- General principles of drug action on multiple body systems, pharmacology of the major drug classifications, and drug side effects as well as basic concepts of mathematics used in the calculation, preparation, and administration of various medications.
AMST 101D INTRODUCTION TO AMERICAN STUDIES
F 3 cr. LEC 2 LAB 1
-Introduction to the field of American Studies and to major issues in American history, literature, and the arts.

AMST 292RA THE ARTS IN AMERICA
F, S 3 cr. LEC 2 RCT 1 to be offered even years.
PREREQUISITE: WRIT 101W.
- Uses the methodologies of American Studies to question the history, theory, and criticism of various American art forms and movements. Disciplines covered include: film, photography, television, sculpture, painting, architecture, and music.

AMST 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

AMST 401R SEMINAR IN AMERICAN STUDIES
S to be offered even years 4 cr. SEM 4
PREREQUISITE: AMST 501.
- Capstone course in American Studies. Students will research and design solutions to contemporary problems in American Society.

AMST 501 METHODS IN AMERICAN STUDIES
F 3 cr. SEM 3
- Introduction to major trends in American Studies scholarship, with a particular focus on American Studies in an international context. The course will also introduce students to the range of scholarship in the American Studies program.

AMST 502 RESEARCH AND WRITING IN AMERICAN STUDIES
F, S 3 cr. SEM 3
PREREQUISITE: AMST 501.
- Graduate research and advanced readings in American Studies.

AMST 590 MASTER’S THESIS
F, S 3 cr. Maximum 8 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Vice Provost of Graduate Education.
- Directed research and study on an individual basis.

AMST 592 INDEPENDENT STUDY
On Demand 1 - 4 cr. IND Maximum 8 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Vice Provost of Graduate Education.
- Directed research and study on an individual basis.

AMST 594 SEMINAR
F 4 cr. SEM 1
PREREQUISITE: Graduate standing.
- Graduate level topics which are not covered in other courses. Students will prepare and present discussion material.

ANSC 100 INTRODUCTION TO ANIMAL SCIENCE
S 3 cr. LEC 5
- Introductory Animal Science includes basic principles of animal genetics, nutrition, live animal evaluation, reproduction, and their application to the production of beef and dairy cattle, sheep, swine, horses, and poultry.

ANSC 205 INTRODUCTION TO MEAT EVALUATION
F 2 cr. LAB 1
PREREQUISITE: ANSC 100.
- Techniques for the evaluation of carcasses. Procedures include U.S. grading standards, introduction to carcass pricing and objective carcass measurements.

ANSC 215 CALVING MANAGEMENT
S 2 cr. LEC 1 LAB 1
PREREQUISITE: ANSC 100 or consent of instructor.
- Procedures to correctly identify calving problems and subsequently assist the birthing process and application of techniques to maximize calf survival.

ANSC 222 LIVESTOCK IN SUSTAINABLE SYSTEMS
S 3 cr. LEC 5
PREREQUISITE: Sophomore standing and ANSC 100 is recommended, or consent of instructor.
- The role of livestock in balanced sustainable and organic systems will be explored with a primary focus on incorporating targeted grazing into farming systems. The principles of sustainable animal production and the regulations associated with organic animal production will be presented.

ANSC 232 LIVESTOCK MANAGEMENT: SHEEP
S 1 cr. LAB 1
PREREQUISITE: ANSC 100.
- Management practices associated with farm flock and range sheep enterprises.

ANSC 234 LIVESTOCK MANAGEMENT: BEEF
S 1 cr. LAB 1
PREREQUISITE: ANSC 100.
- Hands-on laboratories to familiarize students with the principles of beef cattle handling and management.

ANSC 265 ANATOMY AND PHYSIOLOGY OF DOMESTIC ANIMALS, LECTURE
F 3 cr. LEC 3
PREREQUISITE: BIOL 160, Sophomore standing.
COREQUISITE: ANSC 266
- The lecture defines and identifies the organization of cell types into tissues and organ systems. The lecture explains the physiology of organ systems in domestic farm animals.
ANSC 266 FUNCTIONAL ANATOMY OF DOMESTIC ANIMALS LAB
F 1 cr. LAB 1.
PREREQUISITE: BIOL 160, Sophomore standing.
COREQUISITE: ANSC 265
- Location, structure and identification of various tissues, organs, and systems of domestic animals through dissection of cadaver animals. Lab utilizes ruminants and monogastric species.

ANSC 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

ANSC 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ANSC 292 INDEPENDENT STUDY
On Demand 1-4 cr. Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

ANSC 305 ADVANCED MEAT EVALUATION
F 2 cr. LEC 2
PREREQUISITE: ANSC 205 or consent of instructor.
- Advanced skills in carcass evaluation, U.S. grading standards, and carcass pricing.

ANSC 308 LIVESTOCK EVALUATION
F 2 cr. LAB 2
PREREQUISITE: ANSC 241 and ANSC 265, or consent of instructor.
- Techniques and experience in live animal evaluation. Practical use of production data and other evaluation techniques.

ANSC 316 MEAT SCIENCE
S 4 cr. LEC 3 LAB 1
PREREQUISITE: ANSC 100 and BIOL 160 and CHMY 121.
- The meat industry within North America and beyond will be discussed. Live animal evaluation, pricing and carcass evaluation will be discussed. The class will include an explanation of muscle structure and function and its effect on tenderness and functionality.

ANSC 320 ANIMAL NUTRITION
F 4 cr. LEC 3 LAB 1
PREREQUISITE: ANSC 100, ANSC 265/266 and CHMY 121 or consent of instructor.
- Digestion and metabolism of nutrients, nutrient requirements, feed composition, diet formulation, and practical feeding of various classes of domestic animals.

ANSC 321 PHYSIOLOGY OF ANIMAL REPRODUCTION
F 4 cr. LEC 3 RCT 1
PREREQUISITE: ANSC 265/266.
- A study of the anatomy and physiology of reproduction of vertebrates with major emphasis on mammalian domestic animal and wildlife species. This class introduces students to emerging concepts and current technologies for altering reproductive efficiency in a variety of animal species, including humans.

ANSC 322 PRINCIPLES OF ANIMAL BREEDING AND GENETICS
S 3 cr. LEC 3
PREREQUISITE: ANSC 100, BIOL 160, and either STAT 216 or STAT 332 or PSIP 318.
- Genetic improvement of farm animals through performance testing, methods of selection, and application of mating systems such as crossbreeding.

ANSC 337 DISEASES OF DOMESTIC LIVESTOCK
S 3 cr. LEC 3.
PREREQUISITE: ANSC 265/266.
- This course is structured to familiarize students with the common diseases of domestic livestock. Infectious and non-infectious diseases of horses, cattle, sheep and swine will be covered. Particular emphasis will be placed on regional diseases.

ANSC 395 FIELD EXPERIENCE: LIVESTOCK
On Demand 1 cr. LAB 1
PREREQUISITE: ANSC 100 and junior standing.
- Exposure of students to livestock operations and related business enterprises in different geographical locations. One three-day field trip. Graded P/F.

ANSC 408 ADVANCED LIVESTOCK EVALUATION
F, S 3 cr. LEC 3
PREREQUISITE: ANSC 265/266 or equivalent.
- Advanced skills in evaluation of animals and data associated with growth and genetic improvement. Develop decision making and oral communication skills.

ANSC 410 VETERINARY ENTOMOLOGY
S alternate years, to be offered every 2 cr. LEC 2
PREREQUISITE: BIOL 470, BIOL 252.
- This course will provide an overview of the importance of arthropods and their effects on human and animal health. Topics covered will include classification and identification of insects, mites, and ticks, basic biology, behavior and ecology, feeding mechanisms, pathogen transmission, vector competency, production impacts, integrated management and prevention.

ANSC 416R MEAT PROCESSING
F 3 cr. LEC 2 LAB 1
PREREQUISITE: ANSC 316 or instructor approval.
- Students will learn to manufacture processed meat products such as fresh sausage, ham, bacon and cooked sausages. They will also be developing new flavor profiles and new products that will be presented to a panel with proposed marketing plans.

ANSC 418 TOPICS IN BEEF CATTLE NUTRITION
S alternate years, to be offered every 2 cr. LEC 2
PREREQUISITE: ANSC 320 and junior standing or consent of instructor.
- Critical evaluation of current issues and related scientific literature in beef cattle nutrition; application to decision making and problem solving.

ANSC 421 ASSISTED REPRODUCTION TECHNOLOGIES
F 4 cr. LEC 2 LAB 2
PREREQUISITE: ANSC 321.
- Reproductive management programs applying physiological knowledge to increase meat and milk production in cattle. Experience in the techniques of artificial insemination and pregnancy evaluation in cattle.

ANSC 432 SHEEP MANAGEMENT
S 3 cr. LEC 2 LAB 1
PREREQUISITE: ANSC 292, ANSC 320, and ANSC 321 or consent of instructor.
- Management of the ewe flock, nutrition, reproduction, economics, breeding, and health related to efficient sheep production will be discussed. Production preparation and wool marketing in U.S. and world markets and economics of Montana wool production will be covered.

ANSC 454R BEEF CATTLE MANAGEMENT
F 4 cr. LEC 2 LAB 2
PREREQUISITE: NRSM 240, ANSC 320, ANSC 321, ANSC 322 and AGEC 210 or AGBE 541.
- Integration of the principles of nutrition, genetics, physiology, range ecology, and economics into practical and profitable ranch management and business plans. Utilization of performance and financial records, budgeting, feed resource planning, marketing strategies, breeding plans, computer applications, and case studies.

ANSC 490R UNDERGRADUATE RESEARCH
F, S, Su 1-6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis.

ANSC 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ANSC 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

ANSC 494 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ANSC 498 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.
- On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

COURSE DESCRIPTIONS: ANSC
ANTY
Anthropology
formerly ANTH

ANTY 101D ANTHROPOLOGY AND THE HUMAN EXPERIENCE
F S 3 cr. LEC 3
- Comparative focus on human behavior and human cultural systems from the local to global levels. The nature and sources of diversity associated with the human experience are explored and reinforced using examples from archaeology, biological anthropology, cultural anthropology, and linguistics.

ANTY 212CS BONES, APES, & ANCESTORS
S 3 cr. LEC 3
- Exploration of human biological evolution from an anthropological perspective, emphasizing scientific understanding through examination of important fossil discoveries and of the behavior and anatomy of living non-human primates, especially apes. Aimed particularly at students not majoring in anthropology.

ANTY 215S HUMAN PREHISTORY
F 3 cr. LEC 3
- Introduction to basic concepts and ideas about the biological and cultural evolution of human species. Topics include primate ancestors, human origins, evolutionary theory, genetics, archaeological interpretation, and cultural change from the earliest stone tools to the rise of ancient civilization.

ANTY 225S CULTURE, LANGUAGE & SOCIETY
F 3 cr. LEC 3
- The nature of culture through selected societies: symbolism and world view as related to cultural dynamics and representational forms. A survey of social practices, linguistic and cultural representations, exchange, identity, and the dynamics of power.

ANTY 242D CONTEMPORARY JAPAN
F alternate years, to be offered even years 3 cr. LEC 3
- Introduction to major political, economic, social and cultural issues in contemporary Japanese society. On-going legacy of WWII, re-emerging nationalism, and backlash against ideas and institutions of "post-war democracy". Citizen activism on these issues in and outside Japan.

ANTY 252S MYSTERIES OF THE PAST
F 3 cr. LEC 3
- Focuses on archaeological thinking and the use of the scientific method in archaeology. Examines a variety of archaeological and pseudo-archaeological claims from this perspective.

ANTY 290RS UNDERGRADUATE RESEARCH
S 3 CR. SEM 3 PREREQUISITE: ANTY 101 or ANTY 225.
- Undergraduate experiences for non-majors fulfilling their core research requirement. Course content is determined by the upper level anthropology course to which this class is linked and by student's interests. Upper level majors serve as research mentors. At least fifty percent of the course grade is based on library and field or laboratory research.

ANTY 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ANTY 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

ANTY 313 BIOLOGICAL ANTHROPOLOGY
S alternate years, to be offered odd years 3 cr. LEC 3 PREREQUISITE: Junior standing, ANTY 215
- Human evolution and biology from an anthropological perspective: the fossil record, non-human primates, osteology, biological variation, and basic techniques of physical anthropology.

ANTY 315 FORENSIC ANTHROPOLOGY
F alternate years, to be offered odd years 3 cr. LEC 3 PREREQUISITE: Junior standing and consent of instructor.
- Detailed study of human cranial and post cranial skeletal anatomy. Analyses of skeletal materials for estimating sex, age at death, living stature, biological ancestry, cause of death, and other factors of forensic interest. Methods in the recovery of skeletal remains.

ANTY 327 MEDICAL ANTHROPOLOGY
On demand 3 cr. LEC 3 PREREQUISITE: Junior standing, ANTY 215, ANTY 225
- Anthropological research materials, their methodological treatment and theoretical grounding as applied to health-related practices in local and trans cultural contexts. Cultural constructions of disease, intervention and treatment strategies, and the analysis of health concerns associated with globalisation and accelerated culture change.

ANTY 332 NATIVE NORTH AMERICA
S alternate years, to be offered odd years 3 cr. LEC 3 PREREQUISITE: Junior standing, ANTY 225
- An anthropological view of native North American cultures from the perspective of the ethnographic present. Continental-wide diversity in native adaptations and life ways are examined along lines of anthropologically-defined culture areas.

ANTY 336 MYTH, RITUAL, & RELIGION
S alternate years, to be offered odd years 3 cr. LEC 3 PREREQUISITE: Junior standing, ANTY 225.
- Forms of religious representation and practice in cultural and historical context; from animality and symbolic innovation to mythic charters and social transformations, cosmological scenarios and ritual forms are explored in this course.

ANTY 337 SEX, GENDER, & SEXUALITY IN JAPAN
S, to be offered even years 3 cr. LEC 3 PREREQUISITE: ANTY 225 or SOCI 326 or HISTR 145.
- Dominant constructions of sex, gender and sexual identity in contemporary Japanese society, and how such constructions are reinforced, contested or resisted by women in Japan. Interaction with race, ethnicity, class and other social and historical factors (e.g., colonialism, globalization).

ANTY 338 CONTEMPORARY PACIFIC SOCIETIES
S alternate years, to be offered even years 3 cr. LEC 3 PREREQUISITE: Junior standing, ANTY 101 and ANTY 215
- Current ethnological and theoretical considerations of creative cultural processes in relation to classical adaptations and world views of Pacific Island peoples.

ANTY 343 POPULAR CULTURE JAPAN
S to be offered even years 3 cr. LEC 3 PREREQUISITE: ANTY 225 or SOCI 303 or HISTR 145.
- Examine socio-historical and political meanings of mass/popular culture in our everyday lives in personal, local and global contexts. Focus on materials originating from or related to Japan including manga, anime, music, performance arts, food, fashion, the internet, toys and television.

ANTY 350 OLD WORLD PREHISTORY
S alternate years, to be offered even years 3 cr. LEC 3 PREREQUISITE: Junior standing, ANTY 215
- This course provides an understanding of the origins and development of human culture in the Old World (Africa, Europe, Asia, and Australia) over the past three million years. The emphasis is on key theoretical and methodological developments in the archaeology and paleoanthropology of the Old World.

ANTY 351 ARCHAEOLOGY OF NORTH AMERICA
F alternate years, to be offered odd years 3 cr. LEC 3 PREREQUISITE: Junior standing, ANTY 215, ANTY 225
- Prehistoric cultural adaptations and developments in North America from the earliest archaeological evidence through historic times; basic archaeological methods and theory.

ANTY 355 PEOPLES AND PREHISTORY
On Demand 3 cr. LEC 3 PREREQUISITE: Junior standing, ANTY 215, ANTY 225.
- The study of ancient and extant cultures of a selected world region with a comparative focus between the archaeology and ethnography of ancient and extant societies. Explores theoretical and methodological implications associated with the linkages between archaeology and ethnography.

ANTY 425R SOCIAL ORGANIZATION
S alternate years, to be offered even years 3 cr. SEM 3 PREREQUISITE: Junior standing, ANTY 225.
- Senior capstone course. An analysis of culturally relevant components of the social order in small-scale and complex societies, and local constructs of personal and group identity. Considers classical and recent approaches to interpersonal relationships and the organization of social life.

ANTY 428 ANTHROPOLOGICAL THEORY
F alternate years, to be offered even years 3 cr. LEC 3 PREREQUISITE: Junior standing, ANTY 225.
- Senior capstone course. An analysis of theories of anthropological science within their social context of development; exploration and critique of representational classics.
ANTY 441 SOCIAL MOVEMENTS IN JAPAN
S alternate years, to be offered even years
5 cr. LEC 3
PREREQUISITE: ANTY 242 or HSTR 145 or consent of instructor.
→ Examine contemporary social movements and their historical antecedents in Japan. Discuss the claims and organizational strategies of various movements, such as conservative, religious, communist, feminist and queer movements, and the new virtual movement utilizing the internet.

ANTY 450 ARCHAEOLOGY THEORY
S alternate years, odd years 3 cr. LEC 3.
PREREQUISITE: ANTY 101, ANTY 215.
→ Examination of current methodological and theoretical issues in archaeology and how they are applied to our understanding of the past.

ANTY 453 ZOOARCHAEOLOGY
On Demand 3 cr. LEC 2 LAB 1
PREREQUISITE: Junior standing, ANTY 215
→ Hands-on approach to analysis of prehistoric archaeological materials. Typically focuses on a single technology (stone, ceramics, animal bone, etc.). Course emphasis will alternate between replicative/experimental studies, where students create archaeological materials. Typically focuses on a single technology, and laboratory methods. (Offered when funding available.)

ANTY 454 LITHIC TECHNOLOGY
3 cr. LEC 3
PREREQUISITE: ANTY 101, ANTY 215, and Junior standing, or consent of instructor.
→ This course examines prehistoric stone technology and the methodological and theoretical underpinnings of archaeological interpretation. The course material is conveyed through hands-on activities, individual analyses, and discussions of the theoretical foundations for archaeological interpretations.

ANTY 467 ARCHAEOLOGY FIELD SCHOOL
Su On demand 1-9 cr. LEC 1
PREREQUISITE: ANTY 101 or ANTY 225 or permission of instructor.
→ A summer of archaeological field work at a location away from the University; training in excavation and laboratory methods. (Offered when funding available.)

ANTY 472 DESCRIPTIVE LINGUISTICS
On Demand 3 cr. LEC 3
PREREQUISITE: ANTY 101 or ANTY 225 or permission of instructor.
→ The anthropological use of linguistic materials: introduction to phonology, morphology, and syntax of human languages from a variety of languages.

ANTY 473 LANGUAGE & CULTURE
F alternate years, to be offered odd years 3 cr. LEC 3.
PREREQUISITE: Junior standing, ANTY 225.
→ Language as a subsystem of culture, fundamentals of linguistic analysis and the use of language in social contexts. Also explores relationships between perception and conception, thought and representation.

ANTY 490 UNDERGRADUATE RESEARCH
F, S, Su 1-6 cr. IND May be repeated. Max 12 cr.
→ Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

ANTY 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
→ Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ANTY 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
→ Directed study on an individual basis.

ANTY 494 SEMINAR/WORKSHOP
On Demand Maximum 4 cr.
PREREQUISITE: As determined for each offering.
→ Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ANTY 495 FIELD EXPERIENCE
Su On demand 1-9 cr. LEC 1
PREREQUISITE: ANTY 101.
→ A summer of archaeological field work at a location away from the University; training in excavation and laboratory methods. (Offered when funding determined necessary by each offering department.)

ANTY 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 4 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
→ Directed research and study on an individual basis.

ARAB

ARABIC
formerly MLA

ARAB 101 ELEMENTARY MODERN ARABIC I
F, S 4 cr. RCT 4
→ An elementary level course designed to facilitate students’ acquisition of basic proficiency in communication within culturally significant contexts. Students learn Modern Standard Arabic language skills in an environment integrating interactive video and classroom instruction.

ARAB 102D ELEMENTARY MODERN ARABIC II
S 4 cr. RCT 4
PREREQUISITE: ARAB 101 or consent of instructor.
→ This course builds upon the foundation established in 101. Greater emphasis is placed upon oral and written expression. Cultural issues are explored in an environment integrating interactive video and classroom instruction.

ARAB 201 INTERMEDIATE MODERN ARABIC I
F 4 cr. LEC 4
PREREQUISITE: ARAB 102 or equivalent, or a minimum three years of high school Arabic or placement interview.
→ Intensive, methodical review of grammar and syntax combined with the integrated development of proficiency in the four language skills. Expansion of cultural knowledge and functional vocabulary through intermediate-level readings and discussions. Increased emphasis on written communication.

ARAB 202 INTERMEDIATE MODERN ARABIC II
S 4 cr. LEC 4
PREREQUISITE: ARAB 201 or equivalent, or placement interview.
→ Continuation of ARAB 201. Students who successfully complete this course will have ‘survival’ skills for daily life in the Arab world, and will be ready for more advanced course work using authentic materials. Expansion of cultural knowledge.
ARCH 223 INTRODUCTION TO ARCHITECTURAL THEORY
On Demand 3 cr. LEC 3
- Introduction to theoretical approaches advocated by architects, urban designers, planners and theorists throughout history. Emphasis is placed on theoretical positions, their advocacies and their impact on architecture.

ARCH 231CS IN SUSTAINABILITY
F 3 cr. LEC 3
- Introduction to concepts and practices intended to create more sustainable communities where present generations are accountable for the needs of future generations and the natural environment. The course will explore current multi-disciplinary practices in "ecological design".

ARCH 241 BUILDING CONSTRUCTION I
F 3 cr. LEC 2 RCT 1
- Introduction to the materials of construction and an overview of building construction systems. Emphasis upon an understanding of materials and systems as a means to effective and creative design utilization.

ARCH 243 ARCHITECTURAL STRUCTURES I
F 4 cr. LEC 3 RCT 1
PREREQUISITE: PHSX 205, M 151Q or M 171Q.
- Introduction to structural design/analysis of horizontal and vertical members as applied to architectural works; basic statics, moment and shear of rigid bodies and architectural forms; strength concepts using stress and strain assessment; applications of emphasis and intuitive structural concepts in a design context.

ARCH 244 ARCHITECTURAL STRUCTURES II
S 4 cr. LEC 3 RCT 1
PREREQUISITE: ARCH 243, M 151Q or M 171Q.
- Understanding of design for structural elements in wood, steel, masonry, and concrete. Lateral considerations and calculations including wind, soil and seismic loads. Understanding of structural systems; building systems; diaphragms; connections; structural engineer-architect communications.

ARCH 253 ARCHITECTURAL DESIGN I
S 5 cr. LEC 3 RCT 1 STU 4
PREREQUISITE: ARCH 152, ARCH 261. Formal admission into the environmental design program. COREQUISITE: ARCH 262.
- Small-scale design projects requiring integration of spatial, visual concepts, emphasizing relationship of architecture to its context with principles of order, constituents of form, light, structural awareness, nature of materials, architectural coherency. Includes inclusive orthographic graphics design drawing conventions.

ARCH 261 ARCHITECTURAL GRAPHICS I
F 3 cr. LEC 1 STU 2
PREREQUISITE: Formal admission into the environmental design program. COREQUISITE: ARCH 243
- Fundamental techniques in architectural graphics. Course utilizes observation and design drafting studios supplemented by design drafting lecture/demonstration sessions. Topics include freehand observation drawing and constructed multiview, paraline, perspective and shade/shadow drawing leading towards the formal graphic presentation of architectural intentions.

ARCH 262 ARCHITECTURAL GRAPHICS II
S 3 cr. LEC 1 STU 2
PREREQUISITE: ARCH 261. Admission into the environmental design program. COREQUISITE: ARCH 293
- Basic techniques in architectural graphic expression. Course emphasizes observation drawing studio supplemented by design drafting lecture/demonstration sessions. Topics include freehand, perspective, and shade and shadow drawing techniques. Two and three-dimensional digital applications introduced. Notebook computer required.

ARCH 290R UNDERGRADUATE RESEARCH
F, S 1-4 cr. END may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

ARCH 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Course material not covered in regular courses. Students participate in preparing and presenting discussion material.

ARCH 294 SEMINAR
F, S 3 cr. LEC 1 STU 2
PREREQUISITE: Consent of instructor and approval of department head.
- Directed study and research on an individual basis.

ARCH 295 DEPARTMENTS OF A TEMPORARY NATURE
ARCH 295
- Small to medium-size projects extending the development of the design process to site and adjacency analysis, diagramming, fundamental relationship to landscape and context. Topics include hybrid uses of hand and digital graphic communication including 2D and 3D drawing, and modeling. Field trip required.

ARCH 322IA WORLD ARCHITECTURE I
S, Su 9 cr. LEC 6 IND 3
PREREQUISITE: ARCH 321.
- Further exploration of ecologically-sound design with emphasis on the integration of structures, building envelope service systems, and building materials, including design for life safety and accessibility. Building scale and program complexity increases, utilizing long-span structural systems. Notebook computer required.

ARCH 331 ENVIRONMENTAL CONTROLS I
S 5 cr. LEC/RCT 1 STU 4
PREREQUISITE: ARCH 332.
- Advanced principles of computer-aided design and hand applications in architectural practice, including three-dimensional computer-aided design, hand and digital delineation, and presentations. Topics provide foundation for graphic applications in ARCH 354 design studio. Notebook computer required.

ARCH 340 BUILDING CONSTRUCTION II
F 4 cr. LEC 2 RCT 2
PREREQUISITE: ARCH 241, ARCH 244, ARCH 331, ARCH 363, or permission of instructor.
- Development and integration of building materials and assemblies, construction costs and building systems into the construction documents, specifications and design of a small project. Building systems to be investigated include: structural environmental and enclosure, life safety and sustainability. Notebook computer required.

ARCH 354 ARCHITECTURAL DESIGN II
F 5 cr. LEC/RCT 1 STU 4
PREREQUISITE: ARCH 253.
- Corequisite: ARCH 241, and ARCH 363.
- Analysis and design of architectural lighting systems, acoustics, electrical systems, fire protection, and signal-systems. Notebook computer required.

ARCH 355 ARCHITECTURAL DESIGN III
S 5 cr. LEC/RCT 1 STU 4
PREREQUISITE: ARCH 354.
- Corequisite: ARCH 332.
- Structured study in foreign countries under the direction of an architecture faculty member to obtain an understanding of modern and historical architecture and the forces shaping them. Holistic study of urban environments combines design, urban design, architectural history, drawing, and pre-travel design and research. Itineraries include opportunities for additional destinations and independent travel.
ARCH 424 CONTEMPORARY ARCHITECTURAL HISTORY AND THEORY
On Demand 3 cr. LEC 3
PREREQUISITE: ARCH 322 and ARCH 323.
- Critique and discussion of architectural projects built and ideologies proposed in writings, drawings, and models during the 20th and 21st centuries as they relate to their social, cultural, technical and economic context.

ARCH 425 WESTERN ARCHITECTURAL HISTORY
On Demand 3 cr. SEM 3 Maximum 6 cr.
PREREQUISITE: ARCH 323.
- A study of events and influences that led to the development of western architectural styles, ideology, and forms of individual expression.

ARCH 426 IDENTITY OF CONTEMPORARY PLACES
On Demand 3 cr. LEC 3 Maximum 6 cr.
PREREQUISITE: ARCH 322 and ARCH 323.
- A course in applied architectural history and theory. Lectures, discussions, and student projects investigate characteristics which convey a sense of place based on historical development, architectural styles, and urban design.

ARCH 427 NON-WESTERN ARCHITECTURAL HISTORY
On Demand 3 cr. SEM 3 Maximum 6 cr.
PREREQUISITE: ARCH 322 and ARCH 323.
- A study of events and influences that led to the development of non-western architectural styles, ideology, and forms of individual expression.

ARCH 428 FOREIGN STUDY HISTORY
On Demand 3 cr. LEC 2 IND 1
PREREQUISITE: ARCH 322 and ARCH 323.
COREQUISITE: ARCH 414.
- An on-site study in a foreign country of the social, cultural, and historic influences on architectural design. This course is only offered in conjunction with the foreign study program within the School of Architecture. Course shall include research on-site visits documented in an appropriate media form.

ARCH 444 COMPUTATIONAL DESIGN FOR STRUCTURES
On Demand 3 cr. LEC 2 STU 1
PREREQUISITE: ARCH 245 and ARCH 263.
- Introduction to spreadsheets and computational software; spreadsheet developments for typical structural computations used in architecture; introduction to structural design/analysis software; and development of a library of computational software tools for the application of structural architectural design. Notebook computer required.

ARCH 450 COMMUNITY DESIGN CENTER
On Demand 5 cr. LEC/RCT 1 STU 4
PREREQUISITE: ARCH 355.
- The CDC assists public and non-profit groups by providing planning, programming, and conceptual design ideas. Emphasis and scope of projects are determined by the community needs. Projects are intended to complement and promote the professional practice of architecture in the State of Montana.

ARCH 451 DESIGN FOR THE COMMUNITY
On Demand 3 cr. IND 3 Maximum 6 cr.
PREREQUISITE: ARCH 355.
- Students will be engaged in architecturally-related activities with government and non-profit agencies. This will enable students to be involved in a service learning academic experience.

ARCH 456 ARCHITECTURAL DESIGN IV
On Demand 5 cr. LEC/RCT 1 STU 4
PREREQUISITE: ARCH 355
COREQUISITE: ARCH 310.
- Senior capstone course. Architectural design integrating building, landscape, and urban context using multi-story projects of medium scale and complexity with particular focus on mixed-use. Integrated topics include programming, structural and mechanical integration, ecologically sound design, building envelope systems and building codes.

ARCH 457 ARCHITECTURAL DESIGN V
On Demand 5 cr. LEC/RCT 1 STU 4
PREREQUISITE: ARCH 356.
- Advanced architectural design projects integrating site analysis, programming, building systems, and contemporary design theory. Emphasis placed on the inclusive synthesis of conceptual processes, analysis, preliminary design investigation, and design development. Notebook computer required.

ARCH 458 ARCHITECTURAL DESIGN VI
On Demand 5 cr. LEC/RCT 1 STU 4 Maximum 12 cr.
PREREQUISITE: ARCH 356.
- A continuation of the holistic design synthesis encountered in ARCH 457 with emphasis on development of student’s emerging design values and theoretical perspective. Field trip possible. Notebook computer required.

ARCH 464 INTERMEDIATE COMPUTER APPLICATIONS
On Demand 3 cr. LEC/RCT 1 STU 2
PREREQUISITE: ARCH 363 or ARCH 363.
- Investigation of digital design, fabrication, modeling and drawing as applied to architectural practice. Lectures and projects will explore the use of two-dimensional and three-dimensional applications to explore design and construction processes.

ARCH 465 ADVANCED COMPUTER APPLICATIONS
On Demand 3 cr. LEC/RCT 1 LAB 2
PREREQUISITE: ARCH 364, or consent of instructor.
- The investigation and application of advanced two-dimensional and three-dimensional digital applications for design, modeling, and presentation techniques for architectural practice. Lectures and projects may include topics of three-dimensional modeling, animation, delineation, or digital fabrication.

ARCH 471 DIRECTED RESEARCH/CREATIVE ACTIVITY
F, S, Su 1-6 cr. IND May be repeated.
COREQUISITE: ARCH 472.
- Directed research/creative activity which may culminate in a research paper, journal article, or design project.

ARCH 472 DIRECTED RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F, S, Su 1-2 cr. RCT May be repeated. Maximum 4 cr.
COREQUISITE: ARCH 471.
- Classroom instruction associated with directed research/creative activity projects.

ARCH 490 UNDERGRADUATE RESEARCH
F, S, Su 1-6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.
ARCH 525 SPECIAL DESIGN TOPIC
On Demand 3 cr. LAB/STU 2-3. Maximum 12 cr. May be repeated as topics vary.
PREREQUISITE: ARCH 355 and consent of instructor. Admission to graduate program or seniors by petition.
- Students will work under the direction of a faculty member in the research, design, development and presentation of a design, research, or historic preservation project.

ARCH 533 ADVANCED ENVIRONMENTAL CONTROLS
On Demand 3 cr. SEM 3.
PREREQUISITE: ARCH 331 and ARCH 332. Admission to the graduate program or seniors by petition.
- Advanced environmental controls systems explored through experimental exercises, calculations, physical modeling and computer simulations with the goal of designing high-performance buildings with an emphasis on lighting and HVAC systems. Notebook computer required.

ARCH 543 ADVANCED APPLIED DESIGN AND CONSTRUCTION
On Demand 3 cr. LAB/STU 3 Max 6 cr. May be repeated as topics vary.
PREREQUISITE: ARCH 241, consent of instructor, and graduate standing or seniors by petition.
- Small scale projects industrial products, furniture, buildings, etc., will be designed and built by students as an exploration of the opportunities and limitations of materials, technology, economics, and construction methods.

ARCH 545 ADVANCED STRUCTURES
On Demand 3 cr. LEG 2 STU 1.
PREREQUISITE: ARCH 244 or ARCH 344 and graduate standing or seniors by petition.
- Advanced structural topics, historical and contemporary structural precedents, load path, performance design, structural system planning, connection design; structural restoration; complete 2D and 3D design/analysis/structural projects.

ARCH 551 ADVANCED ARCHITECTURAL STUDIO
F, S, Su 6 cr. RCT 2 STU 4.
PREREQUISITE: ARCH 456 and graduate standing.
- Design projects which explore specific critical positions with regard to contemporary architectural issues. Research and analysis of theoretical positions are emphasized along with the development of contemporary methods, models and techniques for analysis.

ARCH 552 ARCHITECTURAL RESEARCH METHODS
F, S, Su 3 cr. SEM 5.
PREREQUISITE: Graduate standing or seniors by petition.
- An examination of the types of inquiry used to conduct architectural research. Students will engage in initial studies of traditional and non-traditional research methods in architecture and its related fields followed by an individual research project.

ARCH 553 ARCHITECTURAL STUDIO-THEORETICAL APPLICATION
On Demand 3 cr. LEG 1 RCT 2.
PREREQUISITE: Graduate standing.
- Graduate research and analysis of the formal manifestations of the specific theoretical positions advocated and illustrated through the design work of significant architectural practitioners. Notebook computer required.

ARCH 554 URBAN DESIGN STUDIO
On Demand 6 cr. RCT 2 STU 4.
PREREQUISITE: Graduate standing.
- Urban design projects that develop an understanding of public planning goals and constraints, urban infrastructure, formal urban fabric, historic preservation, and socio-cultural issues. Notebook computer required. Field trip required.

ARCH 555 URBAN DESIGN RESEARCH/THEORY
On Demand 3 cr. LEC 1 RCT 2.
PREREQUISITE: Graduate standing.
- Methods, models, and techniques for analyzing the city as an artifact of social, cultural, historical, economic and physical significance. Notebook computer required. Field trip required.

ARCH 556 CONSTRUCTION THEORY
On Demand 3 cr. SEM 3. May be repeated as topics vary.
PREREQUISITE: Graduate standing.
- Graduate research and analysis of contemporary and historic design theory.

ARCH 557 ARCHITECTURAL DESIGN STUDIO
F, S, Su 6 cr. RCT 2 STU 4.
PREREQUISITE: ARCH 456 and Graduate standing.
- Advanced architectural design projects integrating site analysis, programming, building systems, and contemporary design theory. Emphasis placed on the synthesis of conceptual processes, analysis, preliminary design investigation, and design development. Field Trip required.

ARCH 558 COMPREHENSIVE DESIGN STUDIO
F, S, Su 6 cr. RCT 2 STU 4.
PREREQUISITE: Graduate Standing. ARCH 551, ARCH 552, and ARCH 557.
- Comprehensive architectural studio which integrates design thinking and investigative skills with site design, accessibility and life safety, sustainability and environmental, and structural systems in the design and presentation of a programatically complex building.

ARCH 564 ADVANCED ARCHITECTURAL GRAPHICS
F, S, Su 3 cr. LAB/STU 3. Maximum 6 credits. May be repeated as topics vary.
PREREQUISITE: ARCH 262, admission to graduate program or seniors by petition.
- Advanced architectural presentation strategies for exploring visual perception and design development through graphic exploration.

ARCH 565 ADVANCED COMPUTER APPLICATIONS II
On Demand 3 cr. RCT 1 LAB 2.
PREREQUISITE: ARCH 464.
- Computer-aided design and theory for architecture. Lectures and projects may include topics of three-dimensional modeling, animation, delination or digital fabrication.

ARCH 589 GRADUATE CONSULTATION
F, S, Su 1-3 cr. END 1-3.
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their course work but who need additional faculty or staff time or help.

ARCH 590 MASTER’S THESIS
F, S, Su 1-10 cr. IND 1-10. Maximum credits unlimited.
PREREQUISITE: Master’s standing.
ARCH 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Courses for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ARCH 592 INDEPENDENT STUDY
On Demand 1-4 cr. IND Maximum 8 cr.
PREREQUISITE: Admission to graduate program.
- Directed graduate research and study of architectural, urban design or historic preservation issues on an individual basis.

ARCH 594 SEMINAR
On Demand 1- cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ARNR
Animal and Range Sciences
only graduate level courses

ARNR 507 - RESEARCH METHODS
F S 1 cr. SEM 1 Maximum 5 cr.
PREREQUISITE: Graduate standing.
- Application of scientific method and research techniques, including design of experiments and use of appropriate statistical procedures.

ARNR 520 - NUTRIENT METABOLISM OF DOMESTIC ANIMALS
F alternate years, to be offered odd years 5 cr. LEC 3
PREREQUISITE: ANSC 320, and either CHMY 123 or BCH 380 or consent of instructor.
- Energy and protein utilization, emphasis on how energy and protein requirements are determined.

ARNR 521 - ADVANCED RUMINANT NUTRITION
F alternate years, to be offered even years 3 cr.
LEC 2 LAB 1
PREREQUISITE: ANSC 320 or consent of instructor.
- Physiological and microbiology aspects of ruminal digestion and their influence on the metabolism of extraruminal issues.

ARNR 523 - ADVANCED PHYSIOLOGY OF REPRODUCTION
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: BIOL 412, BCH 380, ANSC 321 or consent of instructor.
- Study of the basic concepts of reproductive processes of mammals with special emphasis on the application of recent techniques in solving reproductive problems associated with fertility and infertility.
ARNR 524 - ADVANCED ANIMAL BREEDING
S alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: ANSC 322.
- Quantitative genetics applied to the improvement of animals. Biometrical relationships among relatives, methods of estimating genetic parameters, application of crossbreeding systems and selection techniques.

ARNR 525 - MUSCLE AND GROWTH BIOLOGY
S alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: BCH 380 AND BIOE 160.
- Growth and development of muscle, muscle structure and how growth is controlled by hormones and DNA will be studied. The impact of growth manipulation on the final product, meat, will also be evaluated.

ARNR 529 - YELLOWSTONE WILDLIFE HABITAT ECOLOGY
Su 2 cr. LEC 2
Prerequisite: WILD 426 or WILD 429 or Equivalent.
- This course will describe the native communities of the internationally prominent northern Yellowstone winter range for wild ungulates. The ecology of many organisms, both plant and animal will be studied. Plant identification skills will be incorporated with an emphasis on the recognition of the Yellowstone northern range’s flora and its importance as wildlife habitat. Ecosystem interrelationships will form the basis for understanding the ecology of the range and interpreting the consequences of management alternatives.

ARNR 541 - RANGE ECOPHYSIOLOGY
S alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: NRSM 240 or BIOE 370 or BIOE 435.
- Lectures and selected readings on the response of range plants and animals to daily and seasonal changes in their environment, including physiology, animal behavior, and plant population biology.

ARNR 543 - RIPARIAN PROCESSES AND FUNCTION
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: NRSM 455, BIOE 370 and ERTH 432.
- This course involves an in-depth investigation of the geomorphological physical and biological parameters unique to riparian areas of the Northern Rocky Mountains and Great Plains. Emphasis will be placed on how these parameters interact to create the biotic communities associated with riparian areas.

ARNR 544 - ADVANCED GRAZING MANAGEMENT AND ECOLOGY
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: NRSM 240 or NRSM 350 or NRSM 351 or BIOE 370.
- Review of management principles for livestock grazing grasslands and shrub lands and their ecological relationship to other areas. Study design and scientific results will be examined to critically review information.

ARNR 575 - RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major adviser and graduate committee.

ARNR 589 - GRADUATE CONSULTATION
F, S, Su 3 cr. IND Maximum credits unlimited
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

ARNR 590 - MASTER’S THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited
PREREQUISITE: Master’s standing.

ARNR 591 - SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Topics not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ARNR 592 - INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

ARNR 594 - SEMINAR
On Demand 1 cr. SEM Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ARNR 690 - DOCTORAL THESIS
S alternate years, to be offered even years 3 cr.
PREREQUISITE: Master’s standing.

ART

ART 145RA WEB DESIGN
F, S 3 cr. LEC 2 LAB 1
- Basic design principles and how these principles apply to web site construction. HTML and HTML editors. Laboratory projects reflect practical usage of course concepts. Cross-listed with CS 145.

ART 200 - ART AND ARCHITECTURE OF ANCIENT Mesoamerica
Su alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: ARTH 201.
- This course introduces students to the history of decorative arts in western Europe and the United States from the Renaissance through the early 20th Century. Emphasis will be placed on major media and stylistic trends. Attention will also be given to the use of objects in their original spatial environments.

ART 360 HISTORY OF ASIAN ART AND ARCHITECTURE
S alternate years, to be offered odd years 5 cr. LEC 3
PREREQUISITE: ARTH 200 or ARTH 201.
- The purpose of this course is to offer students a broad exposure to art and architecture produced in China, Japan, Southwest Asia and India from the Neolithic period through the 20th century with special emphasis placed on Chinese developments.

ART 400 ART AND ARCHITECTURE OF EGYPT
S alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: ARTH 200.
- This course is an exploration of the art and architecture of ancient Egypt and the Near East (Anatolia, Mesopotamia and Persia). Due to the nature of the surviving material, the emphasis will be on the ideas and attitudes of these civilizations about the relationship between humans and divinities, the cult of the ruler/king, and funerary cult and the afterlife.

ART 401 GREEK ART AND ARCHITECTURE
F alternate years, to be offered odd years 5 cr. LEC 3
PREREQUISITE: ARTH 200 and ARTH 201.
- This lecture-based course will present a survey of the art and architecture of ancient Greece from its origins in the Dark ages through the Hellenistic period. Study begins with the Bronze Age of neoclassical art and ends with the widespread dissemination of Greek material culture after the death of Alexander the Great.
ARTh 406 Roman Art & Architecture
S 3 cr. LEC 3
PREREQUISITE: ARTH 200.
- This course is a survey of the public and private art and architecture of Republican and Imperial Rome. The study encompasses both the Etruscan and Republican foundations-cultural, political and artistic-of Rome and then moves on to the period when emperors ruled and the borders of the empire at its height ranged from Britain to North Africa. The course is arranged as a chronological survey moving from the prehistory of the Italic peninsula to the reign of the emperor Constantine in the fourth century CE.

ARTh 410 Medieval Art
F alternate years, to be offered every 3 cr. LEC 3
PREREQUISITE: ARTH 200.
- Early Christian, Byzantine, Romanesque, and Gothic periods.

ARTh 421 Late Gothic Painting
F alternate years, to be offered every 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- This course will deal with the development of Gothic painting in Italy and its subsequent influence on the Northern tradition of painting in the Netherlands and Germany. Major masters include Giotto, Jan van Eyck, Bosch, Grunewald, Durer, and Bruegel.

ARTh 422 Early Renaissance-15th Century Art
F alternate years, to be offered every 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- A study of painting, sculpture and architecture in Italy in the 15th century. Major artists include Donatello, Masaccio, Piero della Francesca and Botticelli, Michelangelo, and Giorgione.

ARTh 423 History of Printmaking (1450-1945)
S alternate years, to be offered every 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- This course introduces students to the vocabulary, techniques and history of printmaking in the western world from the mid-fifteenth century to end of World War II.

ARTh 424 High Renaissance and Mannerism
S alternate years, to be offered every 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- This course is a study of the high Renaissance in Rome, Florence and Venice, and the reactions to this in the style of mannerism. Major artists include Leonardo, Michelangelo, Raphael, Pontormo and Titian.

ARTh 426 Baroque in Italy & S. Europe, 1600-1700
F alternate years, to be offered every 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- This course is a history of painting, sculpture, and architecture produced in Italy during the 17th century. Emphasis will be placed on major artists and stylistic trends as well as the various social, political and religious contexts for viewing art.

ARTh 427 Baroque Art in Northern Europe
F alternate years, to be offered every 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- The purpose of this course is to offer students a more in-depth study of art in the Baroque period in Europe (1600-1700) by focusing on cultural developments in the Republic of the Netherlands and its colonies.

ARTh 430 19th Century Art
F 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- This course examines the major artists of the 19th century in Europe and America and the development of the styles of Neoclassicism, Romanticism, Realism, and Impressionism.

ARTh 432 Art in the Age of Revolution
S alternate years, to be offered every 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- This course focuses on the art and architecture of the revolutionary years in France and Britain in the 18th century. Through focused lectures, readings and discussions and writing assignments students will learn about the 18th century culture, philosophical and scientific developments in their original contexts as well as their bearing on the present day.

ARTh 438 Beginnings of Modern Art
F alternate years, to be offered every 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- From Post-Impressionism to World War I. Major artists include Gauguin, Van Gogh, Cezanne, Manne, Picasso, and the German Expressionists.

ARTh 440 20th Century Art
S 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- Art from World War I to the present.

ARTh 451 Contemporary Art
F alternate years, to be offered every 3 cr. LEC 3
PREREQUISITE: ARTH 201.
- This course will focus on issues in contemporary painting, sculpture, and related artistic forms. Students are responsible for discussions of assigned readings and presentations of research projects.

ARTh 491 Special Topics
On Demand 1-5 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ARTh 492 Independent Study
On Demand 1-5 cr. Maximum 6 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Directed research and study on an individual basis.

ARTh 495 Field Study
S 2-5 cr. LAB 2-5
PREREQUISITE: ARTZ 106, ARTZ 108 or ARTH 201, or consent of instructor.
- Course will allow students to study at an off-campus location such as a foreign country under the direction of art faculty member. Includes preparatory meetings, several hours per day of discussion on site, and writing or creative project which assimilates direct experience and research.

ARTh 498 Internship
On Demand 2-12 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of the director. Art History majors.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

ARTh 499R Senior Thesis-Art History
F, S, Su 1-5 cr. IND May be repeated. Max 12 cr.
- Senior capstone course. Directed undergraduate research/creative activity which may culminate in a research paper, undergraduate thesis paper, or undergraduate thesis exhibition. Graphic design students must take this course in the spring. Course will address responsible conduct of research.

ARTh 501 Pedagogy and Professionalism in Art History
F 2 cr. RCT 1 SEM 1
- Art historians are continually challenged to impart visual and critical thinking skills to a public audience, whether in the context of a university classroom or a scholarly conference. This graduate seminar is designed to provide graduate students with skills necessary for becoming effective instructors and professionals in academic or museum environments.

ARTh 506 Art History Methods and Critical Theory
F, S 3 cr. SEM 3
- The discipline of Art History has had a remarkably complex development, from the formalist concerns of the late nineteenth century to the theoretical arguments of the late twentieth century. This graduate seminar will explore various methodological approaches currently in use and diverse critical theories developed over the last few decades.

ARTh 512 Etruscan Art
S 3 cr. LEC 3
- The course focuses on the art and architecture produced by an important Italic civilization, the Etruscans, as well as their Iron Age ancestors, Villanovan civilization. The approach is contextual, with an examination of the social, economic, religious factors surrounding their artistic developments.

ARTh 532 Portraiture and Identity Formation
S, alternate years 3 cr. SEM 3
- This graduate seminar will explore how portrait images have promoted a range of identities for sitters from the Renaissance through the Modern Era. It will consider them as strategies for communicating political and social values to various viewing constituencies.

ARTh 555 Critical Terms in Art History
F alternate years 3 cr. SEM 3
- This is a seminar designed for candidates for the masters degree in art history to expose them to a gamut of issues and approaches to research in the history of art, with particular emphasis on recent concepts and theories pertaining to modern and contemporary art.

ARTh 575 Professional Paper
F, S, Su 1-4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major adviser and graduate committee.
ARTH 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; maximum 5 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies.
Courses offered on a one-time basis to fulfill professional development needs of in-service educators. A specific focus is given to each course which is appropriately subtitled.

ARTH 589 GRADUATE CONSULTATION
F, S 3 cr. IND
PREREQUISITE: Master's standing and approval of the Dean of Graduate Studies.
This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

ARTH 590 MASTER'S THESIS
F, S Su 1 - 10 cr. IND Maximum 15 cr.
PREREQUISITE: Master's standing.

ARTH 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ARTH 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, and Dean of Graduate Studies.
Directed research and study on an individual basis.

ARTH 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 6 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ARTZ
Art - Visual Arts
formerly part of ART

ARTH 108RA VISUAL LANGUAGE-3D FOUNDATIONS
F S 4 cr. RCT 1 STU 3
- The development of basic three-dimensional technical and aesthetic concepts through an emphasis on design elements and principles. Visual problemsolving in 3D pictorial construction and color theory. Critiques develop student's ability to formulate and verbalize knowledgeable responses to visual production. Required weekly lecture on various aspects of visual arts practice.

ARTH Z 109RA VISUAL LANGUAGE-3D FOUNDATIONS
S 4 cr. RCT 1 STU 3
- The development of basic three-dimensional technical and aesthetic concepts through an emphasis on design elements and principles. Visual problemsolving in 3D pictorial construction and color theory. Critiques develop student's ability to formulate and verbalize knowledgeable responses to visual production. Required weekly lecture on various aspects of visual arts practice.

ARTH 211RA DRAWING I
F, S 4 cr. RCT 2 STU 2
PREREQUISITE: ARTZ 108. ARTZ 106.
- Introduction to the basic vocabulary of drawing, observation, problem solving, and personal expression. Critiques develop student's ability to formulate and verbalize informed analysis of the completed projects.

ARTH 221 PAINTING I
F, S 4 cr. RCT 2 STU 2
PREREQUISITE: ARTZ 106, ARTZ 105.
- Introduction to oil and/or acrylic painting. Exploration of basic aesthetic and technical concepts in painting. Primarily representational subject matter. Understanding and developing individual stylistic tendencies. Individual and group critiques.

ARTH 231RA CERAMICS I
F, S 4 cr. RCT 2 STU 2
PREREQUISITE: ARTZ 108.
- Contemporary ceramics - the history, development, and aesthetics of ceramic vessels and sculpture. The technical aspects of clay, glazes, and the firing of ceramic objects. Problem solving and the development of ideas.

ARTH 251 SCULPTURE I
F, S 4 cr. RCT 2 STU 2
PREREQUISITE: ARTZ 108.
- Introduction to three-dimensional form through projects involving plaster, woodworking, welding, and non-traditional materials. Introduction to tools, materials, processes, and safety procedures with a conceptual approach to problem solving.

ARTH 261 METALS I
F, S 4 cr. RCT 2 STU 2
PREREQUISITE: ARTZ 108.
- A beginning course in basic metalsmithing techniques and three-dimensional design skills. Design concepts, small metal fabrication methods and practical demonstrations.

ARTH 271 PRINTMAKING I
F, S 4 cr. RCT 2 STU 2
PREREQUISITE: ARTZ 106.
- A beginning course in which multiple original prints are made from a variety of blocks and plates. Emphasis on relief and intaglio history and processes including woodcut, linocut engraving, etching, and aquatint.

ARTH 290E UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

ARTH 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ARTH 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of the director.
Directed research and study on an individual basis.

ARTH 312 INTERMEDIATE DRAWING
F, S 5 cr. RCT 2 STU 3 Maximum 15 cr.
PREREQUISITE: ARTZ 211.
- Advanced technical and aesthetic concepts in drawing with emphasis on the development of a personal artistic style. Use of traditional and non-traditional subject matter. Individual and group critiques.

ARTH 322 INTERMEDIATE PAINTING
F, S 5 cr. RCT 2 STU 3 Maximum 15 cr.
PREREQUISITE: ARTZ 221.

ARTH 332 INTERMEDIATE CERAMICS
F, S 5 cr. RCT 2 STU 3 Maximum 15 cr.
PREREQUISITE: ARTZ 251.
- Advanced problems in ceramics.

ARTH 352 INTERMEDIATE SCULPTURE
F, S 5 cr. RCT 2 STU 3 Maximum 15 cr.
PREREQUISITE: ARTZ 251.
- Development of concept, creative thinking and problem solving in sculpture. Advanced experiences of materials and methods within three-dimensional form.

ARTH 361 METALS II
F, S 5 cr. RCT 2 STU 3 Maximum 15 cr.
PREREQUISITE: ARTZ 261.
- Advanced course designed around a set of specific problems and demonstrations for advanced jewelry and metal forming concepts. Emphasis will be placed on technical development and personal imagery.

ARTH 373 INTERMEDIATE PRINTMAKING
Alternate years, to be offered ever years 5 cr. RCT 2 STU 3 Maximum 15 cr.
PREREQUISITE: ARTZ 271 and ARTZ 211.
- An intermediate course in which multiple original prints are made from hand-drawn images on lithographic limestone. Editioning in black and multicolor using crayon, tusche, transfer, and photo methods.

ARTH 374 INTERMEDIATE PRINTMAKING: SERIGRAPHY
Alternate years, to be offered ever years 5 cr. RCT 2 STU 3 Maximum 15 cr.
PREREQUISITE: ARTZ 271.
- An intermediate course in which multiple original, multicolored prints are made using various water-based silk-screen processes. Stencil techniques include paper, screen filler, drawing fluid, and photo.
ARTZ 375 INTERMEDIATE PRINTMAKING: INTAGLIO
S alternate years, to be offered odd years 5 cr. RCT 2
STU 3 Maximum 15 cr.
PREREQUISITE: ARTZ 271.
- An advanced course in which multiple original prints are
made using engravings and/or etched copper, zinc, and/or
plastic intaglio plates. Methods include spit bite, viscosity, a la
poupee, multi plate color, color, logo graph, and chine colle.

ARTZ 376 INTERMEDIATE PRINTMAKING: RELIEF
F alternate years, to be offered odd years 5 cr. RCT 2
STU 3 Maximum 15 cr.
PREREQUISITE: ARTZ 271.
- An advanced course in which multiple original prints are
made using planck and end grain wood and plastic/rubber relief plates. Methods include
reductive and multi-plate color, shaped and found object (collagraph), color overlay, split fountain,
roller and brush inking, and various hand and press
printing methods.

ARTZ 379 ALTERNATIVE PRINT MEDIA
S alternate years, to be offered even years 5 cr.
LAB 5
PREREQUISITE: ARTZ 271.
- An advanced course in which students are offered a wide range of printing processes. These may include monotype, photo techniques, experimental lithography, large format printing, multimedia, and digital printmaking. The structure of the course is based on technical demonstrations, studio assignments, and critiques.

ARTZ 400 CAREERS IN ART
F 1 cr. LEC 1
PREREQUISITE: Junior, Senior, or Graduate standing,
or consent of instructor.
- Senior capstone course for Liberal Arts Studio majors. Presentations by professional artists about important career elements such as resume writing, photographing and marketing your work, making presentations to galleries and design firms, starting a business, researching graduate schools, teaching as a career, and applying for grants and fellowships.

ARTZ 411 GUIDED RESEARCH-DRAWING
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 311.
- Course in which student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of drawing. Written, signed contract required prior to registering for this course.

ARTZ 412 GUIDED RESEARCH-PAINTING
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 322.
- Course in which student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of painting. Written, signed contract required prior to registering for this course.

ARTZ 413 GUIDED RESEARCH-CERAMICS
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 332.
- Course in which student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of ceramics. Written, signed contract required prior to registering for this course.

ARTZ 438 BEGINNINGS OF MODERN ART
F alternate years, to be offered even years 5 cr. LEC 5
PREREQUISITE: ARTZ 201.
- From Post-Impressionism to World War I. Major artists include Gauguin, Van Gogh, Cezanne,
Matisse, Picasso, and the German Expressionists.

ARTZ 453 GUIDED RESEARCH-SCULPTURE
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 352.
- Course in which student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of sculpture. Written, signed contract required prior to registering for this course.

ARTZ 461 GUIDED RESEARCH-METALSMITHING
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 351.
- Course in which student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of metalsmithing. Written, signed contract required prior to registering for this course.

ARTZ 472 GUIDED RESEARCH-PRINTMAKING
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 373 or 374, ARTZ 376, ARTZ 375, ARTZ 379.
- Course in which student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of printmaking. Written, signed contract required prior to registering for this course.

ARTZ 491 SPECIAL TOPICS
On Demand 1 - 5 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ARTZ 492 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of the director.
- Directed research and study on an individual basis.

ARTZ 498 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of the director.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

ARTZ 4998 SENIOR THESIS-STUDIO
F, S, Su 1 - 5 cr. IND May be repeated. Max 12 cr.
- Senior capstone course. Directed undergraduate research/creative activity which may culminate in a research paper, undergraduate thesis paper, or undergraduate thesis exhibition. Graphic design students must take this course in the spring. Course will address responsible conduct of research.

ARTZ 505 PAINTING
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 421, graduate standing.
- Course in which the student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of painting.

ARTZ 515 CERAMICS
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 451, graduate standing.
- Course in which the student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of ceramics.

ARTZ 524 METALSMITHING
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 461, graduate standing.
- Course in which the student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of metalsmithing.

ARTZ 526 DRAWING
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 411, graduate standing.
- Course in which the student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of drawing.

ARTZ 527 PRINTMAKING
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 472, graduate standing.
- Course in which the student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of printmaking.

ARTZ 529 SCULPTURE
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 453, graduate standing.
- Course in which the student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of sculpture.

ARTZ 530 INTERMEDIA
F, S, Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ARTZ 352, ARTZ 312, ARTZ 322 and graduate standing.
- Course in which the student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of intermedia.

ARTZ 575 PROFESSIONAL PAPER
F, S, Su 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major adviser and graduate committee.

ARTZ 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; maximum 5 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies.
- Courses offered on a one-time basis to fulfill professional development needs of in service educators. A specific focus is given to each course which is appropriately subtitled.

ARTZ 589 GRADUATE CONSULTATION
F, S, Su 3 cr. IND
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.
ARTZ 290 MASTER'S THESIS  
F, S, Su 1 - 10 cr. IND Maximum 15 cr.  
PREREQUISITE: Master's standing.

ARTZ 291 SPECIAL TOPICS  
On Demand 1 - 4 cr. Maximum 12 cr.  
PREREQUISITE: Upper division courses and others  
as determined for each offering.  
- Courses not required in any curriculum for which  
there is a particular one time need, or given on a  
trial basis to determine acceptability and demand  
before requesting a regular course number.

ARTZ 292 INDEPENDENT STUDY  
On Demand 1 - 3 cr. IND Maximum 6 cr.  
PREREQUISITE: Graduate standing, consent of  
instructor, and Dean of Graduate Studies.  
- Directed research and study on an individual basis.

ARTZ 294 SEMINAR  
On Demand 1 cr. SEM 1 Maximum 6 cr.  
PREREQUISITE: Graduate standing or seniors by  
petition. Course prerequisites as determined for  
each offering.  
- Topics offered at the graduate level which are not  
covered in regular courses. Students participate in  
preparing and presenting discussion material.

ASTR Astronomy  
formerly part of PHYS

ASTR 110 IN INTRODUCTION TO  
ASTRONOMY: MYSTERIES OF THE SKY  
F, S, Su 3 cr. LEC 3  
- An introduction to contemporary astronomy that  
explores the nature, methods, and limitations of  
scientific inquiry within the context of our struggle  
to understand the structure and evolution of the  
Universe. Topics include the history of astronomy,  
memories of the night sky, the solar system, stellar  
evolution, galaxies, and cosmology.

ASTR 371 SOLAR SYSTEM ASTRONOMY  
F, Su on demand 4 cr. LEC 3 LAB 1  
PREREQUISITE: PHYS 205, PHYS 220, or  
PHYS 224.  
COREQUISITE: PHYS 207, PHYS 222, or  
PHYS 240.  
- Covers the origin and evolution of our solar  
system, including detailed examinations of the sun,  
earth, moon, other planets, and satellites. Exciting  
new discoveries and emerging research results will  
be integrated into the course. The laboratory oper-  
ates in a “project mode” and includes experiments  
with models that can be done indoors as well as with  
the use of telescopes.

ASTR 373 STARS, GALAXIES & UNIVERSE  
S alternate years, to be offered odd years 4 cr.  
LEC 3 LAB 1  
PREREQUISITE: PHYS 205, PHYS 220, or  
PHYS 224, or the equivalent.  
COREQUISITE: PHYS 207, PHYS 222, or  
PHYS 242, or the equivalent.  
- After reviewing basic classical astronomy on the  
properties, structure and evolution of stars and  
galaxies, the course will introduce some hot topics  
in frontiers of astronomy, such as pulsars, quasars,  
black holes, and fate of the universe.

AVFT 121 PRIVATE PILOT - FUNDAMENTALS  
F 5 cr.  
- Students must be co-enrolled in both AST-141  
and AST-145 Introduction to basic flight principles.  
Course includes the principles of flight (basic aero-  
dynamics), aircraft systems, performance, weight  
and balance, aviation physiology, federal air regula-  
tions, and flight publications.

AVFT 122 PRIVATE PILOT - FLIGHT  
F 2 cr.  
- Students must enroll in this course while pursuing  
the private pilot's certificate from an approved flight  
school. Course credit will be awarded upon receipt  
of a copy of the student's private pilot certificate.

AVFT 123 PRIVATE PILOT - BASIC AIR NAVIGATION  
F 5 cr.  
- Students must be co-enrolled in both AST-141  
and AST-145 An introduction to air navigation  
procedures. Course includes basic meteorology,  
interpreting weather data pilotage and dead reckon-  
ing navigation, radio navigation, and cross country  
flight planning.

AVFT 130 METEOROLOGY FOR AVIATION  
S 3 cr.  
- Includes the following: thermal patterns,  
horizontal and vertical motion, moisture clouds,  
precipitation, air masses, fronts, cyclones, thun-  
derstorms and aviation hazards. Will also include  
meteoro logical flight planning, use of weather  
information systems, and reports and charts used  
for aviation weather reporting and forecasting.

AVFT 141 ADVANCED NAVIGATION SYSTEMS  
S 3 cr.  
Prerequisite: AVFT 125, or consent of instructor.  
- Advanced navigation systems includes HSI, RMI,  
Loran, Doppler, VOR, NDB and GPS. Will include  
navigation theory, in-flight emergencies, electronic  
instrumentation, and advanced flight computing  
problems. Extensive use of in-class computer flight  
simulation will be exercised. Provides the radio navi-  
gation skills necessary for the instrument pilot.

AVFT 142 INSTRUMENT FLIGHT  
S 2 cr.  
Prerequisite: Private pilot's certificate.  
- Students must enroll in this course while pursing  
the Instrument certificate at an approved flight  
school. Credits will be awarded upon receipt of a  
copy of the student’s instrument rating.

AVFT 143 INSTRUMENT GROUND  
S 3 cr.  
Prerequisite: AVFT 122  
- An introduction to flight under IFR conditions.  
Course includes basic instrument flying, flight  
instruments, IFR charts and approach plate, IFR  
regulations and procedures, ATC clearances and  
IFR flight planning. Completion of the course will  
prepare the student for the Instrument Knowledge  
Exam.

AVFT 150 AVIATION OPERATIONS  
S 3 cr.  
- An overview of general aviation operations, specifi-  
cally the operation and management of the Fixed  
Base Operation (FBO). This course also covers cur-  
rent events and trends affecting the general aviation  
industry as a whole.

AVFT 171 AIRCRAFT SYSTEMS FOR PILOTS  
S 3 cr.  
- Introduction to basic aircraft systems found on  
modern single and multi-engine reciprocating air-  
craft. Topics will include piston engines, electrical  
systems, hydraulic and pneumatic systems, radios  
and instruments, propellers, pressurization, mainte-  
nance requirements and documentation, and trouble-  
some shooting from the cockpit. In this course you  
will be introduced to the systems commonly found  
in the training aircraft you are now flying.

AVFT 245 COMMERCIAL GROUND  
F 5 cr.  
Prerequisite: AVFT 143  
- Commercial Flight Maneuvers, Airplane  
Aerodynamics, Advanced Performance, Power  
plants (including fuel injection and turbocharging),  
Environmental Control Systems and Retractable  
Landing Gear Systems will be taught. Also, aircrafts  
(marketing and lighting) will be reviewed. Advanced  
Weight and Balance, and Part 61, 91, 125, and 135  
and NTSB 830 Commercial Pilot Regulations will  
build on the private pilot regulations learned earlier.  
High Altitude Physiology, and High Performance  
and Turbo-Aircraft Flight Operations will be  
emphasized.

AVFT 252 COMMERCIAL FLIGHT  
F S 1 cr.  
- Students must enroll in this course while pursuing  
their Commercial certificate at an approved flight  
school. Credits will be awarded upon receipt of a  
copy of the student’s commercial certificate.

AVFT 260 AVIATION SAFETY  
F 3 cr.  
- This course will concentrate primarily on the orga-  
izations and processes that govern commercial and  
general aviation safety in the United States. This  
course will also provide an overview of modern tech-  
niques used in accident investigation. Also covered  
are descriptions of major factors and the causation of  
aviation accidents.

AVFT 261 FLIGHT INSTRUCTOR THEORY  
F S 1 cr.  
- Students must enroll in this course while pursuing  
their Commercial certificate at an approved flight  
school. Credits will be awarded upon receipt of a  
copy of the student’s commercial certificate.

AVFT 262 ADVANCED AIRCRAFT THEORY  
S 3 cr.  
Prerequisite: Private Pilot Certificate and Instrument  
rating, or consent of instructor.  
- Introduction to high performance, multi engine,  
aerobatic, and tailwheel aircraft; their systems,  
performance, weight and balance computations,  
flight procedures, characteristics, and emergencies.  
Unusual attitude recoveries, IFR and VFR.

AVFT 263 AVIATION REGULATIONS  
AND PROFESSIONAL CONDUCT  
S 3 cr.  
- Provides a detailed study of the regulations and  
procedures common to the aviation industry as well  
as a survey of the legal environment and the stan- 
ards of conduct required of professional pilots.
AVFT 282 CERTIFIED FLIGHT INSTRUCTOR
S 1 cr.
→ Students must be enrolled in this course while pursuing their Certified Flight Instructor certificate. Credit for the course will be awarded upon completion of the FAA Certified Flight Instructor Practical Test.

BCH Biochemistry
formerly BCHM

BCH 104RN THE BIOCHEMISTRY OF HEALTH FOR NONSCIENCE MAJORS
S 4 cr. LEC 3 LAB 1
→ Introduction for non-science majors to the biochemical basis of nutrition, health, DNA, and the human genome. The class and laboratory includes training for in-depth searching of Internet and library information resources, evaluating and presenting the information found, and an introduction to DNA fingerprinting.

BCH 194 SEMINAR/WORKSHOP I
F 1 cr. SEM 1
→ For the new student. Integration into the department and its research and educational program. Scientific communication and chemical literature searching skills.

BCH 290R UNDERGRADUATE RESEARCH
F, S 1-4 cr. IND may be repeated
→ Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

BCH 291 SPECIAL TOPICS
On Demand 1 - 4 cr. LEC Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
→ Course not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BCH 292 INDEPENDENT STUDY
On Demand 1-3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
→ Directed research and study on an individual basis.

BCH 294 SEMINAR/WORKSHOP II
PREREQUISITE: CHMY 194 or BCH 194.
S 1 cr. SEM 1
→ Introduction to faculty research through faculty mini seminars. Departmental research facilities. Research groups. Research planning decisions (MSU laboratory, summer internship, student exchange, REU, USP, etc.).

BCH 298 RBioCHEMISTRY
F, S Su 5 cr. LEC 4 LAB 1
PREREQUISITE: BIOC 100, BIOC 200, or BIOC 211; CHMY 325, or CHMY 335 or CHMY 213.
→ Carbohydrate, lipid, protein, and nucleic acid structure and function; enzyme kinetics; energetics; major metabolic pathways for carbohydrates, lipids, and amino acids; photosynthesis; regulation of gene function.

BCH 394 SEMINAR/WORKSHOP
F 1 cr. SEM 1
PREREQUISITE: CHMY 294 or BCH 294.
→ Research techniques, procedures, and reports. Seminar reporting and presentation skills. Career planning and resume preparation. May be repeated once.

BCH 441 BIOCHEMISTRY OF MACROMOLECULES
F 3 cr. LEC 3
PREREQUISITE: BCH 380 (B or higher) or consent of instructor.
→ Biochemical basis of modern molecular biology; structure and function of proteins, nucleic acids, and membranes; replication; transcription; translation; regulation of gene expression; and recombiant DNA.

BCH 442 METABOLIC REGULATION
S 3 cr. LEC 3
PREREQUISITE: BCH 380 (B or higher) or BCH 441 (C or higher) or consent of instructor.
→ In-depth biochemical treatment of metabolism and its regulation in cellular processes.

BCH 444R BIOCHEMISTRY & MOLECULAR BIOLOGY METHODS
S 3 cr. LEC 1 LAB 2
PREREQUISITE: BCH 441 (B or higher) or consent of instructor.
→ This course focuses on molecular biology/biochemistry procedures integral to current research. Methods include PCR; gene cloning; DNA sequencing; and expression, isolation, purification, and characterization of the gene-encoded protein.

BCH 450 INTRODUCTION TO X-RAY CRYSTALLOGRAPHY
S alternate even years 3 cr. LEC 3
PREREQUISITE: M 172.
COREQUISITE: CHMY 323 or BCH 380 or BCH 441 or PHYS 224 or instructor’s approval.
→ This course focuses on the theory of small and macromolecular structure determination by x-ray crystallography. Topics include crystallization of small and macromolecules, and molecular structure determination from single crystal x-ray diffraction data, including model building, refinement and validation.

BCH 490R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND May be repeated. Max 12 cr.
→ Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

BCH 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
→ Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BCH 492 INDEPENDENT STUDY
On Demand 1-3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing; consent of instructor; and approval of department head.
→ Directed research and study on an individual basis.

BCH 494R BIOCHEMISTRY & MOLECULAR BIOLOGY METHODS
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: CHMY 323 or BCH 380.

BCH 526 ADVANCED PROTEIN NMR SPECTROSCOPY
F alternate years, to be offered even years cr. LEC 3
PREREQUISITE: CHMY 323.
→ This lecture-based course is designed to teach the fundamental principles of nuclear magnetic resonance (NMR) spectroscopy as it applies to the structural elucidations of proteins in solution. Prerequisites include familiarity with linear algebra and basic trigonometric functions and CHMY 323. Cross referenced with CHMY 526.

BCH 543 PROTEINS
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: BCH 441.
→ Structure-function relationships of proteins and enzymes. Current literature stressed. Written student reports required.

BCH 544 MOLECULAR BIOLOGY
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: BCH 441, BIOL 423, BIOL 410 or comparable course.
→ Recent advances in understanding and research methods using both eukaryotic and prokaryotic systems.

BCH 545 ADVANCED PHYSICAL BIOCHEMISTRY
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: CHMY 321 AND BCH 441.
→ Theoretical presentation of the molecular structures and interactions occurring in proteins and nucleic acids. Discussion of spectroscopy techniques used to study bio molecular structures and function. Includes concepts in: Nuclear Magnetic Resonance, X-ray Diffraction, Ultraviolet Absorption, Fluorescence, Circular Dichroism, Vibrational Spectroscopy, molecular motion and transport properties including diffusion, sedimentation, and viscosity.
BCH 547 BIOINORGANIC CHEMISTRY
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITES: CHMY 401 AND BCH 441.
* This course provides an introduction and overview of the field of bioinorganic chemistry, the chemistry of metals in biological systems, with a particular emphasis on metal trafficking, metal center assembly and metal clusters in biology.

BCH 550 PRINCIPLES OF STRUCTURE DETERMINATION BY X-RAY CRYSTALLOGRAPHY
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITES: BCH 441 and BCH 442 or the equivalent and M 182M.
* This course focuses on theory and practice of molecular structure determined by x-ray crystallography. Topics include crystallization of macromolecules, molecular structure determination from x-ray data, and evaluation of the quality of the resulting macromolecular models.

BCH 575 PROFESSIONAL PAPER
F, S 1 - 6 cr. IND Maximum 6 credits.
PREREQUISITE: Consent of instructor.
* A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

BCH 589 GRADUATE CONSULTATION
* This course may be used only by students who have completed all of their coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

BCH 590 MASTER'S THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's standing.

BCH 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
* Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BCH 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 3 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
* Directed research and study on an independent basis.

BCH 594 SEMINAR
F, S 1 cr. SEM 1 May be repeated.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined by petition.
Topics of graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

BCH 689 GRADUATE RESEARCH / CREATIVE ACTIVITY INSTRUCTION
F, S, Su 1 - 3 cr. RCT
PREREQUISITE: Graduate standing.
COREQUISITE: BCH 590 or BCH 600.
* Classroom instruction associated with directed graduate research/creative activity projects.

BCH 690 DOCTORAL THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: PhD standing.

**BFIN**

**Business: Finance**

**formerly FIN**

**BFIN 265 PERSONAL FINANCE**
On Demand 3 cr. LEC 3
PREREQUISITE: Completion of University Core mathematics course.
* Financial concepts as they apply to daily life. Basics of consumer credit, personal investment, insurance, and personal financial planning. This course may not substitute for any required business course.

**BFIN 290R UNDERGRADUATE RESEARCH**
F, S 1-6 cr. IND may be repeated.
* Directed undergraduate research/creative activity which may culminate in a written work or other creative projects. Course will address responsible conduct of research.

**BFIN 291 SPECIAL TOPICS**
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering.
* Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

**BFIN 292 INDEPENDENT STUDY**
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of Associate Dean.
* Directed research and study on an individual basis. Not to be used as a substitute for a required course.

**BFIN 322 BUSINESS FINANCE**
F, S, Su 1 - 3 cr. LEC 3
PREREQUISITE: Concentration in finance.
* Not to be used as a substitute for any required business course.

**BFIN 456 FINANCIAL MANAGEMENT**
F, S 3 cr. LEC 3
PREREQUISITE: BFIN 322.
* For business majors: Formal admission to the College of Business.
* Focuses on the risks associated with financial management of a multinational company. Topics include: financial problems of multinational businesses, international financial environments, long-term capital commitments to international ventures, financial techniques for firm operation, and international investing.

**BFIN 457R FINANCIAL MARKETS AND INSTITUTIONS**
F 3 cr. RCT 3
PREREQUISITE: BFIN 322.
* For business majors: Formal admission to the College of Business.
* Focuses on the risks associated with financial management of a multinational company. Topics include: financial problems of multinational businesses, international financial environments, long-term capital commitments to international ventures, financial techniques for firm operation, and international investing.

**BFIN 458 COMMERCIAL BANK MANAGEMENT**
On Demand 3 cr. LEC 3
PREREQUISITE: BFIN 322.
* For business majors: Formal admission to the College of Business.
* Management of commercial banks and similar depository institutions, emphasizing the measurement and control of risk in asset and liability management. Course includes issues in contemporary banking.
BFIN 466 INVESTMENTS II
S 3 cr. RCT 3
PREREQUISITE: BFIN 420. For business majors: Formal admission to the College of Business. – Security and portfolio analyses, using fundamental and technical indicators, with evaluation of financial and economic environments. In-depth study of stocks, bonds, and derivatives. Risk hedging for both individual investors and portfolio managers, using analyses of embedded risk and returns.

BFIN 490 UNDERGRADUATE RESEARCH
On Demand 1 - 6 cr. IND May be repeated. Max 12 cr.
– Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

BFIN 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering. For business majors: Formal admission to the College of Business. – Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BFIN 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. END Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of Associate Dean. For business majors: Formal admission to the College of Business. – Directed research and study on an individual basis. Not to be used as a substitute for a required course.

BFIN 494 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering. For business majors: Formal admission to the College of Business. – Topics offered at the upper-division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

BFIN 498 INTERNSHIP
On Demand 2 - 12cr. END Maximum 12 cr.
PREREQUISITE: Junior standing, formal admission to the College of Business, and consent of instructor. – An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field. Directed research and study on an individual basis.

BFIN 501 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper-division courses and others as determined for each offering. For business majors: Formal admission to the College of Business. – Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BFIN 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. END Maximum 6 cr.
PREREQUISITE: Graduate standing consent of instructor, approval of Associate Dean and Dean of Graduate Studies. – Directed research and study on an individual basis.

BFEN Business: General
formerly part of MGMT, BUS or MKTG

BFEN 105 INTRODUCTION TO BUSINESS
On Demand 3 cr. LEC 2 RCT 1
– Management principles as they apply to first-line supervision and to the function of leadership and motivation in any organization. This course may not substitute for any required business course.

BFEN 194US SEMINAR
F 3 cr. SEM 3
– Introduction to business concepts, careers, and the culture of professionalism. This freshman seminar introduces students to the principal areas of business including accounting, finance, management, and marketing, while emphasizing ethics, written and oral communication, teamwork, and critical thinking skills.

BFEN 204 BUSINESS FUNDAMENTALS
F, S 3 cr. LEC 3
– Explores the application of business principles and functions including forms of business ownership, management and leadership, marketing, finance, accounting, economics, and social responsibility. Intended for students transferring into the College of Business and non-majors interested in business.

BFEN 242D INTRODUCTION TO INTERNATIONAL BUSINESS
F, S 3 cr. RCT 3
– Introduces topics of globalizations: differences in political economies, culture, legal systems, and ethical standards; international trade laws; issues in foreign direct investment trade alliances; global economic, financial, marketing, and human resource challenges; and organizational and strategic issues for international business.

BFEN 245D CULTURAL DIMENSIONS OF INTERNATIONAL BUSINESS
F 3 cr.
– The course will help students recognize the importance cultural differences play in conducting international business transactions. They will analyze the nature and impact of some common problems resulting from not understanding how to deal appropriately with cultural differences.

BFEN 302 CAREER PERSPECTIVES
F, S, Su 1 cr. LEC 1
PREREQUISITE: BMGT 205. This course is limited to College of Business students. – This highly interactive course helps students manage their career planning for business-related fields with an emphasis on pro-active career exploration and planning. Topics include self-assessment, researching career information, understanding the job search process, interviewing skills, and professionalism.

BFEN 361 PRINCIPLES OF BUSINESS LAW
F, S, Su 3 cr. LEC 3
PREREQUISITE: Junior standing. – American legal institutions, constitutional law, federalism, and roles and processes of the branches of government. Concentration on aspects of contract law and Article 2 of the Uniform Commercial Code. Survey of law of torts, employment, agency, and business organizations.

BFEN 468 CONTEMPORARY ISSUES IN BUSINESS ETHICS
On Demand 3 cr. LEC 3
PREREQUISITE: Senior standing or permission of the instructor. For business majors: Formal admission to the College of Business. – The relationship between business and society in the social, ethical and natural environment. A focus on issues of business responsibility and ethics with emphasis on practical business problems of leadership and accountability.

BFEN 472 LEGAL AND SOCIAL FRAMEWORK OF BUSINESS REGULATION
On Demand 3 cr. LEC 3.
PREREQUISITE: BGEN 361 or consent of instructor. For business majors: Formal admission to the College of Business. – Study of legal and social basis for government regulation of business. Topics include environmental regulation, employment and labor law, securities regulation, antitrust, and international trade. Students research and make class presentation on regulatory issues.

BFEN 499 BUSINESS SENIOR SEMINAR
F, S, Su 1 cr. LEC 1 SEM 3
PREREQUISITE: Senior standing. Formal admission to the College of Business, and completion of BMGT 335, BMIS 311, BMGT 541, BMKT 325, BFIN 322, and BGEN 361. This course is taken the last or next-to-last semester prior to graduation. – Senior capstone course. Policy, strategy, and ethics will be addressed in this integrative senior capstone courses.

BGEN Business - General

BGEN 105 INTRODUCTION TO BUSINESS
On Demand 3 cr. LEC 2 RCT 1
– Management principles as they apply to first-line supervision and to the function of leadership and motivation in any organization. This course may not substitute for any required business course.

BGEN 194US SEMINAR
F 3 cr. SEM 3
– Introduction to business concepts, careers, and the culture of professionalism. This freshman seminar introduces students to the principal areas of business including accounting, finance, management, and marketing, while emphasizing ethics, written and oral communication, teamwork, and critical thinking skills.

BGEN 204 BUSINESS FUNDAMENTALS
F, S 3 cr. LEC 3
– Explores the application of business principles and functions including forms of business ownership, management and leadership, marketing, finance, accounting, economics, and social responsibility. Intended for students transferring into the College of Business and non-majors interested in business.

BGEN 242D INTRODUCTION TO INTERNATIONAL BUSINESS
F, S 3 cr. RCT 3
– Introduces topics of globalization: differences in political economies, culture, legal systems, and ethical standards; international trade laws; issues in foreign direct investment trade alliances; global economic, financial, marketing, and human resource challenges; and organizational and strategic issues for international business.

BGEN 245D CULTURAL DIMENSIONS OF INTERNATIONAL BUSINESS
F 3 cr.
– The course will help students recognize the importance cultural differences play in conducting international business transactions. They will analyze the nature and impact of some common problems resulting from not understanding how to deal appropriately with cultural differences.

BGEN 302 CAREER PERSPECTIVES
F, S, Su 1 cr. LEC 1
PREREQUISITE: BMGT 205. This course is limited to College of Business students. – This highly interactive course helps students manage their career planning for business-related fields with an emphasis on pro-active career exploration and planning. Topics include self-assessment, researching career information, understanding the job search process, interviewing skills, and professionalism.

BGEN 361 PRINCIPLES OF BUSINESS LAW
F, S, Su 3 cr. LEC 3
PREREQUISITE: Junior standing. – American legal institutions, constitutional law, federalism, and roles and processes of the branches of government. Concentration on aspects of contract law and Article 2 of the Uniform Commercial Code. Survey of law of torts, employment, agency, and business organizations.

BGEN 468 CONTEMPORARY ISSUES IN BUSINESS ETHICS
On Demand 3 cr. LEC 3
PREREQUISITE: Senior standing or permission of the instructor. For business majors: Formal admission to the College of Business. – The relationship between business and society in the social, ethical and natural environment. A focus on issues of business responsibility and ethics with emphasis on practical business problems of leadership and accountability.

BGEN 472 LEGAL AND SOCIAL FRAMEWORK OF BUSINESS REGULATION
On Demand 3 cr. LEC 3.
PREREQUISITE: BGEN 361 or consent of instructor. For business majors: Formal admission to the College of Business. – Study of legal and social basis for government regulation of business. Topics include environmental regulation, employment and labor law, securities regulation, antitrust, and international trade. Students research and make class presentation on regulatory issues.

BGEN 499 BUSINESS SENIOR SEMINAR
F, S, Su 1 cr. LEC 1 SEM 3
PREREQUISITE: Senior standing. Formal admission to the College of Business, and completion of BMGT 335, BMIS 311, BMGT 541, BMKT 325, BFIN 322, and BGEN 361. This course is taken the last or next-to-last semester prior to graduation. – Senior capstone course. Policy, strategy, and ethics will be addressed in this integrative senior capstone courses.

BIOB Biology - General
formerly BIOL, PSPP

BIOB 100N ORGANISM FUNCTION
F 3 cr. LEC 3
– Provide students with an understanding of methods used to discover and create factual and theoretical knowledge of Organismal Biology. Emphasis on disciplinary methods, including kinds of questions asked, and methods used by biologists. Comparison of plant and animal systems with respect to structure and function, and examination of ecological adaptations.

BIOB 105CS INTRODUCTION TO BIOTECHNOLOGY
F 3 cr. LEC 2 SEM 1
– Introduction to an ever-growing industry. Course is designed to demonstrate the significance of biotechnology in today’s world. Lecture series presented by research professors, social scientists, and industrial experts.

BIOB 110C INTRODUCTION TO PLANT BIOLOGY
S 3 cr. LEC 1 LAB 2
– Provides an understanding of basic plant science principles and the related environmental components that impact society. Current questions in plant biology, agriculture, and ecology are used to develop problem-solving skills and integrative thinking.
**BIOB 140R HONORS MOLECULAR BIOLOGY AND GENE REGULATION**
S 3 cr. LEC 3
PREREQUISITE: Restricted entry through the Honors Program.
- Introduction to molecular biology research with an emphasis on how gene expression is regulated in cells and organisms. Hands-on learning of basic techniques in cell and molecular biology will culminate in an independent research project.

**BIOB 160 PRINCIPLES OF LIVING SYSTEMS**
F, S 4 cr. LEC 3 LAB 1
PREREQUISITE: CHMY 121 or CHMY 141.
- Introduction to cellular organization and function. Topics covered include synthesis and function of macromolecules, cell organelles and structure, energy transformations in living systems, respiration, photosynthesis, the cell cycle, classical genetics, molecular genetics, and biotechnology.

**BIOB 170N ORGANISMAL BIOLOGY**
F, S 4 cr. LEC 3 LAB 1
- This course examines the biology, ecology, and evolutionary relationships among living organisms. All forms of life will be considered, from single celled prokaryotes to multicellular eukaryotic plants and animals.

**BIOB 205 METHODS IN BIOTECHNOLOGY**
F, S 4 cr. Lab 4
- This course will challenge students in the biotech major to learn a series of essential molecular techniques focusing on research and faculty interaction. The techniques learned will be highly applicable to the biotech industry, giving students a post-graduation competitive edge.

**BIOB 256 INTRO BIO-CELLS TO ORGANISMS**
S 4 cr. LEC 3 LAB 1
PREREQUISITE: BioL 195, Stat 216 and CHMY 141 with a grade of “C” or better.
- Introduction to form and function in the animal and plant kingdoms. Topics will include circulation and gas exchange, chemical signals, reproduction, nutrition, and the animal nervous system. Laboratories will be inquiry based with mathematical and computational applications to biological problems.

**BIOB 258 INTRO BIO: ORGANISMS TO POPULATIONS**
S 4 cr. LEC 3 LAB 1
PREREQUISITE: or BioB 260, Stat 216 and M 161 or M 171.
- An introductory course in ecology and evolution with in-depth coverage of topics in micro- and macroevolution, behavioral ecology, population ecology, community ecology, and biodiversity. The laboratory portion of the course will include material on biological diversity, evolutionary processes, and ecological processes.

**BIOB 260 CELLULAR & MOLECULAR BIOLOGY**
F 4 cr. LEC 3 LAB 1
PREREQUISITE: Stat 216 and CHMY 141 and BioB 256 and CHMY 143 with a grade of “C” or better.
- Introduction to biological macromolecules, cell structures and function, and gene structure and expression. The laboratory portion will include both wet labs and computer-based modules.

**BIOB 290R UNDERGRADUATE RESEARCH**
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

**BIOB 291R SPECIAL TOPICS**
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

**BIOB 318 BIOMETRY**
F 3 cr. LEC 3
PREREQUISITE: M 145 and computer literacy.
- Analysis and interpretation of biological data. Topics include: analysis of frequency data, measures of center and spread, probability distributions, statistical inference for single means, and proportions, two sample means and proportions, linear regression, and correlation. Use of computer software is emphasized in solving problems.

**BIOB 375 GENERAL GENETICS**
F, S 3 cr. LEC 3
PREREQUISITE: BioB 160 or BioB 260 or BioB 360.
- Introduction to classical and molecular genetics of eukaryotes, with emphasis on transmission genetics, the structure and regulation of genes, and mechanisms of genetic change.

**BIOB 377PRACTICAL GENETICS**
S 3 cr. LEC 3
PREREQUISITE: BioB 160 or consent of instructor.
- Examination of the modes of inheritance, gene expression and genetic manipulation of eukaryotic organisms, particularly those of flowering plants and mammals. Population genetics, genetic diversity and quantitative genetics are also discussed.

**BIOB 385 GENETIC ANALYSIS**
F 3 cr. LEC 3
PREREQUISITE: BioB 214.
- Corequisite: BCH 380.
- Introduction to fundamental principles of eukaryotic molecular genetics. Emphasis on the genetics of major model organisms for biomedical research and how they are exploited to understand human biology and disease.

**BIOB 410 IMMUNOLOGY**
F
COREQUISITE: CHMY 211 or CHMY 321.
- Fundamentals of cellular and molecular immunology including consideration of structure, genetics and function of immunoglobulins, T-cell receptors and major histocompatibility antigens; regulation of the immune response; transplantation and immunological diseases.

**BIOB 411 IMMUNOLOGY LAB**
F
PREREQUISITE: BioB 410 (may be taken as corequsite).
- A laboratory study of basic and clinical immunology.

**BIOB 412 HYBRIDOMAS**
F 2 cr. LEC 1 LAB 1
PREREQUISITE: BioM 360 or consent of instructor.
- This course will provide students with a thorough theoretical and practical appreciation and understanding of the uses and methods involved in the production of monoclonal antibodies.

**BIOB 413 FLOW CYTOMETRY**
F 1 cr. LAB 1
PREREQUISITE: BioM 360, BioB 375, or consent of instructor.
- Theory and practice of flow cytometry with an emphasis on the analysis of mammalian cells.

**BIOB 414 ADVANCED MICROSCOPY**
F 1 cr. LAB 1
PREREQUISITE: BioM 360, BioB 375, or consent of instructor.
- Introduction to instrument design, operation and applications, and to modern techniques in preparing specimens for microscopic analyses, including computer-assisted microscopic imaging technology and microinjection.

**BIOB 415 ADVANCED IMMUNOLOGY METHODS**
F 1 cr. LAB 1
PREREQUISITE: BioM 360, BioB 375, or consent of instructor.
- This course provides hands-on experience on assays commonly used in immunology for the detection of an immune response.

**BIOB 420 EVOLUTION**
S 3 cr. LEC 3
PREREQUISITE: BioB 375.
- For seniors in biology. Evolutionary theory is presented and takes two principle directions, the study of evolutionary history, and the study of natural selection.

**BIOB 421 ETHICAL PRACTICE OF SCIENCE**
S 3 cr. Sem 3
PREREQUISITE: PHL 312, PHL 321, or at least one three-hundred level series of any science course.
- Examines the evolution of the scientific process with specific focus on the ethical responsibilities of scientists and to examine policies and procedures developed by the scientific community to ensure integrity in the research process.

**BIOB 425 ADV CELL & MOLECULAR BIOLOGY**
S 3 cr. LEC 3
PREREQUISITE: BioB 260 and BCH 380 or consent of instructor.
- In-depth study of cell structure and function.

**BIOB 450 PLANT BIOTECHNOLOGY**
S 3 cr. LEC 2 LAB 1
PREREQUISITE: BCH 380 or BioB 375 or BioB 377.
- Humans have historically altered plants to meet food and fiber needs. Our ability to transfer genes from organism to organism is accelerating this process. The principles of plant genetic engineering will be discussed along with hands-on laboratory.

---

**COURSE DESCRIPTIONS: BIOB**

---

---
BIOB 428 MOLECULAR EVOLUTION
F
PREREQUISITE: please check in with instructor.
- The educational objectives of this course are to provide advanced, upper division undergraduates and graduate students with a basic introduction to molecular evolution. The study of molecular evolution encompasses the origin and evolution of life on earth at the molecular level.

BIOB 438 DEVELOPMENTAL MECHANISMS
On Demand 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOB 425.
- This course will focus on the molecular and cellular mechanisms which drive developmental processes.

BIOB 475 GENOME SCIENCE
S, 3 cr. LEC 1 LAB 2
PREREQUISITE: BCH 380 or consent of instructor.
- The goals are to provide upper level students with the opportunity of designing and building their own genes. The goal of the course is to use this design experience to learn basic techniques in cell and molecular biology.

BIOB 476R GENE CONSTRUCTION
F 3 cr. LAB 3
PREREQUISITE: BIOB 425 or BCH 380.
- This course will train students in modern practice of genomics and functional gene expression using DNA cloning, automated DNA sequencing, and comprehensive sequence analysis.

BIOB 476R GENE CONSTRUCTION
F 3 cr. LAB 3
PREREQUISITE: BIOB 425 or BCH 380.
- The goals are to provide upper level students with the opportunity of designing and building their own genes. The goal of the course is to use this design experience to learn basic techniques in cell and molecular biology.

BIOE 103CS ENVIRONMENTAL BIOLOGY - ecological surrounding their management.
PREREQUISITE: Junior standing, and either BIOB 170 or BIOB 170.
- Basic ecology of the major animal species of the Yellowstone area and the ecological controversies surrounding their management.
COURSE DESCRIPTIONS: BIOE

BIOE 424 ECOLOGY OF FUNGI
F alternate years, to be offered odd years 3 cr.
LEC 2 LAB 1
PREREQUISITE: BIOB 170IN, BIOB 256, a comparable course in introductory biology, or consent of instructor.
COREQUISITE: None, but an upper division biology course is recommended.
- This course emphasizes the important and varied roles of the higher fleshy fungi in natural and managed systems, focusing on forest habitats. Fungi are the ecological backbone of many terrestrial systems, yet their ecological roles as saprophytes, symbionts, and mycorrhizal mutualists are often minimized. Both traditional techniques and more recent molecular methods will be presented at the individual, population, community, landscape, and biome levels, along with topics on fungal conservation and global change. This course consists of twice weekly sessions of two hours each for lecture, discussions, and demonstrations. One or two afternoon or morning field trips to nearby forests are required to initiate a final project.

BIOE 427 AQUATIC FIELD ECOLOGY
F 2 cr.
LEC 1 LAB 1
PREREQUISITE: Prior or concurrent registration in BIOE 428.
- Optional laboratory for BIOE 428. Introduction to representative freshwater habitats, communities, organisms, and sampling methods through laboratory and field exercises and classroom discussions. Formal written reports are required after completed exercises.

BIOE 428 FRESHWATER ECOLOGY
F 3 cr.
LEC 3
PREREQUISITE: BIOE 370 or consent of instructor.
- This course examines relationships between freshwater organisms and their environment. Students learn about the ecology of rivers, lakes, reservoirs, and wetlands, with exposure to a wide diversity of organisms and processes. Emphasis is placed on linking basic concepts and real-world applications.

BIOE 439 STREAM ECOLOGY
F 3 cr.
LEC 2 LAB 1
PREREQUISITE: BIOB 170, CHMY 121 or CHMY 141, and PHSX 205.
- Examination of the structure and function of stream ecosystems emphasizing connections among stream organisms, the aquatic chemical and physical environment, and the surrounding terrestrial landscape.

BIOE 440 CONSERVATION BIOLOGY
F 3 cr.
LEC 3
PREREQUISITE: BIOE 370.
- Examines issues relevant to conservation of wild populations, focusing primarily on animals. Emphasis is on approaches that use demography, population biology and genetics to address conservation questions. Readings are from the primary literature, rather than a textbook, including case studies. Crosslisted with BIOI 521.

BIOE 455 PLANT ECOLOGY
S 3 cr.
LEC 3
PREREQUISITE: BIOB 170 or BIOB 258 and BIOE 370 or NRSM 240.
- Principles of plant ecology, covering plant-environmental relations, plant life histories, plant species interactions, plant community concepts, succession, and the role of plants in ecosystem processes.

BIOE 490 UNDERGRADUATE RESEARCH
F, Su 1 - 6 cr. IND May be repeated. Max 12 credits, maximum of 6 as electives in Organismal Biology Option.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

BIOE 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 12 credits, maximum of 6 as electives in Organismal Biology Option.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

BIOE 494 SEMINAR/WORKSHOP
S 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Topics offered at the upper division level which are not covered in regular courses. Students attend and discuss seminar presentations by professional biologists.

BIOE 499 SENIOR THESIS/CAPSTONE
S 2 cr. SEM 2
PREREQUISITE: Senior standing and as determined for each offering.
- Senior capstone course. Discussion of topics that integrate evolutionary theory with ecology, genetics, medicine, behavior, or other subjects that are part of the biology curriculum.

BIOE 504 QUANTITATIVE BIOLOGY
F alternate years, to be offered even years 5 cr.
LEC 2 LAB 1
PREREQUISITE: BIOE 370, either STAT 216 or STAT 352, and one of the following: M 161, M 191, M 192.
- Applications of mathematical models to biological phenomena with examples drawn from physiology, ecology and bioengineering. The course is intended to develop facility with optimization techniques, numerical methods, matrix operations, complex variables and simple statistical ideas. Computer lab.

BIOE 505 ENVIRONMENTAL ANALYSIS
S alternate years, to be offered even years 3 cr.
PREREQUISITE: BIOE 370, either STAT 216 or STAT 352 and one of the following: M 161, M 191, M 192.

BIOE 506 POPULATION DYNAMICS
S alternate years, to be offered odd years 3 cr.
LEC 2 LAB 1
PREREQUISITE: BIOE 370, either STAT 216 or STAT 352, and one of the following: M 161, M 171, M 172.
- Techniques for modeling the growth, regulation, harvesting and persistence of populations. Computer lab.

BIOE 513 TERRESTRIAL ECOLOGY OF PLAINS AND PRAIRIES
Su 1 cr.
RQT 1
PREREQUISITE: Either BIOE 408 or BIOE 516, graduate standing, secondary teacher certification, two years teaching experience, and computer access.
COREQUISITE: Suggested: ESCI 513.
- Students will develop plant keys for classroom use, quantitatively analyze two grassland communities, and develop classroom activities on ecology of grasslands. Distance learning, class offered by internet connection. This course is designed for secondary school teachers enrolled in MSSE program and cannot be used in graduate programs in Biological Sciences.

BIOE 515 LANDSCAPE ECOLOGY AND MANAGEMENT
F alternate years, to be offered odd years 4 cr.
LEC 2 LAB 2
PREREQUISITE: Graduate standing or consent of instructor.
- Principles on landscape pattern, change, and function. Application of theory to conservation including population viability, reserve design, multiple-use landscapes. Lab introduces GIS, GPS, and simulation models. For graduate students and motivated undergraduates.

BIOE 516 TERRESTRIAL ECOLOGY OF THE NORTHERN ROCKY MOUNTAINS
Su 2 cr.
RQT 1 LAB 1
PREREQUISITE: Graduate standing, two years of classroom teaching, undergraduate science degree, and one year of biology.
- Description and comparison of grass land, forest, and alpine ecosystems of the NRM with respect to composition, structure, and process such as production, decomposition and mineral cycling. We will use tools including keys to species and environmental types, dimension analysis, remote sensing, and statistics. This course is designed for secondary school teachers enrolled in MSSE Program and cannot be used in graduate programs in biological sciences.

BIOE 518 PARAMETER ESTIMATION FOR ECOLOGICAL MODELS
F alternate years, to be offered odd years 3 cr.
LEC 2 LAB 1
PREREQUISITE: BIOE 504 or equivalent.
- Statistical methods to quantify uncertainty, and to plan data collection for cost-effective reduction in uncertainty, in application to ecological models where data are often sparse and processes are often noisy; and management decision must take account of uncertainty.

BIOE 519 BIOLOGY OF RIPARIAN ZONES AND WETLANDS
Su 2 cr.
RQT 2
PREREQUISITE: Either BIOE 516 or BIOE 408, secondary teacher certification, two years teaching experience, and computer access.
COREQUISITE: Suggested: ESCI 512, ESCI 515.
- Students will develop plant keys for classroom use, quantitatively analyze two riparian and two wetland areas, and develop classroom activities about ecology of those areas. Distance learning class offered by internet connection. This course is designed for secondary school teachers enrolled in the MSSE program and cannot be used in graduate programs in Biological Sciences.
BIOE 520 ANIMAL BIODIVERSITY IN GYE
Su 2 cr. LEC 1 LAB 1
PREREQUISITE: BIOE 370, F&WL 301, BIOE 405, or equivalent and (a) 2 years science technology experience or (b) enrolled in MSSE.
- Exploration of biodiversity’s meaning, importance & determinants; key ecological features of the Greater Yellowstone Ecosystem and patterns of change in these features: possibilities for maintaining biodiversity in the Greater Yellowstone Ecosystem.

BIOE 521 CONSERVATION BIOLOGY
F 3 cr. LEC 3
PREREQUISITE: BIOE 370, BIOB 420 and STAT 216, or equivalents.
- A broad survey of conservation biology, with studies spanning genetics, demography/population dynamics, and community/ecosystem/landscape ecology. Approaches include empirical field studies, mathematical models and conceptual discussion. Includes lab modeling exercises, extensive reading in primary literature, and writing a research paper. Cross-listed with BIOE 449.

BIOE 522 BIRDS OF PREY IN THE GREATER YELLOWSTONE ECOSYSTEM
Su 2 cr. LEC 1 LAB 1
PREREQUISITE: BIOE 370, WILD 501, BIOE 405, or equivalent and 2 years science technology experience or enrolled in MSSE.
- Exploration of the ecology and habitat of avian raptors, study of the Greater Yellowstone Ecosystem (GYE). Application of the scientific method to the study of raptors. Field identification of raptors, investigation of species life histories, and inquiry methods of species-specific habitat needs. Student will develop methods and skills for classroom based research on wildlife. This course is designed for secondary school teachers enrolled in the MSSE program and cannot be used in graduate programs in Biological Sciences.

BIOE 523 WILDLIFE ECOLOGY OF THE NORTHERN ROCKY PLAINS
Su 2 cr. LEC 2
PREREQUISITE: BIOE 370, WILD 501, BIOE 405, or equivalent and 2 years science technology experience or enrolled in MSSE.
- Introduction to wildlife species and the range of habitats present in the Northern Rocky Mountain ecosystems. Emphasis on large carnivores and ungulates within montane terrestrial systems. Application of the scientific method to study interactions between predators, prey, and human impacts. This course is designed for middle and high school teachers and cannot be used in graduate programs in Biological Sciences.

BIOE 524 FRONTIERS IN LANDSCAPE ECOLOGY
F alternate years to be offered even years 3 cr.
LEC 2 LAB 1
PREREQUISITE: BIOE 370 or the equivalent.
- Students and instructor will write a scientific paper for publication that synthesizes an important question in landscape ecology. Students will select the topic, review and synthesize current knowledge on the topic, and write a scientific manuscript.

BIOE 525 RESEARCH METHODS AND THE SCIENTIFIC PROCESS
F 3 cr. LEC 2 RCT 1
PREREQUISITE: Graduate standing or consent of instructor.
- Application of the scientific method to answer biological questions and the development of skills needed to prepare research proposals, critique research studies and communicate research findings. For first year graduate students.

BIOE 532 PHYSIOLOGICAL PLANT ECOLOGY
F alternate years, to be offered odd years 3 cr.
LEC 3
PREREQUISITE: BIOE 370.
- Outlines the plant’s Hutchinsonian niche through review of energy, material (water, nutrients and toxins) and mechanical (including animal) factors. Computer modeling of plant function in the environment is discussed.

BIOE 533 PHYSIOLOGICAL PLANT ECOLOGY LAB
F alternate years, to be offered odd years 1 cr.
LAB 1
COREQUISITE: BIOE 532.
- A research project in physiological plant ecology will be chosen, carried out and reported in scientific journal format.

BIOE 534 VEGETATION ECOLOGY
F, offered in alternate spring semesters in odd numbered years 3 cr.
LEC 3
PREREQUISITE: BIOE 370.
- Considers the composition, structure, function, distribution in time and space, ecology and classification of communities. Emphasizes universal methods, current studies and Rocky Mountain systems. Complementary field experience is available in BIOE 468.

BIOE 540 ANALYSIS OF ECOLOGICAL COMMUNITIES
F, offered in alternate spring semesters in even numbered years 3 cr.
LEC 2 LAB 1
- Multivariate statistical analysis of data from terrestrial or aquatic, plant or animal communities. Classification, ordination, and predictive modeling of species and communities, emphasizing a hands-on approach and practical problem solving in community ecology.

BIOE 542 COMMUNITY ECOLOGY
S alternate years, to be offered odd years 3 cr.
LEC 3
PREREQUISITE: At least one undergraduate or graduate course in each of the following: ecology (e.g., M 170) and statistics (e.g., STAT 216) or consent of instructor.
- Focuses on the origin, maintenance, and consequences of biological diversity within local communities by examining studies of natural patterns, explorations of mathematical models and direct experimentation. The complexities of species interactions are explored in multispecies assemblages.

BIOE 548 CONSERVATION GENETICS
F 3 cr. LEC 3
PREREQUISITE: BIOE 375, STAT 216 and STAT 217.
- Introduction to the application of genetics for the conservation of plant and animal populations. Emphasis will be placed on case studies from the primary literature and analyzing genetic data using mathematical models developed in class. Cross-listed with BIOE 480.

BIOE 555 COMMUNICATIONS IN ECOLOGICAL SCIENCES
S 1 cr. SEM 1
PREREQUISITE: Graduate standing - consent of instructor.
- This course will require students to gain experience presenting scientific information in a variety of communication methods.

BIOE 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1 - 4 cr.
IND
Graduate standing and committee approval and consent of instructor.
- A research or professional paper or project dealing with a topic in the field. The topic must be mutually agreed upon by the student and his or her major advisor and graduate committee.

BIOE 590 MASTER’S THESIS
F, S, Su 1 - 10 cr.
IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.

BIOE 591 SPECIAL TOPICS
On Demand 1 - 4 cr.
Max 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BIOE 592 INDEPENDENT STUDY
On Demand 1 - 3 cr.
IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

BIOE 594 SEMINAR
On Demand 1 cr.
SEM Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition and course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

BIOE 598 INTERNSHIP
On Demand 2 - 12 cr.
IND
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

BIOE 690 DOCTORAL THESIS
F, S, Su 1 - 10 cr.
IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.
COURSE DESCRIPTIONS: BIOH

BIOH 112 HUMAN FORM AND FUNCTION
F 4 cr. LEC 3 LAB 1
- Human anatomy, physiology, and pathology; including etiology, prognosis, medical treatment, signs and symptoms of diseases of respiratory, endocrine, excretory, and reproductive systems. Proper diet and nutrition guidelines are also addressed. This course will focus on the key elements of anatomy and physiology necessary for students in allied health professions, specifically those who will work the areas of community health, health enhancement education, health promotion, and kinesiology. The aim of this course is for students to demonstrate working knowledge of the muscular, skeletal, nervous, cardiovascular, and respiratory systems, and to demonstrate an understanding of the endocrine and digestive systems and body metabolism.

BIOH 113 HUMAN FORM AND FUNCTION II
S 3 cr. LEC 3
- Human anatomy, physiology, and pathology; including etiology, prognosis, medical treatment, signs and symptoms of diseases of muscular, skeletal, nervous, cardiovascular, and lymphatic systems.

BIOH 185 INTEGRATIVE PHYSIOLOGY
F 4 cr. LEC 3 LAB 1
COREQUISITE: CHMY 141 or CHMY 151.
- How the human body works. For students planning to be health professionals. Designed to be taken before BIOB 256, includes basic cellular mechanisms, physiological control and communication. Major topics include muscle, nerve, respiratory, renal, and cardiovascular systems. Cadaver laboratory will cover related human anatomy.

BIOH 201 HUMAN ANATOMY & PHYSIOLOGY I
S,Su 5 cr. LEC 3 LAB 2
PREREQUISITE: CHMY 121, CHMY 141 or CHMY 151 with a grade of “C” or better. Priority given to majors requiring this course.
- General principles of cell and tissue biology that apply to all living systems. Structure and function of skeletal, muscular, nervous, and endocrine systems. Homeostasis, control, and integration of the human body will be emphasized. Laboratory will cover related systems. This course is not repeatable without prior consent of instructor.

BIOH 211 HUMAN ANATOMY & PHYSIOLOGY II
F 4 cr. LEC 3 LAB 1
PREREQUISITE: BIOH 201, BIOB 260 or BIOM 360 with grades of “C” or better in each course. Priority given to majors requiring this course.
- Structure and function of digestive, cardiovascular, respiratory, reproductive, and urinary systems of humans. Principles of integration, metabolism, energy flow, and homeostasis will be emphasized. This course is not repeatable without prior consent of instructor.

BIOH 287 INTERMEDIATE HUMAN PHYSIOLOGY I
S 3 cr. LEC 3
PREREQUISITE: CHMY 121 or CHMY 141 or CHMY 151 with grades of “C” or better in either course.
- General principles of cell and tissue biology; function of skeletal, muscular, nervous, and endocrine systems. Homeostasis, control, and integration of the human body will be emphasized.

BIOH 288 INTERMEDIATE HUMAN PHYSIOLOGY II
F 3 cr. LEC 3
PREREQUISITE: or BIOH 201 or BIOB 260 or BIOH 507 or BIOM 360 with grades of “C” or better in each course.
- Function of the human digestive, cardiovascular, respiratory, reproductive, and urinary systems. Principles of integration, metabolism, energy flow and homeostasis will be emphasized.

BIOH 313 NEUROPHYSIOLOGY
F 3 cr. LEC 3
PREREQUISITE: BIOB 256 and BIOB 260.
- Physiology of integrative mechanisms in nervous systems. Topics range from the mechanisms of synaptic transmission and action potential generation to the neural basic of learning and memory.

BIOH 320 BIOMEDICAL GENETICS
F 3 cr. LEC 3
PREREQUISITE: BIOB 214
COREQUISITE: BCH 580
- Introduction to fundamental principles of eukaryotic molecular genetics. Emphasis on the genetics of the major model organisms of biomedical research and how they are exploited to understand human biology and disease.

BIOH 323 HUMAN DEVELOPMENTAL BIOLOGY
S 4 cr. LEC 4
PREREQUISITE: BIOH 170 or BIOH 258, and or BIOH 260, and BIOB 375.
- Developmental Biology: Introduction to the cell signaling pathways and morphogenetic processes that establish the basic vertebrate body plan. Includes hands-on study of chicken and frog embryos.

BIOH 340 PRINCIPLES OF HISTOLOGY
S 3 cr. LEC 4
PREREQUISITE: or BIOH 260, senior standing and consent of instructor.
- Microscopic study of cells, tissues, and selected mammalian organs.

BIOH 395 HUMAN PATHOPHYSIOLOGY
S 3 cr. LEC 2 IND 1 SEM 1
PREREQUISITE: BCH 380 or consent of instructor.
- Students will research two diseases of their own choosing and present a class presentation of their findings. The presentation normally includes diagnosis, pathophysiology, and treatment.

BIOH 405 HEMATOLOGY
F
PREREQUISITE: , BIOL 207 or BIOL 208, BIOL 410 and BCH 380 are recommended.
COREQUISITE: MB 405.
- A study of the function, biochemistry, cell biology, and pathology of blood and its constituents.

BIOH 406 HEMATOLOGY LABORATORY
PREREQUISITE: BIOL 207 or BIOL 208.
COREQUISITE: MB 405.
- Methods of examining white blood cells, red blood cells, and platelets. Also included is the examination of abnormal blood cells, hemostasis, and fluorescent antibody cell sorting analysis.

BIOH 449 ADVANCED HUMAN ANATOMY OF THORAX AND ABDOMEN
Su 4 cr. LEC 2 LAB 2
PREREQUISITE: Junior standing and 2 upper division biology courses and consent of instructor.
- Covers thorax and abdomen anatomy, emphasizing topography and three dimensional relations. Instruction will be based on student dissections of human cadavers, with lectures covering structure and function, as well as pathology typically encountered in the dissection laboratory.

BIOH 451 ADVANCED HUMAN ANATOMY
S 4 cr. LEC 2 LAB 2
PREREQUISITE: Senior standing, completion of at least two upper division courses in the biological sciences and consent of instructor.
- Covers back, extremities and joint anatomy, emphasizing topography and three dimensional relations. Instruction will be based on student dissections of human cadavers, with lectures covering structure and function, as well as pathology typically encountered in the dissection laboratory. Class can fulfill 4 upper division honors credits, if prerequisites are satisfied.

BIOH 472 GENES AND CANCER
F 3 cr. LEC 3
PREREQUISITE: BIOB 375 and BIOH 425.
- This course will focus on the molecular and cellular mechanism of human cancer. The role of oncogenes and tumor suppressor genes in normal and cancerous cells will be examined, with an emphasis on how mutations in certain genes result in altered cell-cell signaling and cell proliferation. The role of genetic mutation in breast, colorectal and lymphoma cancers will be discussed, along with new technologies to detect and treat these cancers.

BIOH 475 SENSORY NEUROPHYSIOLOGY
S 3 cr. LEC 3
PREREQUISITE: BIOH 313.
- Neurophysiology of sensory cells and systems. Topics range from the mechanisms underlying sensory perception to the processing of sensory information at higher stages. The major focus will be on human sensory systems. Pathologies that effect sensory perception will be considered.

BIOH 490 NEUROTOLOGY
On Demand 3 cr. LEC 3
PREREQUISITE: Consent of instructor.
- Neural and hormonal bases of animal behavior, including mechanisms underlying sensory perception and motor responses, learning and memory, spatial navigation, language, dominance hierarchies and aggression, mating systems, and parental behavior. Model systems from a variety of different animal species will be studied including humans.

BIOH 495 COGNITIVE NEUROSCIENCE
S 3 cr. LEC 3
PREREQUISITE: BIOH 313, BCH 380 plus one of: BIOH 211, PSYX 350, BIOC 412.
- This course will survey our present knowledge of the neural basis of normal and abnormal cognitive function in humans and non-human primates. Topics will range from perception and action to attention, consciousness and mental illness.

BIOH 499 NEUROSCIENCE OF MENTAL ILLNESS
F 3 cr. LEC 3
PREREQUISITE: BIOH 313 or BIOH 435.
- Survey of the major categories of human mental illness and their underlying neural mechanisms and treatments.
BIOH 455 MOLECULAR MEDICINE
S 3 cr. LEC 1 SEM 2
PREREQUISITE: BIOB 375 and BCH 380.
- Lecture and seminar courses based on recent, original papers. Moves from human disease to molecular explanations. Intended for upper level students with a strong background in biology.

BIOH 464 CLIN HEM & BODY FLUIDS
Su
PREREQUISITE: Acceptance in professional training program.
- Topics include a review of normal hematopoiesis; red blood cell, white blood cell, and platelet disorders; body fluid overview; and an introduction to hematology instrumentation.

BIOH 466 CLIN MICROBIOLOGY I
Su
PREREQUISITE: Acceptance in professional training program.
- Topics include a review of medical microbiology, virology, mycology, parasitology, and clinical laboratory testing procedures.

BIOH 467 CLINICAL CHEMISTRY I
Su
PREREQUISITE: Acceptance in professional training program.
- Topics include an introduction to theories and principles with emphasis on all body systems, and the role of instrumentation in the clinical chemistry laboratory.

BIOH 468 CL. IMMUNOHEMATOLOGY I
Su
PREREQUISITE: Acceptance in professional training program.
- Basic techniques in blood banking. Topics to be included are: ABO/Rh typing, antibody identification, transfusion therapy and reactions, donor collection and component preparation.

BIOH 469 ESSENTIALS OF CLIN LAB PRACTICE
Su
PREREQUISITE: Acceptance in professional training program.
- Provides an orientation to the program, safety information, phlebotomy training, and an overview of management practices. Also includes instruction in hemostasis, molecular diagnostics and urinalysis.

BIOH 470 SUMMER CLINICAL LABORATORY
Su
PREREQUISITE: To take this course, students must be accepted into a professional training program.
- MB 460 in a clinical laboratory science course, which will be conducted at affiliate training programs during the summer of a student’s senior year. It includes student lecture and laboratory instruction in clinical immunohematology, clinical chemistry, phlebotomy, clinical hematology, clinical microscopy and urinalysis, clinical body fluids, transfusion techniques, and clinical microbiology.

BIOH 471 PROFESSIONAL TRAINING I
F
PREREQUISITE: MB 460.
- BIOH 471 is the first semester of professional training at a clinical laboratory hospital affiliate. Students will review basic and advanced information in immunohematology, clinical chemistry, clinical hematology, clinical microbiology, clinical immunology, medical mycology, and phlebotomy techniques. Students will perform patient laboratory testing under the guidance of trained professionals.

BIOH 472 PROFESSIONAL TRAINING II
S
PREREQUISITE: MB 461.
- MB 462 is the second semester of professional training at a clinical laboratory hospital affiliate. Students will learn financial and quality management information of the clinical laboratory and study advanced immunohematology, clinical chemistry, clinical microbiology, and clinical hematology. During this course, students will perform actual patient laboratory testing under the guidance of trained professionals.

BIOH 473 LABORATORY PRACTICE II
F
PREREQUISITE: Students must be accepted to the MMLS training program.
- Essential skills for performing phlebotomy, laboratory specimen collection, handling and preparing samples for laboratory analysis and interpersonal communication skills will be emphasized.

BIOH 474 CLINICAL HEMATOLOGY II
F
PREREQUISITE: Students must be accepted to the MMLS training program.
- Blood cell identification, manual and automated procedures for the assessment of hematologic disease will be emphasized. Students will begin to learn to assess, interpret and correlate hematologic data with disease.

BIOH 475 CLINICAL HEMOSTASIS
F
PREREQUISITE: Students must be accepted to the MMLS training program.
- Laboratory skills using manual and automated procedures will be emphasized. Students will assess, interpret and correlate data as it relates to normal and abnormal hemostasis and anticoagulant therapy.

BIOH 476 CLINICAL MICROBIOLOGY II
F
PREREQUISITE: Students must be accepted to the MMLS training program.
- The ability to differentiate pathogens from commensals and perform identification procedures and antimicrobial susceptibility testing are emphasized along with an introduction to specialized and automated testing.

BIOH 477 CLINICAL MICROBIOLOGY II
F
PREREQUISITE: Students must be accepted to the MMLS training program.
- Students must be able to differentiate pathogens from commensals and perform identification procedures and antimicrobial susceptibility testing are emphasized along with an introduction to specialized and automated testing.

BIOH 478 CLINICAL IMMUNOHEMATOLOGY II
F
PREREQUISITE: Students must be accepted to the MMLS training program.
- Maintenance of blood components and performing routine and basic problem solving procedures in the blood bank will be emphasized. Correlation of immunohematology theory and disease with testing and transfusion practices and patient care will be covered.

BIOH 479 CLINICAL IMMUNOLOGY/ SEROLOGY
F
PREREQUISITE: Students must be accepted to the MMLS training program.
- Assessment, interpretation and clinical significance of immunology principles and techniques and their correlation to laboratory data and patient disease will be emphasized.

BIOH 482 LABORATORY PRACTICE III
S
PREREQUISITE: Students must be accepted to the MMLS training program.
- A two week rotation in a small hospital laboratory provides an opportunity to experience a different work environment and practice laboratory skills.

BIOH 484 CLINICAL HEMATOLOGY III
S
PREREQUISITE: Students must be accepted to the MMLS training program.
- Competence in performing testing and the ability to assess, interpret, and correlate hematologic data with other patient information to recommended additional testing, diagnosis, and probable treatment option for the patient will be emphasized.

BIOH 486 CLIN MICROBIO & MOLECULAR DIAG
S
PREREQUISITE: Students must be accepted to the MMLS training program.
- Competently identify and provide susceptibility data for microorganisms isolated from human specimens including clinically significant yeasts, molds, parasites, viruses and mycobacterium. Perform molecular diagnostic techniques available.

BIOH 487 CLINICAL CHEMISTRY III
S
PREREQUISITE: Students must be accepted to the MMLS training program.
- Achieve entry level knowledge of disease processes, and exhibit professional competencies in clinical chemistry laboratory procedures and the operation of laboratory instrumentation.

BIOH 488 CLINICAL IMMUNOHEMATOLOGY
S
PREREQUISITE: Students must be accepted to the MMLS training program.
- Attain competency and the ability to correlate testing data to theory and initiate advanced techniques where appropriate. Students will demonstrate entry level competency by monitoring the daily aspects of blood bank operation.

BIOH 489 LABORATORY MANAGEMENT
S
PREREQUISITE: Students must be accepted to the MMLS training program.
- General management policies, principles, and procedures necessary for efficient operation of a clinical laboratory will be emphasized along with federal and state regulations which govern the clinical laboratory.

BIOH 491 SPECIAL TOPICS
On Demand
Max 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.
BIOH 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing. 
- Directed research and study on an individual basis.

BIO 490 ADV HUMAN TORSO ANAT F
PREREQUISITE: Junior standing and 2 upper division biology courses and consent of instructor.
- Covers thorax and abdomen anatomy, emphasizing topography and three dimensional relations. Instructors will be based on student sections of human cadavers, with lectures covering structure and function, as well as pathology typically encountered in the dissection laboratory.

BIOM 290R UNDERGRADUATE RESEARCH F, S, Su 1 - 3 cr. May be repeated; Max 12 cr.
PREREQUISITE: Course prerequisites as determined by each offering department.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

BIOM 291 SPECIAL TOPICS F
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

BIOM 501 EVOLUTIONARY GENETICS F alternate years, to be offered odd years 3 cr.
LEC 3
PREREQUISITE: BIOL 375.
- The operations of fundamental genetic principles in populations of living things. Emphasis on natural populations with a thorough consideration of factors of evolution, particularly at the species level and below.

BIOM 503 PALEOBIOLOGY S alternate years, to be offered odd years 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOM 310, BIOL 420.
- A study of the fossil record as a means of inferring biological characteristics of extinct species. Current topics in paleontology, phylogenetic systematics, patterns of evolution, speciation and extinction and osteohistology will be examined.

BIOM 508 SCIENTIFIC WRITING S 3 cr. LEC 2 LAB 1
PREREQUISITE: Graduate standing and permission of instructor.
- The course is designed to provide an intensive scientific writing experience for graduate students in the process of writing the first draft of their thesis or dissertation, including editing and critique sessions by both peers and the instructor.

BIOM 510 TOPICS IN NEUROBIOLOGY S 3 cr. LEC 2 RCT 1 Maximum of 9 credits.
PREREQUISITE: Graduate standing and at least one upper division or graduate course in neurobiology.
- Recent advances in topics in neurobiology with emphasis in different years on either neurocytology, neuroendocrinology/neuroimmunology, or developmental neurobiology.

BIOM 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT F, S, Su 1 - 3 cr. IND
Graduate standing and committee approval.
- A research or professional paper or project dealing with a topic in the field. The topic must be mutually agreed upon by the student and his or her major advisor and graduate committee.

BIOM 588 PROFESSIONAL DEVELOPMENT On Demand 1 - 3 cr. May be repeated; maximum 3 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies.
- Courses offered on a one time basis to fulfill professional development needs of in service educators. A specific focus is given to each course which is appropriately subtitled.

BIOM 590 MASTER’S THESIS F, S, Su 3 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.

BIOM 591 SPECIAL TOPICS On Demand 1 - 4 cr. Max 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BIOM 592 INDEPENDENT STUDY On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

BIOM 594 SEMINAR On Demand 1 cr. SEM Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition and course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

BIOM 598 INTERNSHIP On Demand 2 - 12 cr. IND
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

BIOM 690 DOCTORAL THESIS F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

BIOM 101 CAREERS IN MICROBIOLOGY F 1 cr. LEC 1
- The course introduces students to educational and career opportunities in the fields of medical, molecular, ecological, and environmental microbiology. The course introduces students to the various options in the microbiology degree program. It will emphasize the differences in the options and the employment opportunities in each once a degree has been obtained.

BIOM 103 IN UNSEEN UNIVERSE: MICROBES S 3 cr. LEC 2 LAB 1
- Beneficial and harmful effects of microorganisms on individual health, public health, food and water quality; are relevant to an informed citizen of the 21st century. Current news topics and historical perspectives are emphasized. Laboratory exercises investigate microbial activity in our everyday world.

BIOM 210 RN PRINCIPLES OF ENVIRONMENTAL HEALTH SCIENCE F 4 cr. LEC 3 LAB 1
- Environmental programs and activities concerned with identification and control of physical-chemical-biological factors that impact human health; water pollution and treatment, food protection, air pollution, hazardous waste disposal, vector borne disease control, community sanitation, hazard control in institutional and occupational environments. The course emphasizes how human health is linked to the health of the environment.

BIOM 250 MICROBIOLOGY FOR HEALTH SCIENCES: INFECTIOUS DISEASES F, S 5 cr. LEC 3
- Introduction to uses of biological molecules for improving health and agriculture. Gene therapy and DNA fingerprinting are discussed in relation to social/moral issues. Intent of course is to help students develop a rational approach to evaluate cost/benefit of biotechnology to society.

BIOM 290R UNDERGRADUATE RESEARCH F, S, Su 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Consent of instructor and approval of instructor.
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

BIOM 291 SPECIAL TOPICS On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BIOM 292 INDEPENDENT STUDY On Demand 1-3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of instructor.
- Directed research and study on an individual basis.
COURSE DESCRIPTIONS: BIOM, BIOO

BIOM 360 GENERAL MICROBIOLOGY  
F S 5 cr. LEC 3 LAB 2  
PREREQUISITE: BIOB 170N  
COREQUISITE: CHMY 211 or CHM 321.  
- An introduction to major topics and subdisciplines in microbiology including microbial diversity and classification, microbial anatomy and physiology, microbial genetics, microbial ecology, medical microbiology and immunity, epidemiology and public health, and biotechnology.

BIOM 400 MEDICAL MICROBIOLOGY  
S 5 cr. LEC 2 RCT 1  
PREREQUISITE: BIOM 360; Recommended BIOB 410.  
- Selected viral, bacterial and protozoan infections of man and domestic animals will be covered with an emphasis on disease process and immune responses.

BIOM 410 MICROBIAL GENETICS  
S 5 cr. LEC 3  
PREREQUISITE: BIOM 360, BCH 380.  
- The students will become familiar with concepts in microbial genetics, including DNA replication, RNA, and protein biosynthesis. Other concepts covered in the course include bacteriophage and plasmid biology, gene regulation, mobile genetic elements, and the fundamentals of genetic engineering.

BIOM 415 MICROBIAL DIVERSITY, ECOLOGY & EVOLUTION  
S alternate years, to be offered even years. LEC 3  
PREREQUISITE: BIOM 360, BCH 380, or consent of instructor  
- The diversity of procaryotic and eucaryotic microorganisms will be explored from both classical phenotypic and contemporary genotypic perspectives. The linkage between microbial diversity, its evolutionary origins, and its ecological value will be emphasized.

BIOM 421 CONCEPTS OF PLANT PATHOLOGY  
S 3 cr. LEC 2 LAB 1  
PREREQUISITE: BIOB 170N.  
- An introductory course in the study of plant diseases. Includes plant pathogens, etiology of disease, and various control strategies.

BIOM 423 MYCOLOGY  
F alternate years, to be offered even years 5 cr. LEC 2 LAB 1  
PREREQUISITE: BIOB 170N.  
- This course surveys the immense diversity of fungi, including all major groups with emphasis on structures, life cycles, identification, and ecology. It provides a basis of knowledge for the rapidly expanding relevance of fungi in research, medicine, agriculture, biotechnology, and industry.

BIOM 427 GENERAL PARASITOLOGY  
S alternate years, to be offered odd years 3 cr.  
LEC 2 LAB 1  
- Study of life cycles, biochemistry, molecular parasitology, pathogenesis, identification and treatment of the major parasitic groups, including parasitic protoza, monogeneans, digenecans, cestodes, nematodes, acanthocephalans, and parasitic arthropods.

BIOM 430 APPLIED AND ENVIRONMENTAL MICROBIOLOGY  
S 4 cr. LEC 3 LAB 2  
PREREQUISITE: BIOM 360.  
- The course introduces students to complex concepts in water microbiology, food microbiology, sterility and disinfection, the use of microorganisms in manufacturing processes and in the degradation of contaminants in the environment.

BIOM 431 MEDICAL BACTERIOLOGY  
S 3 cr. LEC 3  
PREREQUISITE: BIOM 360.  
- Epidemiology and etiology of bacterial and viral diseases in humans with emphasis on biologic mechanisms; host defenses and responses to infections; Chemotherapy; prevention, and control of bacterial and viral diseases.

BIOM 432 MEDICAL BACTERIOLOGY LAB  
S 2 cr. LAB 2  
PREREQUISITE: BIOM 431.  
- Laboratory methods designed to teach techniques used in culturing and identifying bacterial pathogens and normal flora from clinical specimens. Procedures used to test the antibiotic susceptibility of pathogenic bacteria.

BIOM 435 Virology  
F 5 cr. LEC 3  
PREREQUISITE: BIOM 260 or BIOM 425 or BCH 380 or consent of instructor.  
- Fundamentals of virology with emphasis on animal viruses of medical importance. Molecular aspects of structure, replication transmission and host response to viral infection will be covered.

BIOM 441 EUKARYOTIC PATHOGENS  
S 4 cr. LEC 3 LAB 1  
PREREQUISITE: BCH 380 or equivalent.  
- The study of fungal structure, physiology and taxonomy, disease and host-parasite relationships; and procedures used to isolate and identify pathogenic fungi. Also, the study of biology, pathogenesis, diagnosis and treatment of medically important parasites.

BIOM 450 MICROBIAL PHYSIOLOGY  
F 3 cr. LEC 3  
PREREQUISITE: BIOM 360.  
- An in-depth examination of microbial cell structure and function, bioenergetics, intermediary metabolism and its control, and the orchestration and regulation of cellular functions that enable microbes to adapt to and survive in their environment.

BIOM 452 SOIL & ENVIRONMENTAL MICROBIOLOGY  
S alternate years, to be offered odd years, LEC 3  
PREREQUISITE: CHMY 143, ENSC 245.  
- Microorganisms in soil environments. Focuses on soil microbial ecology, emphasizing relevant aspects of: i) microbial metabolism, physiology and genetics; ii) plant-microbe interactions; and iii) biotransformations of inorganic or organic contaminants.

BIOM 453 VETERINARY ViroLOGY  
On Demand 1 cr.  
PREREQUISITE: BIBD 410 series or consent of instructor.  
- Course covers basic theories of virus replication in cells and provides practical experience in methods for virus culture, quantification, and identification.

BIOM 455R RESEARCH METHODS IN MICROBIOLOGY  
S 4 cr. LEC 3 LAB 1  
PREREQUISITE: BCH 380.  
- Fundamentals of research methodology for undergraduate and graduate students in microbiology and related disciplines. Theory and application of techniques, reagents, and instrumentation will be emphasized in the lecture and laboratory. The emphasis in the course will be on recombinant DNA methodology, and the safe and effective use of radioisotopes.

BIOM 490R UNDERGRADUATE RESEARCH  
F, S, Su 1-6 cr. IND May be repeated. Max 12 cr.  
PREREQUISITE: Senior standing.  
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

BIOM 491 SPECIAL TOPICS  
On Demand 1-4 cr. Maximum 12 cr.  
PREREQUISITE: Course prerequisites as determined for each offering.  
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BIOM 492 INDEPENDENT STUDY  
On Demand 1-3 cr. IND Maximum 6 cr.  
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.  
- Directed research and study on an individual basis.

BIOM 494 SEMINAR/WORKSHOP  
F S 1 cr. SEM 1 Maximum 4 cr.  
PREREQUISITE: BIOM 360 and junior standing.  
- Senior capstone course. Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material. When taken in the senior year, this course fulfills the senior capstone course requirement.

BIOM 497 EDUCATIONAL METHODS/MICROBIOLOGY  
F, S, Su 2 cr. LEC 2  
PREREQUISITE: BIOM 451.  
- Instruction and practice in effective teaching methods; practice in preparing laboratory materials, assisting a class and grading.

BIIOO  
Biology - Organismal  
formerly part of BIOL, PSPP

BIOO 162CS INSECTS AND HUMAN SOCIETY  
S 3 cr. LEC 2 RCT 1  
- Ways in which research and advances in technology in the areas of insect biology and management have influenced people’s lives throughout the world. Focus will be on insects as major factors affecting the areas of the world where humans live, crops and animals humans produce, and general quality of life on the planet. Interactions of insects and human cultures, technologically oriented and indigenous, non-technology based cultures, and concepts of pest management will also be explored. Students generate and test hypothesis and evaluate sources of scientific information on these topics.
BIO 220 GENERAL BOTANY
F 3 cr. LEC 3
PREREQUISITE: BIOB 170.
- This course will provide a thorough overview of the fundamentals of plant and fungal biology from evolutionary, ecological, and physiological perspectives.

BIO 230 IDENTIFICATION OF SEED PLANTS
S 4 cr. LEC 2 LAB 2
PREREQUISITE: BIOB 170.
Identification of conifers, trees and shrubs, and herbaceous seed plants; determination by use of manuals; vocabulary, classification and nomenclature; and preparation and collection of seed plant specimens.

BIO 262 IN INTRODUCTION TO ENTOMOLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: One of the following: BIOB 100, or BIOB 170.
- General biology of insects including principles of morphology, physiology, behavior, ecology, and control. Includes identification of major orders and common families.

BIO 310 COMPARATIVE VERTEBRATE ANATOMY
S 4 cr. LEC 2 LAB 2
PREREQUISITE: BIOB 170 or BIOB 258.
- A comparative study of organ systems of vertebrates. Laboratory utilizes representative vertebrate types.

BIO 412 ANIMAL PHYSIOLOGY
F 3 cr. LEC 3
PREREQUISITE: or BIOB 269, and one of the following: CHMY 211, CHMY 321, or CHMY 123.
- General course in mammalian physiology with emphasis on mammals. Selected body systems are covered with major emphasis on the integration of body processes.

BIO 415 Ichthyology
S 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOO 310.
- Characteristics, classification, evolution, and life histories of major groups of marine and freshwater fishes, with an emphasis on North American freshwater fauna. Laboratory emphasizes identification, nomenclature, morphology, and distribution of Montana species.

BIO 435 PLANT PHYSIOLOGY
S 3 cr. LEC 3
PREREQUISITE: Junior standing, BIOB 170IN, and one of the following: CHMY 211, CHMY 321, or CHMY 123.
- Physiological processes of higher plants, including photosynthesis, water relations, mineral nutrition, and development.

BIO 435 PLANT SYSTEMATICS
F Alternate years, to be offered even years 3 cr.
LEC 1 LAB 2
PREREQUISITE: BIOB 170IN and BIOO 230.
- Introduction to the local vascular plant flora emphasizing characteristics of the common families and genera. Lab concentrates on plant identification of common angiosperm plant families in Montana; preparation of about 120 reference specimens taken from the local flora.

BIO 437 PLANT DEVELOPMENT
S Alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: BIOB 375.
- Cellular and molecular mechanisms of the development of multi cellular life forms that consist of walled cells, and primarily plants. Some topics include developmental differences between plants and animals, regulation of gene expression, environmental effects on plant development, and computer modeling of development.

BIO 458 PLANT CELL PHYSIOLOGY
F Alternate years, to be offered odd years 3 cr.
LEC 3
PREREQUISITE: BIOB 375, BCH 380.
- The features of plant cells that differentiate them from animal cells are the chief topics covered. These include cell walls, plastids and vacuoles. Other cellular organelles will also be briefly covered, including intra- and inter-cellular communication mechanisms.

BIO 460 PLANT METABOLISM
S Alternate years, to be offered odd years 3 cr.
LEC 3
PREREQUISITE: BIOO 230, BCH 380.
- In-depth overview of plant metabolism: photosynthesis including C4 and CAM metabolism; intermediary carbon metabolism; lipids; nitrogen and sulfur assimilation and metabolism; amino acid biosynthesis; secondary metabolism (terpenoids, alkaloids, phenylpropanoids, flavonoids); metabolic changes during plant development.

BIO 465 INSECT IDENTIFICATION
S Alternate years, to be offered odd years 4 cr.
LEC 2 LAB 2
PREREQUISITE: ENTO 204N and one of the following: BIOB 100, BIOB 160 or BIOB 170IN.
- The identification of insects and related terrestrial arthropods. Evolutionary patterns reflected in modern insect diversity will be used to illustrate classification methods. Taxonomic methods will be used as an access to information retrieval.

BIO 470 ORNITHOLOGY
S 5 cr. LEC 2 LAB 1
PREREQUISITE: BIOO 310.
- Evolution, functional biology, distribution, and classification of birds. Montana species recognition is developed through laboratory use of a representative skin collection.

BIO 475 MAMMALOLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOO 310.

BMGT 205 PROFESSIONAL COMMUNICATION FUNDAMENTALS
F, S, Su 3 cr.
LEC 3
PREREQUISITE: Completion of University Seminar and Writing University Core Requirement.
- Recognizing and creating effective approaches and styles for written, oral, and nonverbal communications appropriate to organizational situation, nature of message, and audience. Course addresses professional document and presentation designs, choices of media, and tones for individual and organizational communications.

BMGT 2403B BUSINESS RESEARCH METHODS
F, S 3 cr.
LEC 3
PREREQUISITE: STAT 216, and BMIS 211 as pre- or corequisite.
- Introduction to the methods of knowledge and knowing regarding business activities and business organizations. Focused on disciplined inquiry using statistics and quantitative analysis providing the intellectual foundation for further exploration of the business discipline.

BMGT 298R UNDERGRADUATE RESEARCH
F, S 1-6 cr.
IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

BMGT 291 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BMGT 292 INDEPENDENT STUDY
On Demand 1-3 cr.
IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of Associate Dean.
- Directed research and study on an individual basis. Not to be used as a substitute for a required course.

BMGT 329 HUMAN RESOURCES MANAGEMENT
S 3 cr.
LEC 3
PREREQUISITE: BMGT 335 and BGEN 361. For business majors: Formal admission to the College of Business.
- The functions and tools used in procurement, development, compensation, integration, and maintenance of human resources and their impact on the effective attainment of organizational goals.

BMGT 335 HUMAN RESOURCES AND ORGANIZATION
F, S, Su 5 cr.
LEC 3
PREREQUISITE: junior standing.
- A survey of contemporary research-based concepts relevant to management and organization including topics such as motivation, leadership, teamwork, organizational design, communication, decision making, entrepreneurship, diversity, and ethics.

BMGT 341 OPERATIONS MANAGEMENT
F, S, Su 3 cr.
LEC 3
PREREQUISITE: Junior standing and BMIS 211, M 161, and STAT 216.
- Introduction to the topics and methods of production and operations management. Emphasis is given to critical thinking, business analyses and computer modeling. Application areas include accounting, finance, marketing, and management.

BMGT 360 SUPERVISORY MANAGEMENT SKILLS
S 3 cr.
LEC 3
PREREQUISITE: Junior Standing, BMGT 335. For business majors: Formal admission to the College of Business.
- An applied management course that will build the foundational knowledge and skills required by first line supervisors and newly appointed managers. The course deals with issues including personality, communication, creative problem solving and motivation. The course emphasizes analysis that informs value-adding actions in response to typical challenges confronting first-line supervisors.
BMGT 406 NEGOTIATION/ DISPUTE RESOLUTION  F 3 cr. RCT 3 PREREQUISITE: BMGT 335 or consent of instructor. For business majors: Formal admission to the College of Business.  - Introduction to negotiation theories and skills to help students practice and improve this essential area of business and personal competence. Taught primarily through discussion and in-class exercises that allow students to gain experience and confidence as negotiators.

BMGT 420 LEADERSHIP AND MOTIVATION  F 3 cr. LEC 3 PREREQUISITE: BMGT 335 or permission of the instructor. For business majors: Formal admission to the College of Business.  - Theories, issues, and current topics related to the emergence and effectiveness of leaders, with focus on leadership behaviors and processes in business organizations. Emphasis placed on examination of how individual and organizational leadership capacity is developed.

BMGT 453 MANAGING QUALITY AND PRODUCTIVITY  On Demand 2 cr. IND Options: 12 cr. PREREQUISITE: BMGT 322. For business majors: Formal admission to the College of Business.  - In-depth study of the theoretical foundations of quality management along with applications of the quantitative and qualitative tools used in improving organizational quality and productivity. Coverage will include the principles promoted by major quality experts and a review of the requirements for corporate quality certification.

BMGT 448 ENTREPRENEURSHIP  F 3 cr. RCT 3 PREREQUISITE: ACTG 202, BMGT 355, BFIN 322, and Senior standing. For business majors: Formal admission to the College of Business.  - Evaluation of small business entrepreneurial opportunities, start-up problems, tax aspects, legal forms, forecasts, feasibility studies, venture financing, and promotion. Students develop own business plans.

BMGT 460 BUSINESS TUTORIAL  F 3 cr. LEC 3 PREREQUISITE: By application. For business majors: Formal admission to the College of Business.  - Provides selected upper-division students an opportunity to develop leadership and mentoring skills through involvement with the BGEN 194 Seminar course. Student Associates work closely with faculty to enhance the academic, cultural, and social experiences of students in the seminar course.

BMGT 461 SMALL BUSINESS MANAGEMENT  S 3 cr. LEC 3 PREREQUISITE: ACTG 202, BMGT 355, BMKT 325, BFIN 322, and Senior standing. For business majors: Formal admission to the College of Business.  - Focus on the process of starting and managing a small business, with an emphasis on businesses owned and operated by one individual or family. Topics covered will include typical funding sources and all phases of small business management from startup to exit.

BMGT 463 THE ENTREPRENEURIAL EXPERIENCE  F, S 3 cr. LEC 3 PREREQUISITE: ACTG 202, BMGT 335, BMKT 325, BFIN 322 and Senior standing. For business majors: Formal admission to the College of Business.  - Real-world experience in projects that will assist area entrepreneurs. Students will work with these new ventures to solve their management, marketing, finance and other business problems. The content of the problems will depend on the situation of the client businesses.

BMGT 464 INTERNATIONAL MANAGEMENT  F 3 cr. LEC 3 PREREQUISITE: BGEN 241D, BMGT 335, or Senior standing. For business majors: Formal admission to the College of Business.  - Description of the challenges which the global context poses to business managers. Examination of the elements of international environments and illustration of their effects on management practices and how management deals with such forces.

BMGT 465 INTERNATIONAL PRACTICUM  On Demand 1-12 cr. IND PREREQUISITE: By application. For business majors: Formal admission to the College of Business.  - Intensive study of culture, customs, politics, history, and business practices of another country. Program culminates with extended visit to location for lectures, and other relevant activities.

BMGT 466 MIDDLE MANAGEMENT SKILLS  F 3 cr. LEC 3 PREREQUISITE: BMGT 335, Junior Standing. For business majors: Formal admission to the College of Business.  - An applied management course that will build the knowledge and skills required by middle managers. The course deals with issues including the use of teams and teamwork, employee empowerment, conflict, negotiation and ethics. The course emphasizes analysis that informs value-adding actions in response to typical challenges confronting middle managers.

BMGT 469 COMMUNITY AND SOCIAL ENTREPRENEURSHIP  S 3 cr. RCT 3 PREREQUISITE: Senior standing or permission of the instructor. For business majors: Formal admission to the College of Business.  - Engages students in the application of entrepreneurial thinking and business strategies to address community and societal issues. Students develop and strengthen their understanding of business principles, leadership skills and management capacities as related to effective nonprofit management.

BMGT 473 MODERN MANAGEMENT OF WESTERN RESOURCES  On Demand 3 cr. LEC 3. PREREQUISITE: BGEN 361 or consent of instructor. For business majors: Formal admission to the College of Business.  - Study of the decision making process of managers of large tracts of Western land. Real world cases will be used to explore the variables impacting their decision such as: production versus subdivisions, conservation easements, inheritance taxes and wildlife based business plans.

BMGT 475R MANAGEMENT PRACTICUM  F, S 3 cr. RCT 3 PREREQUISITE: Senior standing or permission of instructor. For business majors: Formal admission to the College of Business.  - Teams do major project such as substantive community service project, research paper, small business experience case, business plan, or strategic analysis. Practical experience with project and/or team management where performance is measured by delivered product. No credit for previous experience.

BMGT 490R UNDERGRADUATE RESEARCH  On Demand 1-6 cr. IND May be repeated. Max 12 cr. For business majors: Formal admission to the College of Business.  - Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

BMGT 491 SPECIAL TOPICS  On Demand 1-3 cr. IND Maximum 6 cr. PREREQUISITE: Junior standing, consent of instructor, and approval of Associate Dean. For business majors: Formal admission to the College of Business.  - Directed research and study on an individual basis. Not to be used as a substitute for a required course.

BMGT 494 SEMINAR  On Demand 1-3 cr. IND Maximum 3 cr. PREREQUISITE: Junior standing and as determined for each offering. For business majors: Formal admission to the College of Business.  - Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BMGT 498 INTERNSHIP  On Demand 2-12 cr. IND PREREQUISITE: Junior standing, Formal Admission to the College of Business, and consent of the instructor.  - An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

BMGT 505 THE STRATEGIC MANAGEMENT OF TECHNOLOGICAL INNOVATION  On Demand 3 cr. LEC 3 PREREQUISITE: Graduate standing in Business, Engineering or Agriculture or consent of instructor.  - To prepare students to strategically manage the innovation of technology by bringing together students from several disciplines and have them work together to integrate strategy and technology. The students will be given cases and other problems throughout the semester that require them to use and integrate these concepts.
**BMGT 591 SPECIAL TOPICS**
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper-division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

**BMGT 592 INDEPENDENT STUDY**
On Demand 1 - 3 cr. IND Maximum 6 cr
PREREQUISITE: Graduate standing consent of instructor, approval of Associate Dean and Dean of Graduate Studies.
- Directed research and study on an individual basis.

---

**BMIS**

**Business: Management**

**Information Systems**

*formerly part of BUS or MGMT*

**BMIS 211 INTRO TO BUS DECISION SUPPORT**
F, S 3 cr. LEC 3
PREREQUISITE: Placement exam or CAPP 120 and a minimal math competency of M 121.
- Focuses on best business practices with word-processing, presentation, spreadsheet, and database software. Emphasis on producing and evaluating effective and efficient information designs to support decisions in finance, accounting, marketing, and management.

**BMIS 311 MANAGEMENT INFORMATION SYSTEMS**
F, S, Su 3 cr. LEC 3
PREREQUISITE: Junior standing, BMIS 211, and ACTG 201.
- A survey of the uses of information in organizational management, with emphasis on strategic systems and systems to support managerial decision making. Students apply concepts in practical application projects using currently available software.

**BMIS 314 BUSINESS WEB SITE DESIGN**
F 3 cr. LEC 3
PREREQUISITE: BMIS 311. For business majors: Formal admission to the College of Business.
- Students acquire skills necessary to create and implement effective business web sites. Best practices in web site design, HTML, CSS, host site selection and introductory programming are covered. Project-based course includes creating web sites for businesses or non-profit organizations.

**BMIS 315 TELECOMMUNICATIONS MANAGEMENT**
S 3 cr. LEC 3
PREREQUISITE: BMIS 311. For business majors: Formal admission to the College of Business.
- Students acquire skills necessary to understand the role that telecommunications play in organizations, how networks facilitate competitive advantage, and how to integrate technology into a corporate culture. Students create business cases for value-adding networks and telecommunications systems.

**BMIS 405 BUSINESS APP DEVELOPMENT**
On Demand 3 cr. LEC 3
PREREQUISITE: ACTG 321R or BMIS 311. For business majors: Formal admission to the College of Business.
- Business applications for computers. Accounting inventory, planning, and financial analysis are among the topics covered. End-user programming and prototyping will be emphasized.

**BMIS 412 DESIGN OF E-COMMERCE SITES**
S 3 cr. LEC 3
PREREQUISITE: BMIS 311. For business majors: Formal admission to the College of Business.
- Study of methods and tools a system analyst uses in development of e-commerce web sites including best practices and performance metrics. Design done on networked microcomputers. Final solutions presented orally, in writing, and on the web.

**BMIS 413 CONTEMPORARY SUPPORT SYSTEMS**
F 3 cr. LEC 3
PREREQUISITE: BMIS 311. For business majors: Formal admission to the College of Business.
- Integrates theory, application and development of information systems to support managerial decision making in semi-structured and unstructured situations. Considers spreadsheet, expert system, and/or web-based software applications to support decision making. Uses cases and project-based assignments.

**BMIS 414 DATA-DRIVEN BUSINESS WEB SERVICES**
S 3 cr. LEC 3
PREREQUISITE: BMIS 314. For business majors: Formal admission to the College of Business.
- Design and create data-driven, web-based applications commonly found in electronic-commerce applications by combining database design and use with interactive web site creation.

**BMIS 415 MANAGEMENT OF INFORMATION TECHNOLOGY**
On Demand 3 cr. LEC 3
PREREQUISITE: BMIS 412, and BMGT 335. For business majors: Formal admission to the College of Business.
- Course integrates content from the courses in the Management of Information Technology minor. The course will unite the technical knowledge and skills acquired by students with behavioral knowledge and skills necessary to effectively manage business applications of information technology.

**BMKT**

**Business: Marketing**

*formerly part of MKTG or BUS*

**BMKT 241 SALES**
On Demand 3 cr. LEC 3
PREREQUISITE: Junior standing, BMGT 240, and BMIS 311. For business majors: Formal admission to the College of Business.
- Principles of sales for non-business majors. Focus is on selling in retail and service environments. This course may not substitute for any required business course.

**BMKT 290R UNDERGRADUATE RESEARCH**
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

**BMKT 291 SPECIAL TOPICS**
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

**BMKT 292 INDEPENDENT STUDY**
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approv- al of Associate Dean.
- Directed research and study on an individual basis. Not to be used as a substitute for a required course.

**BMKT 325 PRINCIPLES OF MARKETING**
F, S 5 cr. LEC 3
PREREQUISITE: Junior standing, ECNS 202.
- Marketing management decision-making in the product, price, promotion, and distribution areas. The behavioral, legal, ethical, competitive, technological, and economic environments as they affect decisions in the domestic and international organization.

**BMKT 337 CONSUMER BEHAVIOR**
F, S 3 cr. LEC 3
PREREQUISITE: BMKT 325. For business majors: Formal admission to the College of Business.
- Application of behavioral sciences to understand human behavior in the marketplace. Emphasis on culture and subculture, social class, reference group, family, attitudes, perception, motivation, personality, and learning theory on consumer and marketing management decisions.

**BMKT 342R MARKET RESEARCH**
F, S 3 cr. RCT 3
PREREQUISITE: STAT 217 or BMGT 240; and BMKT 325. For business majors: Formal admission to the College of Business.
- The application of scientific research methods to marketing problems. The emphasis is on survey design and data analysis for market segmentation studies.

**BMKT 343 INTEGRATED MARKETING COMM**
F 3 cr. LEC 3
PREREQUISITE: Senior standing, BMKT 325. For business majors: Formal admission to the College of Business.
- Explores the use of advertising, sales promotion, Internet, electronic media, and personal selling as methods for promoting goods and services. Taught from the perspective of the marketing manager, with emphasis on the theory, strategy, and tactics of promotion.

**BMKT 436 SALES AND SALES MANAGEMENT**
F 3 cr. LEC 3
PREREQUISITE: BMKT 325. For business majors: formal admission to the College of Business.
- Personal selling techniques applied to outside sales. Sales organization including structure, training, motivation, and compensation. Evaluation of sales goals and individual performance.
BMKT 411 INTERNATIONAL MARKETING
S 3 cr. LEC 3
PREREQUISITE: BMKT 325 and BGEN 242. For business majors: Formal admission to the College of Business.
- International economic, financial, cultural, political, and legal environment; marketing research, market segmentation and positioning issues analyzed as related to foreign market entry, sourcing, product development, pricing, promotion, logistics and distribution, and export-import management.

BMKT 444 RETAIL MANAGEMENT
F 3 cr. LEC 3
PREREQUISITE: Senior standing, BMKT 325. For business majors: Formal admission to the College of Business.
- The application of marketing theory to retail management problems. Topics include structure of the retail industry and nature of competition; merchandising planning, budgeting and control; and pricing and location theory.

BMKT 446 MARKETING FOR ENTREPRENEURS
F 3 cr. LEC 3
PREREQUISITE: BMKT 325. For business majors: Formal admission to the College of Business.
- Examines the unique marketing challenges faced by start-up organizations. New firms are often resource constrained. As a result, penetrating markets dominated by larger competitors with new and innovative products and services requires different marketing tactics. Markets are undefined and establishing primary demand for a new product category may be required.

BMKT 447 MARKETING MIX DESIGN
S 3 cr. LEC 3
PREREQUISITE: Senior standing, BMKT 325. For business majors: Formal admission to the College of Business.
- Student teams apply their expertise in marketing to practical business problems encountered by firms in the community and surrounding area. The problems have their basis in any of the marketing mix elements such as identifying market potential, developing a promotional campaign, or development of a new product.

BMKT 490R UNDERGRADUATE RESEARCH
On Demand 1-6 cr. IND May be repeated. Max 12 cr. For business majors: Formal admission to the College of Business.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

BMKT 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering. For business majors: Formal admission to the College of Business.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BMKT 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of Associate Dean. For business majors: Formal admission to the College of Business.
- Directed research and study on an individual basis. Not to be used as a substitute for a required course.

BMKT 494 SEMINAR
On Demand 1 cr. SEM 1
PREREQUISITE: Junior standing and as determined for each offering. For business majors: Formal admission to the College of Business.
- Topics offered at the upper-division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

BMKT 498 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: For business majors: Formal admission to the College of Business and consent of instructor.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

BMKT 499 SENIOR CAPSTONE MARKETING MGMT
F 3 cr. LEC 3
PREREQUISITE: BMKT 343 and BMKT 436. For business majors: Formal admission to the College of Business.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

BMKT 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper-division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BMKT 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr
PREREQUISITE: Graduate standing consent of instructor, approval of Associate Dean and Dean of Graduate Studies.
- Directed research and study on an individual basis.

BSI
Big Sky Institute

BSI 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Graduate status or seniors by petition.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

BSI 594 SEMINAR
F, S 1 cr. SEM 1
PREREQUISITE: Graduate status or seniors by petition.
- Presentations and discussion of current research by faculty, students, and guest lecturers on the biological, physical, cultural, economic, and social components of montana ecosystems. Participation required of all graduate students enrolling for multidisciplinary study in the Big Sky Institute.

CAA
College of Arts & Architecture

CAA 290R COLLABORATIVE RESEARCH
F, S 1-4 cr. IND May be repeated. Max 8 cr.
COREQUISITE: Freshman or sophomore standing and consent of instructor.
- Intended for lower division undergraduate research and creative projects undertaken in an interdisciplinary team format. The student will work closely with students and faculty colleagues seeking creative project solutions while exploring innovative methods of collaborative problem solving. Course will address responsible conduct of research.

CAA 291 SPECIAL TOPICS
On Demand
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

CAA 310IA HISTORY OF FILM MUSIC
F 3 cr. LEC 3
PREREQUISITE: Junior standing or permission of instructor.
- A composer and director trace the development of film music. Key concepts in the development of the film soundtrack will be examined. Various musical styles, as well as technological developments applicable to soundtrack/music production, will be studied.

CAA 490R COLLABORATIVE RESEARCH
F, S, Su 1-4 cr. IND May be repeated. Max 8 cr.
COREQUISITE: Junior or higher standing and approval of instructor.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

COURSE DESCRIPTIONS: BMKT, BSI, CAA
COURSE DESCRIPTIONS: CAA, CAPP, CE, CET, CHIN, CHMY

CAA 501 INTRODUCTION TO DIGITAL MEDIA
F 4 cr. STU
- This course provides an introduction to the creation, management and uses of digital media with a focus on publishing web based creative work. Adobe Illustrator and Photoshop in conjunction with Digital Photography will be applied to personalized media environments.

CAPP
Computer Applications

CAPP 120 INTRODUCTION TO COMPUTERS
F 3 cr. LEC 2 LAB 1
- Using lecture and lab experience, this course introduces the technology and terminology of computer systems and demonstrates how computers have impacted individuals and society. The course also provides instruction in the basics of operating systems and word processing, spreadsheet, and database software.

CAPP 156 MS EXCEL
F 3 cr.
- This course introduces students to business applications using spreadsheets. Emphasis will be placed on the essential functions of spreadsheet operation, as well as an introduction to some advanced spreadsheet features such as lookup functions and list management. This course covers expert level skills for the Microsoft Certified Application Specialist (MCAS) certification in Microsoft Excel.

CE
Civil Engineering
see also ECIV

CE 201 SURVEYING
F, S 3 cr. LEC 2 LAB 1
PREREQUISITE: M 165 or M 171 or M 181 and EGEN 116.
- Surveying field practice, error propagation analysis, survey for project design.

CE 361 LEGAL PRINCIPLES IN SURVEYING
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: CE 201.
- Principles of the profession: case law, legal aspects of boundary location, monumentation, and property descriptions.

CE 362 PUBLIC LAND SURVEY SYSTEM
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: CE 201.
- Federal and state laws and regulations governing property descriptions.

CE 363 ADVANCED SURVEYING COMPUTATIONS
S alternate years, to be offered even years 3 cr. LEC 2 LAB 1
PREREQUISITE: CE 201.
- Modern instrumental and computational techniques in surveying.

CE 465 PHOTOGRAMMETRY
F alternate years, to be offered odd years 2 cr. LEC 1 LAB 1
PREREQUISITE: M 165 or M 171 or M 181.
- Measurement and computation techniques for mapping from photographs; photo geometry, flight planning, ground control, cameras, control extension, stereoscopic instruments.

CE 466 PROJECT DESIGN IN SURVEYING
S alternate years, to be offered odd years 3 cr. LEC 2 LAB 1
PREREQUISITE: CE 201.
- Surveying requirements of large project; land subdivision, utilities, topography, and earthwork. Term project research and report required.

CET
Construction Engineering Technology
see also ETC

CET 202 CONSTRUCTION SURVEY & EARTHWORK
S 3 cr. LEC 2 LAB 1
PREREQUISITE: CE 201.
- Advanced construction and route surveys, earthwork mass diagrams, quantity takeoff, computer analysis.
- Department of Civil Engineering

CHIN
Chinese

CHIN 101 ELEMENTARY CHINESE I
F 4 cr. RCT 4
- Elementary course designed to help students acquire basic language skills in Mandarin: reading, writing, listening, speaking. Introduction to Chinese writing systems. Emphasis on establishing correct pronunciation and grasp of grammar. Cultural perspectives such as greetings, simple dialogues re introduced.

CHIN 102D ELEMENTARY CHINESE II
S 4 cr. RCT 4
PREREQUISITE: CHIN 101 or equivalent, or placement interview with instructor.
- Continuation of CHIN 101. Builds upon the foundation established in 101. Greater emphasis placed upon oral and written expression. Reading and discussions are designed to increase comprehension of more linguistically complex texts and more conceptually complex cultural issues.

CHIN 120I HISTORY, CULTURE AND SOCIETY IN CHINESE FILMS
On Demand 3 cr. LEC 3
- This course is intended to present students with a clear picture of contemporary Chinese society in transition, as reflected in the cinematic works of the fifth-generation and sixth-generation Chinese directors.

CHIN 130D HISTORICAL AND LITERARY JOURNEY INTO MODERN CHINA
S 3 cr. LEC 3
- The focus of this course will be on twentieth-century Chinese short stories and novellas in English translation. We will look at modern Chinese literature in its historical setting as well as from the point of view of literary critical theory.

CHIN 201D INTERMEDIATE CHINESE I
F 4 cr. LEC 4
PREREQUISITE: CHIN 102.
- The second year college-level Chinese course that emphasizes four language skills: listening, speaking, reading and writing. The overall goal is to help students develop their Chinese communication skills, and provide students a broader perspective on Chinese culture.

CHIN 202D INTERMEDIATE CHINESE II
S 4 cr. LEC 4
PREREQUISITE: CHIN 201.
- Continuation of CHIN 201. Throughout the entire course, the more up-to-date language ingredients and authentic linguistic materials are introduced with a view towards reflecting cultural life in the dynamic and rapidly changing contemporary China.

CHIN 211D CHINESE CULTURE & CIVILIZATION
S 3 cr. LEC 3
COREQUISITE: WRIT 101 or equivalent.
- Chinese cultural, social and political history. Confucianism, Buddhism, and such elements of high culture as the arts of poetry and prose, while providing a sense of dynastic chronology. Class is offered in English.

CHIN 320IH HISTORY OF CHINESE CINEMA
F 3 cr. LEC 3
PREREQUISITE: Junior standing or permission of instructor.
- This course reviews the history of Chinese cinema. Provides students opportunities to interrogate cinematic representations of China, to participate in critical thinking discussions and dialogues, and to understand the methods that Chinese filmmakers use to explore those questions. In English.

CHMY
Chemistry
formerly CHEM

CHMY 102CS APPLYING CHEMISTRY TO SOCIETY
S 3 cr. LEC 5
- An introduction to contemporary chemistry in the contextual framework of current issues including the effect of human impact on the air, water, and earth. This course will examine the scientific basis for current scientific and societal issues such as depletion of the ozone layer, water pollution, acid rain, genetic engineering and nuclear fission among other issues. Topics will be addressed from a scientific viewpoint to develop knowledge and understanding of the chemical concepts that underlie these contemporary issues. The goal is to inform non-science majors of chemical and scientific issues in order to help them to become well-informed, inquiring citizens.

CHMY 121IN INTRO TO GENERAL CHEMISTRY
F, S, Su 4 cr. LEC 5 LAB 1
PREREQUISITE: Passing a level 2 math course (Survey of Algebra) or placement in a math level 3 course (College Algebra).
- Introductory general chemistry. Measurement systems, atomic structure, chemical periodicity, bonding, chemical reactions, acid-base chemistry, electrochemistry, nuclear chemistry.
CHMY 125 INTRO TO ORGANIC & BIOCHEMISTRY PRINCIPLES
F, S 4 cr. LEC 3 LAB 1
PREREQUISITE: CHMY 121, or equivalent.
- An introduction into functional group organic chemistry and important biochemical structures, concepts, and processes. The laboratory is closely integrated with lecture coverage.

CHMY 141 COLLEGE CHEMISTRY I
F, S 4 cr. LEC 3 LAB 1
PREREQUISITE: Passing a level 3 math course (College Algebra) or placement in a math level 4 course (Survey of Calculus or Precalculus).
- The first of a two-semester course sequence about the general principles of modern chemistry with emphasis on atomic structure, chemical bonding, the periodic table, equilibria, chemical reactivity, and kinetics.

CHMY 143 COLLEGE CHEMISTRY II
F, S 4 cr. LEC 3 LAB 1
PREREQUISITE: CHMY 141 or CHMY 151.
- The second semester of the two-semester general chemistry sequence.

CHMY 151 HONORS COLLEGE CHEMISTRY I
F 4 cr. LEC 3 LAB 1
PREREQUISITE: High school chemistry and physics, high school algebra, and some additional mathematics.
- Topic coverage parallels CHMY 141, with emphasis on critical and analytical thought and with a greater reliance on math skills. For departmental honors program.

CHMY 153 HONORS COLLEGE CHEMISTRY II
S 4 cr. LEC 3 LAB 1
PREREQUISITE: A grade better than a C in CHMY 141 or CHMY 151.
- Topic coverage parallels CHMY 143, with emphasis on critical and analytical thought and with a greater reliance on math skills. For departmental honors program.

CHMY 194 SEMINAR/WORKSHOP
F 1 cr. SEM 1
- For the new student. Integration into the department and its research and educational program. Scientific communication and chemical literature searching skills.

CHMY 211 ELEMENTS OF ORGANIC CHEMISTRY
F, S 5 cr. LEC 4 LAB 1
PREREQUISITE: One of the following: CHMY 121, CHMY 143, or CHMY 153.
- A one-semester introduction to organic chemistry. The unique character of carbon: bonding, structure, nomenclature, and common reactions of hydrocarbons and functional organic compounds.

CHMY 290R UNDERGRADUATE RESEARCH/Creative Activity
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

CHMY 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required, but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

CHMY 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

CHMY 294 SEMINAR/WORKSHOP
S 1 cr. SEM 1
PREREQUISITE: CHMY 194 or BCH 194.
- Introduction to faculty research through faculty mini seminars. Departmental research facilities. Research groups. Research planning decisions (MSU laboratory, summer internship, student exchange, REU, USP, etc).

CHMY 311 FUNDAMENTAL ANALYTICAL CHEMISTRY
F 4 cr. LEC 3 LAB 1
PREREQUISITE: CHMY 143 or CHMY 153.
- Introduction to wet analytical chemistry with an emphasis on the systematic treatment of equilibria, acid-base chemistry, redox equilibria and titrations, complexometric equilibria and titrations, Beer’s law, fundamental lab skills and chromatography.

CHMY 321 ORGANIC CHEMISTRY I
F, S 4 cr. LEC 3 LAB 1
PREREQUISITE: CHMY 143 or CHMY 153.
- The first of a two-semester professional sequence in organic chemistry. In-depth coverage of stereochemistry, synthetic organic chemistry, physical organic chemistry, spectroscopy, and nomenclature. Students should register for both semesters.

CHMY 323 ORGANIC CHEMISTRY II
S, Su 4 cr. LEC 3 LAB 1
PREREQUISITE: CHMY 321.
- The second semester of the two-semester professional sequence in organic chemistry.

CHMY 331 HONORS ORGANIC CHEMISTRY I
F 4 cr. LEC 3 LAB 1
PREREQUISITE: CHMY 151 and CHMY 153 or consent of instructor.
- CHMY 331 is the first of a two-semester honors sequence in organic chemistry. Topic coverage parallels CHMY 321, but at an accelerated pace with in-depth coverage of physical organic chemistry, stereochemistry, synthetic organic chemistry, spectroscopy, and nomenclature.

CHMY 333 HONORS ORGANIC CHEMISTRY II
S 4 cr. LEC 3 LAB 1
PREREQUISITE: A grade of better than a C in CHMY 331.
- CHMY 333 is the second semester of the two-semester honors sequence in organic chemistry. Topic coverage parallels CHMY 323, with more in-depth coverage of mechanisms and more emphasis on retrosynthetic analysis and on solving multi step synthesis problems.

CHMY 350 ASTROBIOLOGY
F 4 cr. LEC 3 RCT 1
PREREQUISITE: BIOL 170, CHMY 121, and ASTR 110 (or equivalent) and junior standing.
- This course examines the science of Astrobiology focused on the origin, evolution, and distribution of life in the universe. Topics that will be discussed include planetary evolution, origin of life, habitability, evolution, intelligence, and the search for life beyond Earth.

CHMY 351 PHYSICAL CHEMISTRY
F 4 cr. LEC 3
PREREQUISITE: M 170, PHSX 207, and CHMY 211 or CHMY 323.
- A physical chemistry course directed toward the life sciences, health professions, and agricultural sciences.

CHMY 352 PHYSICAL CHEMISTRY LABORATORY
F 1 cr. LAB 1
PREREQUISITE: or COREQUISITE: CHMY 351.
- The laboratory to accompany CHMY 351.

CHMY 357 PHYSICAL CHEMISTRY: QUANTUM CHEMISTRY AND SPECTROSCOPY I
F 3 cr. LEC 3
PREREQUISITE: CHMY 143 or CHMY 153, PHSX 207, M 172.
COREQUISITE: M 273.
- The first semester of a two-semester sequence for science and engineering majors on quantum chemistry, statistical thermodynamics, spectroscopy, classical thermodynamics and kinetics.

CHMY 358 PHYSICAL CHEMISTRY-LABORATORY II
S 2 cr. LAB 2
PREREQUISITE: CHMY 372.
- The second semester of a two-semester course sequence for science/engineering majors. Students should take both semesters of the sequence.

CHMY 361 ELEMENTS OF PHYSICAL CHEMISTRY
F 4 cr. LEC 4
PREREQUISITE: M 170, PHSX 207, and CHMY 211 or CHMY 323.
- A physical chemistry course directed toward the life sciences, health professions, and agricultural sciences.

CHMY 362 ELEMENTS OF PHYSICAL CHEMISTRY LABORATORY
F 1 cr. LAB 1
PREREQUISITE: or COREQUISITE: CHMY 361.
- The laboratory to accompany CHMY 361.

CHMY 371 PHYSICAL CHEMISTRY: QUANTUM CHEMISTRY AND SPECTROSCOPY II
F 3 cr. LEC 3
PREREQUISITE: CHMY 143 or CHMY 153, PHSX 207, M 172.
COREQUISITE: M 273.
- The first semester of a two-semester sequence for science and engineering majors on quantum chemistry, statistical thermodynamics, spectroscopy, classical thermodynamics and kinetics.

CHMY 373 PHYSICAL CHEMISTRY-LABORATORY II
S 3 cr. LAB 3
PREREQUISITE: CHMY 371 or CHMY 373.
- The advanced laboratory to accompany CHMY 371. In-depth experiments and data analysis. Required of all chemistry majors who take CHMY 373.

CHMY 394 SEMINAR/WORKSHOP II
F 1 cr. SEM 1
PREREQUISITE: CHMY 294 or BCH 294.
- Research techniques, procedures, and reports. Seminar reporting and presentation skills. Career planning and resume preparation. May be repeated once.

CHMY 401 ADVANCED INORGANIC CHEMISTRY
S 3 cr. LEC 3
COREQUISITE: CHMY 361 or CHMY 373.
- A systematic presentation of atomic structure and chemical bonding with emphasis on properties, structure, and the reactions of representative members of the various families of the periodic table.

CHMY 417 SYNTHETIC CHEMISTRY
Alternate years, to be offered odd years 5 cr. LEC 3
PREREQUISITE: CHMY 323.
- Organic and inorganic reaction chemistry for advanced students. Modern reagents and transformations are treated in detail, along with relevant theoretical and mechanistic considerations.
COURSE DESCRIPTIONS: CHMY

CHMY 421 ADVANCED INSTRUMENT ANALYSIS
F, alternate years 3 cr. LEC 2 LAB 1
PREREQUISITE: CHMY 361 or CHMY 371.
- An advanced analytical chemistry course which covers modern instrumental methods based on spectroChemical and electrochemical principles.

CHMY 480 UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated, Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

CHMY 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
CHMY 491 SPECIAL TOPICS: possible conduct of research. culminate in a research paper, journal article, or

CHMY 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

CHMY 494 SEMINAR/WORKSHOP
S 1 cr. SEM 1
PREREQUISITE or COREQUISITE: CHMY 394 or BCH 394.
- Senior capstone course. Taught in collaboration with departmental Honors Thesis, CHMY 499. The chemistry/biochemistry research undergraduate experience constitutes a synthesis of our (bio) chemistry classroom and laboratory education. The projects are orally presented in seminar form, discussed on the basis of acquired knowledge, and analyzed using stringent scientific methods and criteria. A complete personal resume is prepared. May be repeated once.

CHMY 499 SENIOR THESIS/CAPSTONE
S 1 cr. LEC 1
PREREQUISITE: CHMY 490 or BCH 490 (minimum of 3 cr.)
- Thesis format and style will be illustrated, discussed, and monitored. Draft portions of manuscripts are to be completed on a regular schedule. Required of all candidates for departmental honors.

CHMY 505 CRITICAL CONCEPTS IN CHEMISTRY
Su 3 cr. LEC 2 LAB 1
PREREQUISITE: CHMY 121 or equivalent.
- Course explores new learning strategies that encourage discovery-based learning. Class will explore ways to use computer technology to engage students in discovery-based learning.

CHMY 506 INTEGRATING COMPUTERS INTO LABORATORY INSTRUCTION
Su 3 cr. LEC 2 LAB 1
PREREQUISITE: Secondary teacher certification and 2 years teaching experience. One year introductory chemistry course (CHMY 142 and 143) and coursework or experience equivalent to one semester physical chemistry (CHMY 361). A baccalaureate degree and experience teaching science at the secondary level are required.
- The course will examine and discuss fundamental and critical concepts in chemistry. A practical laboratory component will enable students to develop laboratory and/or demonstration projects for each concept. Individual student-generated presentations are a key course component.

CHMY 507 MODERN ORGANIC AND BIOCHEMISTRY
F 3 cr. RCT 3
PREREQUISITE: Secondary teaching certification and 2 years teaching experience. One year introductory chemistry course (CHMY 141, 144) and coursework or experience equivalent to one semester physical chemistry (CHMY 361). A baccalaureate degree and experience teaching science at the secondary level are required.
- The course will examine/discuss fundamental information and concepts in organic chemistry and biochemistry. A module based on drug development will exemplify major topics. Information acquired via the internet will be a significant course component. (A distance learning course)

CHMY 515 STRUCTURE AND BONDING IN INORGANIC CHEMISTRY
F 3 cr. LEC 3
PREREQUISITE: CHMY 401.
- Spectroscopy, structure, and bonding of coordination and organometallic compounds.

CHMY 516 MECHANISMS AND DYNAMICS IN INORGANIC CHEMISTRY
S 3 cr. LEC 3
PREREQUISITE: CHMY 401.
- Mechanisms and dynamics of the reactions of coordination and organometallic compounds.

CHMY 525 ORGANIC REACTION MECHANISMS
F 3 cr. LEC 3
PREREQUISITE: CHMY 323.
COREQUISITE: CHMY 553.
- A problem solving approach concentrating on analyzing organic reactions and transformations via electronic mechanisms. Problems chosen will be from the current chemical literature. Designed for incoming graduate students and upper-class undergraduates who want to learn or brush up on their electron-pushing skills.

CHMY 524 MASS SPECTROMETRY
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: CHMY 371 or CHMY 361.
- Application of organometallic chemistry to organometallic compounds.

CHMY 520 CHEMICAL REACTIONS AND TRANSPORT IN ANALYTICAL METHODS
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: CHMY 573.
- Treatment of complex chemical equilibria, kinetics, and mass transport in the solution and gas phases with respect to their effects on methods of chemical analysis.

CHMY 526 ADVANCED PROTEIN NMR SPECTROSCOPY
F alternate years, to be offered even years 3 cr.
PREREQUISITE: CHMY 371.
- This lecture-based course is designed to teach the fundamental principles of nuclear magnetic resonance (NMR) spectroscopy as it applies to the structural elucidations of proteins in solution. Prerequisites include familiarity with linear algebra and basic trigonometric functions and CHMY 325. Cross-referenced with BCHM 526.

CHMY 527 OPTICAL SPECTROSCOPY
F alternate years, to be offered even years 3 cr.
PREREQUISITE: CHMY 371.
- Use of optical spectroscopic methods for chemical analysis.

CHMY 533 PHYSICAL ORGANIC CHEMISTRY
F 3 cr. LEC 5
PREREQUISITE: CHMY 417.
- A semi-quantitative description of the mechanisms of organic reactions. Topics include M.O. theory, orbital symmetry, addition and elimination reactions, the kinetics and thermodynamics of organic reactions, solvent effects, etc.

CHMY 535 REAGENT CHEMISTRY
S 3 cr. LEC 5
PREREQUISITE: CHMY 417.
- A thorough study of synthetic processes, methodologies and reagents.

CHMY 540 ORGANIC SYNTHESIS
F 3 cr. LEC 5
PREREQUISITE: CHMY 533 and CHMY 555.
- A thorough study of strategies for the synthesis of complex natural products.

CHMY 551 ORGANOMETALLIC CHEMISTRY
S alternate years, to be offered even years 3 cr.
PREREQUISITE: CHMY 417.
- Spectroscopic structure elucidation of small organic molecules. Techniques to be discussed include 1-D and 2-D NMR spectroscopy, UV, IR, MS, and Raman spectroscopies. Emphasis will be on interpreting spectra to elucidate the structure of the compound in question.

CHMY 554 ORGANOMETALLIC CHEMISTRY
S alternate years, to be offered even years 3 cr.
PREREQUISITE: CHMY 321, CHMY 325 and CHMY 553.
- Application of organometallic chemistry to organometallic transformations.

CHMY 557 QUANTUM MECHANICS
F alternate years, to be offered even years 3 cr.
PREREQUISITE: CHMY 373 or equivalent.
- Applications of quantum mechanics to molecules and spin systems.

CHMY 558 CLASSICAL & STATISTICAL THERMODYNAMICS
F alternate years, to be offered odd years 3 cr.
PREREQUISITE: CHMY 373 or equivalent.
- Classical & statistical thermodynamics applied to chemical systems.

CHMY 559 KINETICS AND DYNAMICS
S alternate years, to be offered even years 3 cr.
PREREQUISITE: CHMY 373 or equivalent.
- Chemical kinetics, theories of reaction rates, molecular reaction dynamics, with applications to Chemical reactions in the gas phase, on surfaces, and in solution.
CHMY 560 SYMMETRY, ORBITALS AND SPECTROSCOPY
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: CHMY 573.
– Group theory with applications, semi-empirical and ab initio calculations, vibrational and electronic spectroscopy, and their interrelationship will be covered.

CHMY 564 ADVANCED QUANTUM CHEMISTRY
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: CHMY 557 or equivalent.
– Time independent and time dependent quantum mechanics with application to chemical bonding and molecular spectroscopy.

CHMY 575 PROFESSIONAL PAPER
F, S Maximum 6 credits
PREREQUISITE: Consent of instructor.
– A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

CHMY 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; Maximum 5 cr.
PREREQUISITE: Graduate standing; teaching experience and/or current employment in a school or organization; and consent of instructor and Dean of Graduate Studies.
– Courses offered on a one-time basis to fulfill professional development needs of in service educators. A specific focus is given to each course which is appropriately subtitled.

CHMY 589 GRADUATE CONSULTATION
F, S Su 3 cr. TUT
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
– This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

CHMY 590 MASTER’S THESIS
F, S, Su 1 - 10 cr.
PREREQUISITE: Master’s standing.

CHMY 591 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: Graduate standing, consent of instructor; approval of department head and Dean of Graduate Studies.
– Directed research and study on an individual basis.

CHMY 594 SEMINAR
On Demand 1 cr. SEM Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
– Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

CHMY 599 GRADUATE RESEARCH / CREATIVE ACTIVITY INSTRUCTION
F, S, Su 1 - 3 cr. RCT
PREREQUISITE: Consent of instructor.
COREQUISITE: CHMY 590 or CHMY 690.
– Classroom instruction associated with directed graduate research/creative activity projects.

CHMY 690 DOCTORAL THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

CLS College of Letters & Science

CLS 101US KNOWLEDGE AND COMMUNITY
F, S 3 cr. SEM 3
PREREQUISITE: First year students (less than 30 credits) only.
– Small seminar-style classes. Introduction to university study and the excitement of intellectual inquiry. Participation in a community of learners. Readings in the humanities, social sciences, and natural sciences. Emphasis on critical thinking, effective communication, and active learning.

CLS 201US KNOWLEDGE AND COMMUNITY
F, S 3 cr. SEM 3
– CLS 201 is similar to CLS 101 but is designed for students beyond their freshman year. CLS 201 is open to students who have completed at least 30 credits; students will not receive credit if they have passed CLS 101 with a grade of C- or better. Small seminar-style classes.

CLS 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr.
IND may be repeated.
– Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

CLS 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

CLS 460 TEACHING FELLOWSHIP
(Facilitating Teaching Internship) effective F/05
F, S 2-3 cr. SEM 2 Maximum 6 credits.
– As co-facilitators of a section of CLS 101US or CLS 201US, students will learn and have the opportunity to practice classroom teaching strategies and mentor skills.

CLS 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr.
IND May be repeated. Max 12 cr.
– Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

CLS 492 INDEPENDENT STUDY
F, S 1 cr. IND Maximum 2 cr.
PREREQUISITE: CLS 460.
– Directed research and study on an individual basis.

COLS College Studies

COLS 100 EFFECTIVE ACADEMIC PRACTICES
F, S 3 cr. LEC 3
– The course is designed to help students maximize their potential in all courses, specifically to: define one’s purpose in pursuing a college education; utilize components that students need to be successful learners—motivation, methods of learning, time management, physical and social environment, and performance; develop practical study techniques that can be applied to daily college course work; set short- and long-term academic and career goals; and become acquainted with professors, MSU resources, and how to seek academic assistance. Offered by Gallatin College Programs.

COLS 101US FIRST YEAR SEMINAR
F, S 5 cr. LEC 3
PREREQUISITE: First year students only.
– This multi-disciplinary course, presented in seminar format, draws from the disciplines of psychology, sociology, history, and philosophy, and encourages students to explore issues critical to their academic goals and objectives. The course emphasizes verbal communication, critical thinking, intellectual development, and academic choices. Fulfills university seminar requirement of the core curriculum. This course may not be repeated. Offered by Gallatin College Programs.

COLS 191 SPECIAL TOPICS
F, S 1 cr. LEC 1
– This survey course introduces students to the effective use of college resources and methods of increasing success in other courses. It acquaints students with study skills and prepares them to integrate traditional study skills with college content areas. Students will develop learning and study strategies to become efficient students. Also, students will become familiar with professors, academic advisors, and college resources.

COM or COMM Communications

COMM is part of Gallatin College

COM 110US INTRODUCTION TO PUBLIC COMMUNICATION
F, S 3 cr. LEC 1 RCT 2
– Overview of the theories, concepts, and principles of public speaking, to include audience analysis, evidence, intercultural communication, small group communication and media communication. Application of concepts and principles through preparation and delivery of ceremonial, informative, persuasive, and group presentations.
COURSE DESCRIPTIONS: CS, CSCI

CS
Computer Science

CS 140CS SPINNING WEBS
F 3 cr. LEC 3
- The World Wide Web. What it is. How it works. Where it’s headed. Societal implications. Examination of currently popular Web ventures, such as Google, Facebook, YouTube, Twitter, and Drupal. Construction of individual Web portfolios and a hosted website. Prepares students from all majors to participate in Web ventures and to become Web-savvy citizens. No previous Web or programming experience required.

CS 145RA WEB DESIGN
F, S 2 cr. LEC 2 LAB 1
- Basic design principles and how these principles apply to web site construction. HTML, JavaScript, Cascading Style Sheets. Laboratory projects reflect practical usage of course concepts. Cross-listed with ART 145.

CS 204 MULTIMEDIA DEVELOPMENT METHODS
S 3 cr. LEC 2 LAB 1
- The design and development of multimedia presentations using computerized studio techniques. Methods for combining video, audio, photography, studio techniques, and computer-generated art forms. Computer-assisted studio control and editing. Project-oriented course organization with interdisciplinary project teams.

CSCI
Computer Science - Programming formerly part of CS

CSCI 111 PROGRAMMING WITH JAVA I
F, S 4 cr. LEC 3 LAB 1
- Introduction to programming: program design, analysis, and implementation in Java, including I/O, assignment, decision, iteration, scalar types, arrays, control structures, methods, classes, and common data types. No previous programming experience required.

CSCI 112 PROGRAMMING WITH C I
S 3 cr. LEC 2 LAB 1
PREREQUISITE: CSCI 111 or ELEE 371.
- C Programming knowledge. Introduces imperative programming and the C standard library. Course covers pointers, memory management and structures.

CSCI 122 BASIC DATA STRUCTURES AND ALGORITHMS
F, S 4 cr. LEC 3 LAB 1
PREREQUISITE: CSCI 111 and M 151.
- An introduction to algorithms employing the data structures to solve various problems including searching and sorting, and recursion. Understanding and using Java class libraries. The laboratory uses Java. Introduces Big-O Notation.

CSCI 215S SOCIAL & ETHICAL ISSUES IN CS
F 3 cr. LEC 2 RCT 1
PREREQUISITE: W core and US core.
- Social and ethical issues as they relate to computing, including privacy, risks, computer abuse, commerce, professionalism, free speech, intellectual property, social justice, and current issues. History of computing.

CSCI 232 DATA STRUCTURES AND ALGORITHMS
S 4 cr. LEC 3 LAB 1.
PREREQUISITE: CSCI 112.
- Advanced data structures and programming techniques and their application. Topics include: trees, balanced trees, graphs, dictionaries, hash tables, heaps. Examines the efficiency and correctness of algorithms. The laboratory uses Java.

CSCI 246 DISCRETE STRUCTURES
F 3 cr. LEC 3
PREREQUISITE: CSCI 111.
- This course covers logic, discrete probability, recurrence relations, Boolean algebra, sets, relations, counting, functions, maps, Big-O notation, proof techniques including induction, and proof by contradiction.

CSCI 290R UNDERGRADUATE RESEARCH
S 1-6 cr. END may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

CSCI 291 SPECIAL TOPICS
On Demand 1-3 cr.
- Course is offered on a limited basis to determine acceptability and demand there is a particular one-time need, or given on a special or current unique topic offered.

CSCI 292 INDEPENDENT STUDY
F, S 1-5 cr.
- Consent of instructor and approval of department head.

CSCI 305 CONCEPTS OF PROGRAMMING LANGUAGES
S 3 cr.
PREREQUISITE: CSCI 152 and CSCI 246.
- An examination of several programming paradigms, and languages, as well as their application and underlying execution model. Topics include imperative, object-oriented, functional, logic and string based. Students will gain exposure to a variety of languages such as C, C++, Scheme, Prolog and Perl.

CSCI 338 COMPUTER SCIENCE THEORY
S 3 cr.
PREREQUISITE: CSCI 246.
- Formal languages, theory, automata, Turing Machines, computability, the Church-Turing thesis, computational complexity, and NP-completeness.

CSCI 351 SYSTEMS ADMINISTRATION
S 3 cr.
PREREQUISITE: CSCI 112 and CSCI 232.
- The administration and management of Linux computer systems. Includes installation, user, process management, configuration of services and device handling. A thorough knowledge of Linux/Unix command structure is required.

CSCI 352 ADVANCED ALGORITHM TOPICS
F 3 cr. LEC 3
PREREQUISITE: CSCI 246 and CSCI 232.
- A rigorous examination of advanced algorithms and data structures. Topics include average case analysis, probabilistic algorithms, advanced graph problems and theory, distributed and parallel programming.

CSCI 361 COMPUTER ARCHITECTURE
F 3 cr. LEC 5
PREREQUISITE: CSCI 112 and CSCI 232.
- The structure and function of computer systems: CPU, memory, I/O. I/O: digital logic, data types, instruction set design, pipelining, RISC, parallel processing, and assembly language programming.

CSCI 440 DATABASE SYSTEMS
F 3 cr. LEC 3
PREREQUISITE: CSCI 232.
- DBMS architecture; major database models; relational algebra fundamentals; SQL; query language; index file structures, data modeling and management, entity relationship diagrams.

CSCI 441 COMPUTER GRAPHICS
S odd years 3 cr. LEC 3
PREREQUISITE: M 221 and CSCI 232.

CSCI 442 COMPUTER VISION: ROBOT VISION
S odd years 3 cr. LEC 3
PREREQUISITE: CSCI 232.
- Image processing techniques are used to quantify and manipulate visual information in diverse applications such as satellite imagery, robotic vision, and animation. Topics include enhancement, representation, restoration, segmentation, and digitization techniques.

CSCI 446 ARTIFICIAL INTELLIGENCE
F even years 3 cr. LEC 3
PREREQUISITE: CSCI 232.
- The fundamental bases of artificial intelligence: knowledge representation, search, and learning. Applications include game playing, neural networks, and expert systems.

CSCI 447 MACHINE LEARNING: SOFT COMPUTING
F odd years 3 cr. LEC 3
PREREQUISITE: CSCI 446 recommended.
- An exploration of biologically inspired machine learning models and algorithms, including evolutionary algorithms, neural networks, swarm intelligence, and fuzzy systems. An emphasis is placed on results from current research in computational intelligence. Students engage in class discussions and team projects.

CSCI 451 COMPUTATIONAL BIOLOGY
F odd years 3 cr. LEC 3
PREREQUISITE: CSCI 246.
- This course surveys classic and recent problems from computational biology. Topics covered include algorithms for genomic sequencing and searching, protein structure prediction, and regulatory network discovery.
CSCI 455 EMBEDDED SYSTEMS: ROBOTICS
S even years 3 cr LEC 3.
PREREQUISITE: CSCI 232 and CSCI 361 or EELE 371.
- The basic tools and techniques of embedded systems using robotics as a platform. Student teams will build an autonomous mobile robot, and learn to program it to perform increasingly sophisticated behaviors. Besides providing an introduction to autonomous mobile robot technologies, the students also learn key concepts of mechanics, electronics, programming techniques, and systems design and integration.

CSCI 460 OPERATING SYSTEMS
F 3 cr LEC 3
PREREQUISITE: CSCI 232 and CSCI 361 or EELE 371.
- Operating systems design including necessary hardware support. Processes, threads, concurrent programming, and scheduling. Memory, file, and I/O management. Security issues.

CSCI 466 NETWORKS
F 3 cr LEC 3
PREREQUISITE: CSCI 232 and CSCI 112.
- How computer systems are organized into networks and how communication over networks is organized. Communication protocols and their design with an emphasis on current technology and implementation of software.

CSCI 468 COMPILERS
S 4 cr. LEC 3 LAB 1
COREQUISITE: CSCI 338 and CSCI 305.
- Senior capstone course. Compiler design and construction. Scanning, parsing, symbol tables, semantic analysis, intermediate representations, run-time memory management, target code generation, and optimization. Implementation of a small compiler.

CSCI 476 COMPUTER SECURITY
S 3 cr. LEC 3
PREREQUISITE: CSCI 232.
- Introductory to computer security. Covers security issues in software design and development from technical, social and legal viewpoints. Topics include cryptography, security models, software security, authentication, authorization, and system security.

CSCI 477 SIMULATION
F 3 cr. LEC 3
PREREQUISITE: CSCI 112 and a probability or statistics course.
- Discrete and continuous simulation modeling methodology using a computer simulation language; random number generation, output analysis, validation, and verification; application to varied system design and analysis problems. Cross-listed with EIND 422.

CSCI 481 PROGRAM ASSESSMENT
F S 0 cr. IND 0
PREREQUISITE: Graduating Senior.
- Student participation in Computer Science program assessment activities such as taking the Computer Science Major Field Test.

CSCI 482 INTERDISCIPLINARY PROJECT INSTRUCTION
F 1 cr. RCT 1
PREREQUISITE: Senior standing.
- First part of a senior capstone sequence for the interdisciplinary option. Classroom instruction that prepares a student to undertake an interdisciplinary project that relates computing to the student’s minor.

CSCI 483R INTERDISCIPLINARY PROJECT
S 3 cr. IND 3
PREREQUISITE: CSCI 482R.
Second part of a senior capstone sequence for the interdisciplinary option. Students undertake an interdisciplinary project and present their results through a written paper, a poster and an oral presentation.

CSCI 490R UNDERGRADUATE RESEARCH
On Demand 1-6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Consent of instructor.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

CSCI 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: To be determined based on actual topic offered.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

CSCI 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

CSCI 494 SEMINAR
On Demand 1-4 cr. SM Maximum 4 cr.
PREREQUISITE: junior standing and as determined by each offering.
- Topics offered at the upper divisional level that are not covered in regular courses. Students participate in preparing and presenting discussion material.

CSCI 495 FIELD WORK/praCTicum/STUDENT TEACHING
F S 1 cr. IND Maximum 2 cr.
PREREQUISITE: junior standing and consent of instructor.
- Directed assistance to, and involvement in labs, with lower division CS students.

CSCI 498 INTERNSHIP
On Demand 1 - 6 cr. IND
PREREQUISITE: junior standing, consent of instructor, and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

CSCI 520 DISTRIBUTED SYSTEMS
S even years 3 cr. LEC 3
PREREQUISITE: CSCI 452 and CSCI 466.
- The design and implementation of software systems that utilize multiple host computer networks as a foundation. Concurrency control, homogenous and heterogeneous systems, interprocess communication, protocols and application design.

CSCI 532 ALGORITHMS
S 3 cr. LEC 3
PREREQUISITE: CSCI 232.
- Concrete time and space complexity; combinatorial algorithms; greedy algorithms; dynamic programming; probabilistic and randomized algorithms; branch-and-bound algorithms.

CSCI 538 COMPUTABILITY
F 3 cr. LEC 3
PREREQUISITE: CSCI 338.
- Turing machine computability and decidability; abstract time and space complexity; intractability.

CSCI 540 ADVANCED DATABASE SYSTEMS
F odd years 3 cr. LEC 3
PREREQUISITE: CSCI 440 or consent of instructor.
- Advanced database models including spatial, temporal, and object-oriented; advanced data indexing techniques, data warehousing and query optimization.

CSCI 541 COMPUTER GRAPHICS
S odd years 3 cr. LEC 3
PREREQUISITE: M 221 and CSCI 232.
- Realistic visualization of complex structures. Current research in high resolution computer graphics, advanced graphics computational models. Animation techniques. Architectures for high resolution graphics.

CSCI 547 MACHINE LEARNING
S even years 3 cr. LEC 3
PREREQUISITE: CSCI 446.
- An exposure to advanced topics from the field of artificial intelligence. Example topics include machine learning, evolutionary computation, natural language processing, and cognitive science.

CSCI 548 REASONING UNDER UNCERTAINTY
S odd years 3 cr. LEC 3
PREREQUISITE: CSCI 446 recommended. Background in probability recommended.
- An exploration of problem solving using structured probabilistic models. Topics in probabilistic representations, inference algorithms, and learning such models from data will be explored.

CSCI 550 DATA MINING
F even years 3 cr. LEC 3
PREREQUISITE: CSCI 452.
- This course examines a variety of algorithmic computational biology topics with an emphasis on elucidating new research problems.

CSCI 565 WIRELESS NETWORKS AND MOBILE COMPUTING
F even years 3 cr. LEC 3
PREREQUISITE: CSCI 466 or (EELE 445 and EELE 447).
- This course introduces the topics of wireless networks and mobile computing. Students will be exposed to different technologies of mobile computing, both software and hardware, and be able to use them to perform wireless networking analysis.

CSCI 566 ADVANCED NETWORKING
S odd years 3 cr. LEC 3
PREREQUISITE: CSCI 466.
- This graduate-level course covers advanced topics in networking, with emphasis on IP and wireless networks. After taking this course, the students are expected to know the state-of-the-art in networking algorithms, protocols and architectures, and to understand how networking research is done.

CSCI 575 COMPUTATIONAL RESEARCH TOPICS
S odd years 3 cr. LEC 3 Maximum 9 cr.
PREREQUISITE: To be determined based on actual topic offered.
- Focus on a current research topic such as structured probabilistic models and explore the topic using a project-oriented format.
CSCI 580 MASTER'S PROJECT
F, S. S. Su 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

CSCI 599 MASTER'S THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's standing.

CSCI 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

CSCI 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

CSCI 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

CSCI 598 INTERNSHIP
On Demand 1 - 6 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

CSCI 599 GRADUATE CONSULTATION
On Demand 1-3 cr. IND
PREREQUISITE: Master's standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their course work, and thesis, if on a thesis plan but who need additional faculty or staff time or help.

CSCI 600 DOCTORAL THESIS
F, S. S. Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

DANC
Dance
formerly part of HHD

DANC 150 SOCIAL DANCE
F, S 1 cr. LAB 1
- Traditional and popular styles of ballroom dancing, including jitterbugging, polka, waltz, cha cha, western dance, and foxtrot.
- Department of Health & Human Development

DANC 206D DANCE AS CULTURAL EXPRESSION
On demand 3 cr. LEC 3
- Dance in a variety of cultures will be identified and examined, taking into consideration many of the factors that have influenced its development (geography, climate, music, sociological values, and customs).
- Department of Health & Human Development

DANC 250IA DANCE APPRECIATION
On demand S 3 cr. LEC 3
- Dance as a performing art; its historical development; the way dance makes statements about man and the environment through the use of music, art, movement, literature, and theater.
- Department of Health & Human Development

DGED
The Graduate School
formerly The Division of Graduate Education

DGED 501 GTA DEVELOPMENT
F, S 1 cr. SEM 1.
PREREQUISITE: Current Graduate Teaching Assistant Program.
- The purpose of this course is to provide MSU's graduate teaching assistants (GTA) with an opportunity for on-going, interdepartmental training throughout the semester as they teach their assigned course(s). The class will meet three times a semester in a seminar style fashion. Most of the requirements will be met through independent reflective writings by the GTA.

DGED 501 SPECIAL TOPICS
On Demand 1 - 4 cr. Max 12 cr
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

DGED 610 GEOBIOLOGICAL SYSTEMS TEXTS AND CRITICS: KNOWLEDGE
F 3 cr. LEC 2 RCT 1
PREREQUISITE: Acceptance into a Ph.D. program.
- This course represents the first of a two-course sequence for Ph.D. students participating in the Geobiological Systems Science IGERT program. The course will provide an introduction to systems biology and explore the components necessary for understanding, formulating and developing models that represent key processes in complex microbial communities.

DGED 611 IGERT: GEOBIOLOGICAL SYSTEMS SCIENCE: LABORATORY ROTATIONS
F, S 3 cr. IND 3
PREREQUISITE: Acceptance in IGERT Program.
- This course is part of the required curriculum for IGERT students. The purpose is to provide students with the opportunity to experience different laboratory environments and different experimental approaches, which will assist them in choosing a laboratory for thesis work.

DGED 613 IGERT: SCIENTIFIC PROPOSAL WRITING
F 3 cr. LEC 3
PREREQUISITE: Acceptance in IGERT Program; DGED 610 and DGED 611.
- The goal of this course is to provide the doctoral student with strategies, practical skills and experience in seeking funding sources and writing and evaluating scientific proposals. The student should leave this course with a proposal that is ready to submit for funding.

DGED 614 IGERT: ADVANCED METHODS IN GEOBIOLOGY
F, S 3 cr. LEC 1 IND 1 LAB 1
PREREQUISITE: Acceptance in IGERT Program.
- This course is part of the required curriculum for IGERT students. The purpose is to provide students with the opportunity to learn advanced research methods that will allow them to understand complex geomicrobiological communities.

DGED 621 IGERT: GEOBIOLOGICAL SYSTEMS SCIENCE: INTERNSHIP
F, S 3 cr. IND 3
PREREQUISITE: Acceptance in IGERT Program, DGED 610 AND DGED 611.
- This course is part of the required curriculum for IGERT students, and provides an opportunity for IGERT students to participate in a domestic or international internship at an academic, private and or national laboratory.

DRFT
Drafting

DRFT 094 PCE TOPIC
- Non-credit professional and continuing education (PCE) courses offered to provide condensed coursework to meet the needs of working students and professionals. These courses are eligible for Continuing Education Units (CEU’s) and OPI Renewal Units and are shown on the student’s continuing education transcript. Typically Taken – N/A

DRFT 120 BLUEPRINT READING
F 2 cr.
- This course will introduce blueprints and emphasize reading, scaling, analyzing and bidding from plans. Topics covered will include: line weights, styles and types, tile block information, dimensions, structural shapes, auxiliary views, section views, detail prints, symbols, scaling, acronyms found in different industries, and other various blueprint information. Students will also be taught how to use plans to bid and price materials, visit the Fall Parade of Homes, and compare what’s on the page to what really gets built. Typically Taken – 1st Semester (Fall)
DRFT 131 HAND DRAFTING
F 3 cr.
- Hand lettering, Isometric, Perspective, Quick-sketch, pencils, ink
- The course will cover basic drafting theory, visualization, line weight representation, scale, applied geometry, orthographic projection, dimensioning, applied technical mathematical relations, primary auxiliary views, sections, and symbols. Traditional drafting materials will be used, such as: Tsquares, triangles, scales, lettering shields and mechanical pencils.
Typically Taken – 1st Semester (Fall)

DRFT 132 DESCRIPTIVE GEOMETRY
S 4 cr. (upgraded from 3cr in Spring 2011)
Prerequisite: DRFT 131 or instructor approval.
- Advanced theory and practices in descriptive geometry construction and pattern development are covered in this course in preparation for advanced courses in Design Drafting. Descriptive Geometry teaches 3D visualization and how to solve geometric problems by drawing them in CAD.
Typically Taken – 2nd Semester (Spring)

DRFT 140 PROFESSIONAL PRACTICES
S 3 cr.
- Interviewing, work ethic, writing a resume, professional dress and presentation, first impressions, overview of the field, potential careers in the field, guest speakers from various parts of the industry, job shadows, and site visits.
Typically Taken – 2nd Semester (Spring)

DRFT 156 CAD 1 (formerly “INTRO to CAD”)
F, S 4 cr. (upgraded from 3cr in Spring 2011)
Prerequisite: DRFT 151 or instructor approval.
- Students will expand upon CAD learned in DRFT 131 by delving deeper in to the AutoCAD program itself and learning about concepts including: LISP routines, fields, shortcuts, settings and the CAD Ribbon. During this course, students will field measure multiple objects, including an existing building, and recreate those objects in AutoCAD, in both individual and team projects.
Typically Taken – 1st Semester (Spring)

DRFT 186 CAD 2 (*new Spring 2011)
F, S 3 cr.
Prerequisite: DRFT 156.
- Explores advanced concepts, techniques, and customization of AutoCAD. Create templates, set up and modify printers, generate shortcuts and sub-routines, and increase drafting speed and efficiency. Transition from an AutoCAD user into a competent CAD manager.
Typically Taken – 2nd Semester (Spring)

DRFT 194 PCE TOPIC
Credits vary (sufficient demand).
- Credit-bearing professional and continuing education (PCE) courses offered to provide students and professionals condensed courses for skills upgrades, Professional Certification requirements, and as electives for the Associate of Arts (AA) or Associate of Science (AS) degrees. These courses may be eligible for financial aid for students pursuing the AA or AS degrees and are shown on the student’s undergraduate transcript.
Typically Taken – N/A

DRFT 201 RESIDENTIAL DRAFTING
F 3 cr.
Prerequisite: DRFT 156. -The students in this course will create, from scratch, an entire two story home, and draw the plans in CAD to the level where it is ready to be submitted for permit to the City of Bozeman or other municipality. Plans will include: Site Plan, Four Exterior Elevations, Foundation Plan, Main Floor Plan, Second Floor Plan, Electrical Plans, Sections and Details as required. All drawings must follow current codes including: International Residential Code, International Mechanical Code, Fuel Gas Code, International Energy Conservation Code, Uniform Plumbing Code, and National Electrical Code.
Typically Taken – 3rd Semester (Fall)

DRFT 205 MACHINE DRAFTING
S 3 cr.
Prerequisite: DRFT 132 (Descriptive Geometry) and DRFT 156 (CAD 1). -This course is a study and application of standards used for producing working drawings, including the fundamentals of geometric dimensioning and tolerance. Both detail and assembly drawings will be produced.
Typically Taken – 4th Semester (Spring)

DRFT 244 TOPOGRAPHIC MAPPING AND GIS APPLICATIONS / CIVIL
S 3 cr.
- Fundamentals of mapping and geographic information systems (GIS). Includes applications of mapping projections, presentations of surveying information, and GIS methods. Mapping and GIS computer applications will be used and developed throughout the course.
Typically Taken – 4th Semester (Spring)

DRFT 256 COMPUTER RENDERING
F 3 cr.
Prerequisite: DRFT 156 CAD 1
- This is a study in advanced CAD concepts and procedures to develop three-dimensional wireframe and rendered models. Emphasis will be on the creation and use of 3D primitives, surface modeling, basic solids modeling, shading techniques, and the use of animation software. Exercises will include rendered output with programs like: Adobe Photoshop, AutoCAD Architecture, and Impression.
Typically Taken – 1st Semester (Fall)

DRFT 260 AEROSPACE DRAFTING
S 3 cr.
Prerequisite: –
Typically Taken – N/A

DRFT 261 CIVIL DRAFTING
S 3 cr.
Prerequisite: –
Typically Taken – N/A

DRFT 266 REVIT
S 3 cr.
Prerequisite: DRFT 156
- Students will be introduced to Parametric Design and Building Information Modeling (BIM) that make up the base platform of this software as they work through a variety of drafting projects.
Typically Taken – 4th Semester (Spring)

DRFT 297 DESIGN-DRAFTING PORTFOLIO
(*new Spring 2011) S 3 cr.
Prerequisite: DRFT 140 and DRFT 256.
- Organize and refine previously created work into a presentation/job application format. Course includes: in-class presentations, mock interviews, and a public presentation of the portfolio to be judged by local industry professionals.
Typically Taken – 4th Semester (Spring)

DRFT 298 INTERNSHIP
S 4 cr.
Prerequisite: Program Director approval only
- Job experience within your chosen field.
Typically Taken – 4th Semester (Spring)

EBIO

EBIO 100 INTRODUCTION TO BIOLOGICAL ENGINEERING
F 2 cr. LEC 1 LAB 1
COREQUISITE: M 151Q or above.
- An introduction to engineering measurements, computations, problem solving, and experimental design. Discussion of the breadth of opportunities in chemical and biological engineering.

EBIO 216 ELEMENTARY PRINCIPLES OF BIOENGINEERING
S 3 cr. LEC 5
PREREQUISITE: ECHM 215, M 172.
- Fundamentals of energy balances in biological engineering applications.

EBIO 290 UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project.

EBIO 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EBIO 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of the Associate Dean.
- Directed research and study on an individual basis.

EBIO 324 BIOENGINEERING TRANSPORT
F 3 cr. LEC 5
PREREQUISITE: EBIO 216, ECHM 321.
- Fundamentals of the phenomena governing the transport of momentum, energy, and mass in biological systems.

EBIO 411R BIOLOGICAL ENGINEERING DESIGN I
F 3 cr. LEC 2 RCT 1
PREREQUISITE: ENGR 310, ECHM 438 and (ECHM 325, ECHM 328, or (EBIO 324, and EBIO 409).
- Senior capstone course. Design and simulation of chemical engineering equipment, processes and plants.

EBIO 412R BIOLOGICAL ENGINEERING DESIGN II
S 3 cr. LEC 2 RCT 1
PREREQUISITE: ECHM 411.
- Senior capstone course. Design and economic analysis of chemical engineering equipment, processes and plants.
EBIO 439 DOWNSTREAM PROCESSING
S 3 cr. LEC 3
PREREQUISITE: EBIO 324.
COREQUISITE: ECHM 438.
– Theory and Quantitative description of separation processes commonly employed in biotechnology and bioengineering. Cell disruption, extraction, crystallization, precipitation, filtration, centrifugation, chromatography, electrophoresis.

EBIO 442 BIOENGINEERING LABORATORY I
F 2 cr. LEC 1 LAB 1
PREREQUISITE: EBIO 324, ECHM 438, EGEN 350.
– Students will develop an experimental objective and experimental design to meet a particular objective. Independently investigate the relevant theory for a proposed experiment, analyze data for statistical significance, draw conclusions from the experimental data. They will then effectively communicate the technical information through written reports.

EBIO 443 BIOENGINEERING LAB II
S 2 cr. LEC 1 LAB 1
PREREQUISITE: EBIO 442.
– Students will develop an experimental objective and experimental design to meet a particular objective. Independently investigate the relevant theory for a proposed experiment, analyze data for statistical significance, draw conclusions from the experimental data. They will then effectively communicate the technical information through written reports.

EBIO 490R UNDERGRADUATE RESEARCH
F, S 1-8 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Senior Standing.
– Directed undergraduate research which may culminate in research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

EBIO 491 SPECIAL TOPICS
On Demand
PREREQUISITE: Course prerequisites as determined for each offering.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EBIO 492 INDEPENDENT STUDY
OnDemand1-3cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
– Directed research and study on an individual basis.

EBIO 498 INTERNSHIP
On Demand 1 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
– Directed research and study on an individual basis.

EBIO 566 FUNDAMENTALS OF BIOFILM ENGR
PREREQUISITE: M 274.
– Development of quantitative descriptions of processes of microbial growth, diffusion and convective solute transport, and cell attachment and detachment. Integration of these processes in mathematical models of biofilm accumulation and activity. Application of these approaches to the analysis of biofilms in diverse industrial and natural environments.

EBIO 575 RESEARCH OR

PROFESSIONAL PAPER PROJECT
On Demand 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing. A research or professional dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee. – Directed research and study on an individual basis.

EBIO 590 MASTER’S THESIS
F, S, Su 1 - 10 cr. IND
PREREQUISITE: Master’s standing.

EBIO 591 SPECIAL TOPICS
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EBIO 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
– Directed research and study on an individual basis.

EBIO 594 SEMINAR
On Demand
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
– Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

EBIO 598 CHBE GRAD INTERNSHIP
F, S, Su 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of advisor and approval of department head.
– An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

EBIO 600 DOCTORAL THESIS
F, S, Su 1 - 10 cr. IND
PREREQUISITE: Doctoral standing.

ECHM Engineering - Chemical
formerly part of CHBE

ECHM 100 INTRODUCTION TO CHEMICAL ENGINEERING
F 2 cr. LEC 1 LAB 1
COREQUISITE: M 151Q or above.
– An introduction to engineering measurements, computations, problem solving, and experimental design. Discussion of the breadth of opportunities in chemical and biological engineering.

ECHM 205CS ENERGY & SUSTAINABILITY
F, S 3 cr. LEC 3
– Students from all academic backgrounds explore an array of renewable and non-renewable energy sources and energy conversion systems. Contemporary and contentious energy related issues are presented, and course participants will formulate strategies to address them.

ECHM 215 ELEMENTARY PRINCIPLES OF CHEMICAL & BIOLOGICAL ENGINEERING I
F 3 cr. LEC 3
PREREQUISITE: CHMY 141 and M 171Q.

ECHM 216 ELEMENTARY PRINCIPLES OF CHEMICAL ENGINEERING II
S 3 cr. LEC 3
PREREQUISITE: ECHM 215, M 172Q.
– Energy balances and combined energy-material balances. Discussion of contemporary issues in engineering and the impact of engineering solutions in a global, economic, environmental and societal context.

ECHM 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated.
– Directed undergraduate research which may culminate in a written work or other creative project.

ECHM 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ECHM 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of the Associate Dean.
– Directed research and study on an individual basis.

ECHM 307 CHEMICAL ENGINEERING THERMODYNAMICS I
F 3 cr. LEC 3
PREREQUISITE: ECHM 216, M 273Q.
– Application of the laws of thermodynamics to power, refrigeration and gas liquefaction cycles. An introduction to vapor-liquid phase equilibrium for solutions at low pressure.

ECHM 321 CHEMICAL ENGINEERING FLUID MECHANICS OPERATIONS
S 3 cr. LEC 3
PREREQUISITE: ECHM 215 and M 172Q.
– Theory and equipment for fundamental chemical and biological engineering operations involving fluid mechanics. Equipment design and computations of operational rates.

ECHM 322 CHEMICAL ENGINEERING HEAT TRANSFER OPERATIONS
F 3 cr. LEC 3
PREREQUISITE: ECHM 216, ECHM 321, EGEN 102.
COREQUISITE: M 274.
– Theory and equipment for fundamental chemical engineering operations involving heat transfer. Equipment design and computations of operational rates.

ECHM 325 CHEMICAL ENGINEERING MASS TRANSFER OPERATIONS
S 3 cr. LEC 3
PREREQUISITE: ECHM 307, ECHM 322.
– Theory and equipment for fundamental chemical engineering operations involving mass transfer. Equipment design and computations of operational rates.
ECHM 328 CHEMICAL ENGINEERING REACTOR DESIGN
S 3 cr. LEC 3
PREREQUISITE: ECHM 216, M 274.
- Application of the chemical kinetics of homogeneous and heterogeneous reactions to the design of chemical processing equipment.

ECHM 407 CHEMICAL ENGINEERING THERMODYNAMICS II
F 2 cr. LEC 2 cr.
PREREQUISITE: ECHM 307 and ECHM 325 and ECHM 328.
- Application of laws of thermodynamics to vapor-liquid phase equilibrium, liquid-liquid phase equilibrium, and chemical reaction equilibrium.

ECHM 411R CHEMICAL ENGINEERING DESIGN I
F 3 cr. LEC 2 RCT 1
PREREQUISITE: EGEN 310, ECHM 438 and (ECHM 323, ECHM 328, or (EBIO 324, and EBI0 439).
- Senior capstone course. Design and simulation of chemical engineering equipment, processes and plants.

ECHM 412R CHEMICAL ENGINEERING DESIGN II
S 3 cr. LEC 2 RCT 1
PREREQUISITE: ECHM 411.
- Senior capstone course. Design and economic analysis of chemical engineering equipment, processes and plants.

ECHM 424 TRANSPORT ANALYSIS
F 3 cr. LEC 5
PREREQUISITE: ECHM 323, M 273Q, M 274.
- Deterministic modeling techniques are applied to processes for the transport of momentum, energy and mass. Analytical and numerical solution techniques for the differential equations commonly encountered in the transport processes.

ECHM 428 REACTION ENGINEERING & REACTION MODELING
S 3 cr. LEC 5
PREREQUISITE: ECHM 325 and ECHM 328.
- Advanced engineering aspects of chemical reactor design. Analysis of coupled mass and energy transport processes and chemical reaction in application to real-time design and scale-up of various types of chemical reactors. Optimization problems in reactor design and operation.

ECHM 438 BIOPROCESS ENGINEERING
S 3 cr. LEC 5
PREREQUISITE: ECHM 340 or BIOM 360 and CHBE 216.
- Biotechnology process engineering - microbial process fundamentals, enzyme catalysis, bioreactor design and analysis, separation of biomaterials.

ECHM 442 CHEMICAL ENGINEERING LABORATORY I
F 2 cr. LEC 1 LAB 1
PREREQUISITE: ECHM 323, ECHM 438, University Seminar and WRIT 101W, EGEN 350.
- Experimental studies of unit operations and transport phenomena. Pilot plant studies. Design of Chemical processes and equipment from experimental studies.

ECHM 443 CHEMICAL ENGINEERING LABORATORY II
S 2 cr. LEC 1 LAB 1
PREREQUISITE: ECHM 442.
- Experimental studies of unit operations and transport phenomena. Design of chemical processes and equipment from experimental studies.

ECHM 451 CHEMICAL ENGINEERING PROCESS DYNAMICS & CONTROL
S 3 cr. LEC 3
PREREQUISITE: ECHM 328, ECHM 323, M 274.
- Transient response analysis of controllers and instruments. Design of chemical process control systems.

ECHM 452 ADVANCED ENGINEERING MATERIALS
On Demand 3 cr. LEC 3
PREREQUISITE: EMEC 250 or EMAT 251, M 274.
- Micro and macro properties of electronic materials and material processing.

ECHM 490R UNDERGRADUATE RESEARCH
F, S, Su 1-8 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Senior Standing.
- Directed undergraduate research which may culminate in research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

ECHM 491 SPECIAL TOPICS
On Demand 1 - 12 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ECHM 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

ECHM 498 INTERNSHIP
On Demand 1 - 12 cr. Maximum 12 cr.
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

ECHM 503 THERMODYNAMICS
F 3 cr. LEC 3
PREREQUISITE: ECHM 307.
- Chemical engineering application to phase equilibria and chemical reaction equilibrium. Liquid-liquid, vapor-liquid, and multiple reaction systems.

ECHM 506 SEPARATIONS
On Demand 3 cr. LEC 3
PREREQUISITE: ECHM 323.
- Separation topics of interest, including distillation, membranes, specialized separation of low concentration materials.

ECHM 510 REACTION ENGINEERING & REACTION MODELING
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: ECHM 328.
- Theory and practice of industrial reactions, kinetics, synthesis, modeling of fixed and fluidized beds, process design problems.

ECHM 532 TRANSPORT PHENOMENA
S 3 cr. LEC 3
PREREQUISITE: ECHM 424.
- Comprehensive treatment of mass, momentum, and energy transport. Cross listed with ME 533.

ECHM 534 MASS TRANSFER
On Demand 3 cr. LEC 3
PREREQUISITE: ECHM 424.
- Mass transfer theory, transport in liquids, porous solids, interfacial effects, related mathematical techniques and application.

ECHM 535 VISCOUS FLUID DYNAMICS
On Demand 3 cr. LEC 3
PREREQUISITE: EM 355.

ECHM 575 RESEARCH OR PROFESSIONAL PAPER PROJECT
On Demand 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing. A research or professional dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee. - Directed research and study on an individual basis.

ECHM 590 MASTER'S THESIS
F, S, Su 10 - 12 cr. IND
PREREQUISITE: Master's standing.

ECHM 591 SPECIAL TOPICS
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ECHM 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

ECHM 594 SEMINAR
F 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ECHM 598 CHBE GRAD INTERNSHIP
F, S, Su 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of advisor and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

ECHM 690 DOCTORAL THESIS
F, S, Su 10 - 12 cr. IND
PREREQUISITE: Doctoral standing.
COURSE DESCRIPTIONS: ECIV

ECIV 101 INTRODUCTION TO CIVIL ENGINEERING
F 1 cr. LEC 1
PREREQUISITE: Must be taken within your freshman year.
- This course is optional for students entering civil engineering but is encouraged for freshmen wanting to learn about the breadth of the discipline. Students choosing to take the course will be introduced to civil engineering, including department programs and areas of specialty, civil engineering career opportunities, professionalism, history, and ethics.

ECIV 202 APPLIED ANALYSIS & TECHNICAL COMMUNICATION
F, S 2 cr. LAB 2
PREREQUISITE: M 165 or M 171 or M 181.
- Computer applications in civil engineering using M-based software and a programming language. Introduction to engineering communication.

ECIV 220CS CIVIL ENGINEERING & CONSTRUCTION: FROM THE ANCIENT TO THE MODERN
On Demand 3 cr. LEC 3
- Through the lenses of civil engineering and construction, follow the advancement of civilizations. Assess and evaluate decisions that we must make as a society with respect to protecting the health of the public and the environment with our finite resources.

ECIV 290 UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated.
- Students choosing to take the course will be introduced to civil engineering, including department programs and areas of specialty, civil engineering career opportunities, professionalism, history, and ethics.

ECIV 291 SPECIAL TOPICS
F, S 3 cr.
- Course will address responsible conduct of research. May terminate in a written work or other creative project.

ECIV 307 CONSTRUCTION ESTIMATING & BIDDING
F 3 cr. LEC 3
PREREQUISITE: Concurrent registration with ECIV 306.
- Preparation of cost estimates and bids for construction projects. Introduction of computer estimating software and procedures.

ECIV 308 CONSTRUCTION PRACTICE
F 3 cr. LEC 3
PREREQUISITE: BGMT 205 and EGEN 116.
- Contract documents, insurance, bonding, specifications, drawings, labor and labor law, estimating, bidding and scheduling, business organizations, leadership, and ethics. Significant technical and business writing required.

ECIV 315 STRUCTURES II
F, S 3 cr. LEC 2 LAB 1
PREREQUISITE: ECIV 312.
- Structural design of steel and reinforced concrete members used in buildings and bridges. Theory and application of design codes. Laboratory experience utilizing construction materials.

ECIV 320 GEOTECHNICAL ENGINEERING
F, S 3 cr. LEC 2 LAB 1
PREREQUISITE: EGEN 205.
- The treatment of soil as an engineering material. Fundamental soil mechanics principles and introductory solutions to geotechnical engineering problems. Basic soil mechanics laboratory tests and procedures.

ECIV 331 ENGINEERING HYDROLOGY
F 2 cr. LEC 2
PREREQUISITE: EGEN 330 or STAT 332.
- Descriptive and quantitative hydrology with applications in water resources engineering.

ECIV 332 ENGINEERING HYDRAULICS
F, S 2 cr. LEC 1 LAB 1
PREREQUISITE: EGEN 335.
- Pipe flow, open channel flow, and hydraulic machines with applications in water resources engineering.

ECIV 350 TRANSPORTATION ENGINEERING
F, S 3 cr. LEC 2 LAB 1
PREREQUISITE: CE 201.
- Introduction to vehicle operating characteristics, geometric and pavement design, traffic flow theory, signal design and analysis, capacity analysis and planning. Laboratory work will introduce various in-practice software packages.

ECIV 401 CIVIL ENGINEERING PRACTICE AND ETHICS
F, S 1 cr. RCT 1
PREREQUISITE: Concurrent registration with ECIV 489 required.
- Professional ethics, social responsibility, public policy, and leadership.

ECIV 404 HEAVY CONSTRUCTION EQUIPMENT & METHODS
F, S 3 cr. LEC 2 LAB 1
PREREQUISITE: STAT 216, EGEN 325, and ETCC 392 or ECIV 400.
COREQUISITE: ECIV 397.
- Construction equipment operating characteristics, economics, and production rate estimation. Heavy construction methods associated with tunneling, aggregate production, and mass earthwork operations.

ECIV 405 CONSTRUCTION PROJECT PLANNING & SCHEDULING
F, S 3 cr. LEC 2 LAB 1
PREREQUISITE: ECIV 307.
- Project planning and scheduling procedures involving both network (CPM) and non-network techniques. Introduction to computer scheduling software.

ECIV 414 STEEL DESIGN
Fall alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: ECIV 315.
- Design of structural steel members and systems.

ECIV 415 DESIGN OF MASONRY STRUCTURES
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: ECIV 315.
- Introduction to masonry design. Integrated with building design, including load calculations, design of foundations, structural elements and connections. Emphasis on lowrise buildings.

ECIV 416 DESIGN OF WOOD AND TIMBER STRUCTURES
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: ECIV 315.
- Students will be exposed to the basic behavior of wood and timber structures. They will also be exposed to the current building codes and methodology for the design of wood and timber structures.

ECIV 420 EARTH AND FOUNDATION ENGINEERING
F, S 3 cr. LEC 3
PREREQUISITE: ECIV 300.
- Analysis of lateral earth pressures and design of retaining walls, and the stability of natural and engineered slopes.

ECIV 425 GEOTECHNICAL STRUCTURES
F 3 cr. LEC 3
PREREQUISITE: ECIV 300.
- Analysis of lateral earth pressures and design of retaining structures and braced excavations. Stability analysis of natural and engineered slopes. Analysis and design of embankments and dams.

ECIV 431 OPEN CHANNEL HYDRAULICS
F 3 cr. LEC 3
PREREQUISITE: ECIV 332 or consent of the instructor.
- Principles of open channel flow; hydraulic design of open channel structures.

ECIV 435 CLOSED-CONDUIT HYDRAULICS
S 3 cr. LEC 3
PREREQUISITE: ECIV 332.
- Advanced topics in hydraulic engineering, with emphasis on analysis and design of pipe transmission lines, pumps, and pipe distribution networks.

ECIV 450 PUBLIC TRANSIT SYSTEM DESIGN
Fall alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: ECIV 350, and EGEN 350 or STAT 332.
- Design, implementation and management of public transit systems including paratransit, bus and light rail; including an overview of funding sources, legislation, public relations and other issues with coverage or route optimization strategies and demand estimation techniques. ECIV 450 is corequisite with ECIV 550. Students enrolled in ECIV 450 will not be able to take ECIV 550 and have it count toward degree requirements.

ECIV 451 HIGHWAY PAVEMENTS
S alternate years, to be offered even years 3 cr. LEC 2 LAB 1
PREREQUISITE: ECIV 321, ECIV 350.
- Design of highway pavements including drain- age and base/subbase/subgrade preparation. Laboratory in bituminous materials.
COURSE DESCRIPTIONS: ECIV

ECIV 452 TRAFFIC ENGINEERING AND ITS
F alt. years, to be offered odd years
5 cr. LEC 2 LAB 1
PREREQUISITE: ECIV 350 and EGEN 350 or STAT 352
- Application of driver, vehicle, and roadway character-istics to principles of traffic control, operations, and safety. Traditional and advanced technology solutions will be explored.

ECIV 454 TRANSPORTATION PLANNING
S alt. years, to be offered odd years
3 cr. LEC 2 LAB 1
PREREQUISITE: ECIV 350 and EGEN 350 or STAT 352.
- Transportation planning process and travel demand forecasting including trip generation, trip distribution, mode split and traffic assignment. Laboratory work will introduce TransCADm software.

ECIV 456 HIGHWAY GEOMETRIC DESIGN
F 3 cr. LEC 3
PREREQUISITE: CE 201, ECIV 350.
- Advanced geometric design of highway systems including two-lane and interstate roadways and intersection design and traffic control.

ECIV 484 REINFORCED CONCRETE DESIGN
F alternate years, to be offered even years 5 cr.
LEC 3
PREREQUISITE: ECIV 315.
- Design of reinforced concrete members and systems.

ECIV 489R CIVIL ENGINEERING DESIGN I
F S 2 cr. RCT 1 LAB 1
PREREQUISITE: Student must be within two semesters of graduation, and EGEN 310.
COREQUISITE: EGEN 325, ECIV 308. Concurrent registration with ECIV 401 is required.
- Senior capstone course. Discussion of the design process from conceptual/preliminary design to final design, plan, and specifications. Development of contract documents, including scope of work, data acquisition, and organization of design team.

ECIV 490R UNDERGRADUATE RESEARCH
F S Su 1-4 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

ECIV 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ECIV 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 4 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of Department Head.
- Directed research and study on an individual basis.

ECIV 498 INTERNSHIP
On Demand 2 cr. IND
PREREQUISITE: Junior standing, consent of instructor and approval of Department Head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field. Students may not take this course the semester they graduate.

ECIV 499R CAPSTONE:CIVIL ENGINEERING DESIGN II
F S 2 cr. RCT 1 LAB 1
PREREQUISITE: ECIV 489.
- Senior capstone course. Design of an engineering project. Evaluation of design alternatives and design recommendations. Development of construction documents. Discussion of project management, cost estimates, and engineering services during construc-tion.

ECIV 504 CONSTRUCTION PRODUCTIVITY
On Demand 5 cr. LEC 3
PREREQUISITE: One year of experience or one internship (ECIV 498 or ETCC 498).
COREQUISITE: ETCC 499 or equivalent.
- Productivity improvement data collection, analy-sis, and solutions to include the construction work face and the office. Human factors and economics involved in productivity will be emphasized.

ECIV 505 QUALITY ASSURANCE/RISK MANAGEMENT IN CONSTRUCTION
On Demand 3 cr. LEC 3
PREREQUISITE: Either EGEN 350, EIND 354 or STAT 352 and ECIV 308 or equivalent plus one year of industrial experience or one internship (ECIV 498 or ETCC 498).
- Analysis of quality assurance and control concepts to include utilization of statistical analysis. Application of risk analysis principles to the con-struction process to minimize liability and project costs.

ECIV 506 ADVANCED CONSTRUCTION MANAGEMENT
On Demand 3 cr. LEC 3
PREREQUISITE: One year of industrial experience or one internship (ECIV 498 or ETCC 498).
COREQUISITE: ETCC 499 or equivalent.
- Quality improvement techniques to include Total Quality Management and Partnering. Enlightened leadership and management concepts.

ECIV 507 LAW OF THE CONSTRUCTION INDUSTRY
F 5 cr. LEC 3
PREREQUISITE: EGEN 361.
- This class exposes engineers to the effect of law, rules and regulations on their work both from a practical perspective, for example, what engineers should know about basic concepts of contract law, to more abstract concepts like whether, and in what manner, government should mandate green construction practices. It is about understanding how the construction industry works within a frame-work of rules and regulations, critically considering whether the rules help or hinder the construction process and most importantly, how you as future leaders in the engineering profession are going to make the process better.

ECIV 511 BUILDING STRUCTURAL SYSTEMS
F alternate years, to be offered even years 2 cr.
LEC 2
PREREQUISITE: ECIV 484 or ECIV 414 or ECIV 415 or ECIV 416.
COREQUISITE: ECIV 512.
- Analysis of multistory structural systems. Emphasis on lateral force resisting systems in buildings.

ECIV 512 STRUCTURAL DYNAMICS
F alternate years, to be offered even years 2 cr.
LEC 2
PREREQUISITE: ECIV 312.
- Response of structures to dynamic loads, including seismic loads.

ECIV 513 BEHAVIOR OF CONCRETE STRUCTURES
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: ECIV 498.
- Behavior of reinforced concrete members, frames, and shear wall systems. Significance of behavior in design of reinforced concrete structures.

ECIV 514 BEHAVIOR OF STEEL STRUCTURES
S alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: ECIV 414 and EGEN 415.
- Behavior of steel members and frames. Significance of behavior in design of steel structures.

ECIV 515 ADVANCED STRUCTURAL ANALYSIS
S alternate years, to be offered odd years 2 cr.
LEC 2
PREREQUISITE: EGEN 415.
- This course will present the theoretical back-ground behind common solid mechanics finite ele-ments used by structural engineers. Elasticity, energy methods, dynamics, buckling, nonlinear materials and large rotation topics will be addressed. These topics will allow students to utilize advanced finite element software in an informed manner.

ECIV 519 BRIDGE & Prestressed Concrete Design
F alternate years, to be offered odd years 3 cr.
LEC 3
PREREQUISITE: ECIV 315.
- Design of concrete structures utilizing pre- and post-tensioned concrete elements. Introduction to bridge analysis and design.

ECIV 521 APPLIED GEOTECHNICAL ENGINEERING
F alternate years, to be offered even years 3 cr.
LEC 2 LAB 1
PREREQUISITE: ECIV 320.
- Principles of advanced geotechnical labora-tory testing and field investigative techniques. Application of laboratory and field test results to the geotechnical design of soil-supported structures.

ECIV 524 ADVANCED SOIL MECHANICS
F alternate years, to be offered odd years 5 cr.
PREREQUISITE: ECIV 320.
- Topics leading to an advanced understanding of the engineering behavior of soils with an emphasis on settlement and shear strength.

ECIV 529 GROUNDWATER CONTAMINATION
S 3 cr. LEC 5
PREREQUISITE: EENV 434.
- Subsurface mass transport and microbial processes and their affect on fate and transport of organic and inorganic contaminants. Bioremediation and other contemporary remediation technologies will be emphasized.

ECIV 530 ADVANCED HYDRAULIC INVESTIGATIONS
S alternate years, to be offered even years 3 cr.
LEC.
PREREQUISITE: ECIV 451.
- Advanced topics in open channel flow.

ECIV 535 PUBLIC TRANSIT SYSTEM DESIGN
F alternate years, to be offered odd years 3 cr.
LEC 3
PREREQUISITE: Graduate Standing and ECIV 350 or equivalent.
- This course covers the designing, implementation and management of public transit systems including paratransit, bus and light rail. The course includes an overview of funding sources, legislation, public relations and other issues. The student will learn several route optimization strategies and demand estimation techniques.
ECIV 552 ROAD ECOLOGY
F Alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: ECIV 350 or consent of instructor.
– This course provides multidisciplinary coverage of
ecological effects of transportation systems, primari-
y focused on rural highways. Ecological impacts on
air quality, water quantity, vegetation, and wildlife will
be covered (there will be more coverage of impacts
to wildlife than the other areas).

ECIV 554 SEMINAR
F S 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by
petition. Course prerequisites as determined for
each offering.
– Topics offered at the graduate level which are not
covered in regular courses. Students participate in
preparing and presenting discussion material.

ECIV 556 TRAFFIC FLOW FUNDAMENTALS
S Alternate years, to be offered odd years 3 cr.
LEC 3
PREREQUISITE: ECIV 350 or consent of instructor.
– This course covers traffic stream parameters,
their relationships, and important analytical techniques in
traffic engineering such as capacity analysis, queueing
analysis, shockwave analysis, and traffic simulation.
Topics covered are essential in understanding the
behavior of vehicular traffic as a complex system.

ECIV 575 RESEARCH OR
PROFESSIONAL PAPER PROJECT
F S 1 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
– A research or professional paper or project deal-
ing with a topic in the field. The topic must have
been mutually agreed upon by the student and his or
her major adviser and graduate committee.

ECIV 589 GRADUATE CONSULTATION
F S Su 1-3 cr. TUT Maximum 3 cr.
PREREQUISITE: Master’s standing and approval of
the Dean of Graduate Studies.
– This course may be used only by students who
have completed all of their course work (and thesis,
if on a thesis plan) but who need additional faculty
or staff time or help.

ECIV 590 MASTER’S THESIS
F S 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.

ECIV 690 DOCTORAL THESIS
F S, Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

ECNS
ECONOMICS

ECNS 101S ECONOMIC WAY OF THINKING
F S 3 cr. LEC 3
– Introduces important tools and methods of eco-
nomics, including the core reasoning that underlies
decision-making, analytical thinking and problem
solving, demand and supply analysis, and indicators of
economic performance. Emphasis is on applica-
tion of the tools of economics to current issues of
social and personal importance.

ECNS 105 STUDY IN THE
ECONOMIC WAY OF THINKING
F S 3 cr. LEC 1
COREQUISITE: ECNS 101.
– Optional directed study in a small group setting for
ECNS 101 students. Students meet weekly in
small groups to review ECNS 101 concepts, gain
additional practice with economic problems, and
complete in-class problem sets.

ECNS 132 ECON & THE ENVIRONMENT
On demand 3 cr. LEC 3
PREREQUISITE: ECNS 101.
– This course includes topics on renewable (fisher-
ies, wildlife, surface water use) and non-renewable
(oil, natural gas, minerals) natural resource issues,
environmental resources (public lands, resource
preservation), pollution control issues, and the
global environment (including climate change, bio-
diversity and population).

ECNS 202 PRINCIPLES OF MACROECONOMICS
F S Su 3 cr. LEC 3
PREREQUISITE: ECNS 101.
– Topics include inflation, unemployment, interest
rates, money, and the impact of government sur-
pluses or deficits. Government policies of growth,
employment, income distribution, and international
trade are examined.

ECNS 204S MICROECONOMICS
F S Su 3 cr. LEC 5
PREREQUISITE: ECNS 101.
– Consumer theory and the theory of the firm are
utilized to show how independent decisions by con-
sumers and firms interact in markets to determine the
price and output of goods and services.

ECNS 206 STUDY PRINCIPLES
OF MACROECONOMICS
F S 1 cr. LEC 1
– Optional directed study in a small group setting for
ECNS 202 students. Students meet weekly in
small groups to review ECNS 202 concepts, gain
additional practice with economic problems, and
complete in-class problem sets.

ECNS 251S HONORS ECONOMICS
S 4 cr. SEM 4
– Economic principles are introduced and applied to
a wide range of contemporary and historical
problems including legal, environmental, resource,
health, taxation, poverty, economic development,
and macroeconomic policy issues.

ECNS 290R UNDERGRADUATE RESEARCH
F S Su 1-8 cr. IND
PREREQUISITE: ECNS 101 and approval of
instructor.
– Intended for lower division undergraduate
research/undergraduate scholars program. The
student will work closely with the supervising faculty.
Course will address responsible conduct of research.

ECNS 291 SPECIAL TOPICS
F S Su 3 cr. Maximum 6 cr.
PREREQUISITE: Consent of instructor and approv-
of department head.
– Directed research and study on an individual basis.

ECNS 301 INTERMEDIATE
MICRO WITH CALCULUS
F S 3 cr. LEC 3
PREREQUISITE: ECNS 204 or ECNS 251, M 161
or M 171.
– A study of microeconomic theory and selected
applications with emphasis on the theory of consumer
behavior and theory of the firm. A major objective
of the course is to prepare students for additional
upper-division courses in economics.

ECNS 303 INTERMEDIATE
MACRO WITH CALCULUS
F S 3 cr. LEC 3
PREREQUISITE: ECNS 202 and ECNS 294 or
ECNS 251, M 161 or M 171.
– The economic theory of economy-wide aggregates
such as national income, levels of employment,
income distribution; the determinants of the per-
formance of entire economies: nations, groups of
nations, and the world.

ECNS 305R LEADER IN ECONOMICS
S 5 cr. LEC 3
PREREQUISITE: ECNS 301 and by consent of
instructor.
– Teaches leadership through peer instruction of
ECNS 101 students. Students lead economics study
labs, study and implement effective economics
pedagogical techniques analyze and communicate
to others regarding economic problem solving, and
conduct research on economics pedagogy.

ECNS 309 MANAGERIAL ECONOMICS
S 3 cr. LEC 3
PREREQUISITE: ECNS 204 or ECNS 251, M 161
or M 171.
– An integration of various principles and concepts
from different areas of economics. These are com-
 pared with several tools of analysis and related to
problems of economic decision making and policy
formulation at the firm level.
ECNS 311 INT. MICRO WITH ECON EDUC APPS  
On Demand 3 cr. LEC 3  
PREREQUISITE: ECNS 204 or ECNS 251 or consent of instructor.  
- A study of microeconomic theory with selected applications in the area of the economics of education and emphasis on the theory of the behavior of consumers, firms, non-profit organizations and government agencies, and welfare economics. Applications will address issues such as the labor market for primary and secondary school teachers, the effects of voucher programs on the quality of public and private education, and the returns to primary and secondary education.

ECNS 312 LABOR ECONOMICS  
S, to be offered alternate years, 2012 3 cr. LEC 3  
PREREQUISITE: ECNS 204 or ECNS 251.  
- Economics of labor markets, wage determination, and human capital. The theoretical framework of labor market analysis is presented, along with empirical research results and descriptive aspects of current labor issues.

ECNS 313 MONEY & BANKING  
F 3 cr. LEC 3  
PREREQUISITE: ECNS 202 or ECNS 251.  
- Principles and problems of money, banking, and credit. Monetary and banking history; monetary theory and policy; structure and operation of our financial system.

ECNS 314 INTERNATIONAL ECONOMICS  
F 3 cr. LEC 3  
PREREQUISITE: ECNS 204 or ECNS 251.  
- A survey of international economic theory and policy. Major concepts explored are comparative advantage, impacts of tariffs, exchange rates, and international payments.

ECNS 317 ECONOMIC DEVELOPMENT  
S, to be offered alternate years, 2011 3 cr. LEC 3  
PREREQUISITE: ECNS 204 or ECNS 251.  
- The plight of the world’s low income countries, and the many national and international programs devoted to its alleviation. Primary emphasis directed to economic factors, but attention given to political and social characteristics vital to economic development.

ECNS 329 PUBLIC FINANCE  
F 3 cr. LEC 3  
PREREQUISITE: ECNS 204 or ECNS 251.  
- Analysis of public expenditure programs, government behavior, and public decision making. Topics such as health care and welfare programs, and principles of taxation will be covered.

ECNS 332 ECON OF NATURAL RESOURCES  
F 3 cr. LEC 3  
PREREQUISITE: ECNS 204 or ECNS 251.  
- Economic principles regarding the allocation and use of natural resources and the impact of institutional factors within which these decisions are implemented. Emphasis on property rights, economic rent, and impact of regulations on resources such as forests, fisheries, land, and water.

ECNS 345 ECONOMIC ORGANIZATION, FINANCE & CREDIT ANALYSIS  
F 3 cr. LEC 3  
PREREQUISITE: ECNS 204 or ECNS 251.  
- Alternatives available to business owners for acquiring and maintaining control over resources used in production. Emphasis is on the management of cash, credit, debt, taxes, and interest in relation to price levels and general economic conditions. Primary focus is on the agriculture industry. Cross-listed with AGBE 545.

ECNS 372 ECONOMIC HISTORY OF THE US  
On Demand 3 cr. LEC 3  
PREREQUISITE: ECNS 101 or ECNS 251.  
- Interpretation of American economic growth in the context of economic theory. Examines specific issues in U.S. history while focusing on the question of how the U.S. has been able to sustain increases in per capita income.

ECNS 394 SEMINAR  
F, S 1 cr. SEM 1  
PREREQUISITE: ECNS 204 or ECNS 251 or consent of instructor.  
- Current economic problems and current writings of people in the profession. Topics vary each semester; students should check with the department before registering.

ECNS 401 MICROECONOMIC THEORY  
F 3 cr. LEC 3  
PREREQUISITE: ECNS 204 or ECNS 251 or consent of instructor.  
- Current economic problems and current writings of people in the profession. Topics vary each semester; students should check with the department before registering.

ECNS 403R INTRODUCTION TO ECONOMETRICS  
S 3 cr. LEC 3  
PREREQUISITE: ECNS 204 and STAT 216 and M 161.  
- Senior capstone course. Statistical analysis and interpretation of quantitative data in economics. Focus on estimating economic relationships and conducting hypothesis testing in economics. Utilizes cutting-edge statistical software packages and real data to apply economic methods to problems in business, economics, and public policy.

ECNS 406 INDUSTRIAL ORGANIZATION  
F 3 cr. LEC 3  
PREREQUISITE: ECNS 301.  
- Offers students the opportunity to use training in price theory by focusing on issues concerned with public policy toward business. The subject matter should appeal to students in pre-law and business as well as economics majors.

ECNS 452R BENEFIT-COST ANALYSIS  
S 3 cr. LEC 3  
PREREQUISITE: ECNS 301.  
- Senior capstone course. Applied welfare economics and methods and criteria for evaluating benefits and costs of public policies and investment. Applications include environmental and natural resource issues.

ECNS 490R UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY  
F, S, Su 1-8 cr. IND  
PREREQUISITE: ECNS 204, junior standing, and approval of instructor.  
- Intended for upper division undergraduate research/undergraduate scholars program. The student will work closely with the supervising faculty. Course will address responsible conduct of research.

ECNS 491 SPECIAL TOPICS  
On Demand 1-4 cr. Maximum 12 cr.  
PREREQUISITE: Determined by each offering.  
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ECNS 492 INDEPENDENT STUDY  
On Demand 1-3 cr. IND Maximum 6 cr.  
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.  
- Directed research and study on an individual basis.

ECNS 494 SEMINAR  
On Demand 1 cr. SEM 1 Maximum 4 cr.  
PREREQUISITE: Junior standing and as determined for each offering.  
- Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ECNS 501 MICROECONOMIC THEORY  
S 3 cr. LEC 3  
PREREQUISITE: ECNS 401.  
- Economic models of optimization as they apply to consumer and firm decision making. Topics covered include comparative statistics, theory of the firm and consumer, and consumer and producer surplus.

ECNS 502 MACROECONOMIC THEORY  
S 3 cr. LEC 3  
PREREQUISITE: ECNS 303.  
- Systematic review of accepted macroeconomic theory and critical study of the functional relationships contained therein.

ECNS 561 ECONOMETRICS I  
F 3 cr. LEC 3  
PREREQUISITE: ECNS 301, STAT 216, M 211.  
- The use of regression analysis in the estimation of economic relationships, with emphasis on development of the least squares technique, the properties of estimators, and hypothesis testing in the context of the regression model.

ECNS 562 ECONOMETRICS II  
S 3 cr. LEC 3  
PREREQUISITE: ECNS 561.  
- Course consists of theoretical and applied econometrics of static and dynamic structural models, primarily using time-series data. Single equations and systems of equations are evaluated. Estimation properties specific to statistical problems, dynamic adjustments to economic behavior, and model forecasting are emphasized.

ECNS 569 RESEARCH METHODOLOGY  
F 1 cr. LEC 1  
PREREQUISITE: Graduate standing, ECNS 301, ECNS 303.  
- The research process as a means of acquiring knowledge which is reliable and relevant to problems.

ECNS 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT  
F, S, Su 1-4 cr. IND Maximum 6 cr.  
PREREQUISITE: Graduate standing.  
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

ECNS 589 GRADUATE CONSULTATION  
F, S, Su 5 cr. TUT  
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.  
- This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.
ECNS 590 MASTER'S THESIS
F, S, Su 1 - 10 cr. IND May be repeated.
PREREQUISITE: Master's standing.

ECNS 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ECNS 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, and approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

ECNS 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as dependent on the offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

EDCI Education - Curriculum & Instruction

EDCI 501 EDUCATIONAL STATISTICS I
F, Su 3 cr. LEC 3
PREREQUISITE: STAT 216, graduate standing or consent of instructor
- The application of statistical processes to the analysis of educational data. Educational problems that require hypothesis testing, regression, estimation and the t-distribution, analysis of frequencies, and ANOVA in their solution will be included.

EDCI 502 EDUCATIONAL STATISTICS II
F 3 cr. or On Demand LEC 3
PREREQUISITE: EDCI 501.
- The application of statistical processes to the analysis of educational data. Educational problems that apply multifactor ANOVA, multiple comparison techniques, ANCOVA, multiple regression, and factor analysis in their solution are included.

EDCI 504 ASSESSMENT AND EVALUATION IN EDUCATION
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- Evaluation as an ongoing process in education. This course will engage students in a discussion regarding the construction, selection and use of criterion-referenced, norm-referenced, and alternative assessment methods. In addition, students will be involved in special projects which allow them to explore evaluation at the classroom and program levels.

EDCI 505 FOUNDATION OF ACTION RESEARCH IN TEACHING AND LEARNING
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course presents an overview of classroom-based research for practicing teachers. Students will explore the role of action research in teacher professional development, and review multiple models and methods for action research. Participants will gain experience in data collection and, analysis, and will prepare an action research proposal.

EDCI 506 APPLIED EDUCATIONAL RESEARCH
F, S, Su 5 cr. LEC 3
PREREQUISITE: Graduate standing.
- Students are introduced to systematic scientific inquiry, its purpose in an educational environment, the different approaches to conducting educational research, and the major components of an educational research study. Providing a foundation for further study of research methodologies, students will identify and evaluate existing literature on a topic and conduct an educational research study. Course will address responsible conduct of research.

EDCI 507 QUALITATIVE EDUCATIONAL RESEARCH
S or On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing and EDCI 506.
- This course explores the implications and application of the qualitative research paradigm to systematic inquiry within the field of education. Methods used in qualitative research including techniques of data collection, analysis, and reporting will be reviewed. Students will plan and complete a qualitative research project. Course will address responsible conduct of research.

EDCI 508 ADVANCED EDUCATIONAL PSYCHOLOGY
S 3 cr. LEC 3
PREREQUISITE: Graduate standing or permission of the instructor.
- An examination of theory and research related to the diverse learning and motivation needs of K-12 students. Practical implications for effective teaching will be identified throughout the course.

EDCI 509 IMPLEMENTING ACTION RESEARCH IN TEACHING AND LEARNING
On Demand 3 cr. LEC 3
PREREQUISITE: EDCI 505 or another foundational course in action research.
- In this course, students will implement the research design created in EDCI 505 or in a similar course. This will include developing and refining techniques for gathering classroom data, using multiple strategies for data analysis, and communicating the research results in a professional report and in presentation to more than one audience (e.g. other educators, community members.)

EDCI 510 ISSUES & TRENDS IN SOCIAL STUDIES INSTRUCTION
S 3 cr. LEC 3
PREREQUISITE: Graduate Standing.
- Treats current issues & trends in social studies teaching and learning, with special focus on the social and political forces driving change in social studies education and the responses from the research and practice communities.

EDCI 511 IMPROVEMENT OF INSTRUCTION IN HEALTH ENHANCEMENT
On Demand 3 cr. LEC 2 LAB 1
PREREQUISITE: EDU 495.
- Health enhancement curriculum content, integration concepts amongst instructional topics such as skill acquisition, physical fitness, nutrition, mental health, sexuality and drug and alcohol education. Identification and development of appropriate value orientation and curriculum framework for health enhancement instructional design activities.

EDCI 512 WRITING AND ITS IMPROVEMENT
Su alternate years, 3 cr. LEC 3
PREREQUISITE: Graduate Standing.
- Advanced study in language arts pedagogy. Special attention is given to the writing process.

EDCI 514 MENTORING NEW TEACHERS
F 3 cr. LEC 3
PREREQUISITE: Graduate Standing.
- This course examines research relevant to the process of mentoring new teachers and supporting their professional development. Course content explores skills necessary for successful mentoring, the professional development needs of new teachers, and development of tools for monitoring and evaluation.

EDCI 518 MASTER TEACHING STRATEGIES FOR SCIENCE EDUCATORS
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate Standing.
- A professional development class for practicing science educators to learn master teaching strategies to engage grade 6 - 12 students learning science. Intended as a “gateway” online class for teachers interested in exploring an online course in consideration of the MSSE degree. Course an elective for the MSSE degree.

EDCI 520 VISUAL ARTS AND LEARNING
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- Explores the importance of art in the lives of children and adolescents while finding ways to include art experiences in an integrated curriculum. Emphasizes philosophical and cultural groundings for teaching art, studio experiences and research potentials.

EDCI 522 INFORMATION RESOURCES AND SERVICES
S 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- A course in the use of information resources in research, reference, integration, and online learning. Topics include the use and evaluation of traditional and electronic information resources, design and selection of information resources for classrooms and libraries. Restricted to BATE Library Media program students.

EDCI 525 IMPROVEMENT OF INSTRUCTION IN SCIENCE
S alternate years, 3 cr. LEC 3
PREREQUISITE: EDU 495 OR EDU 497.
- This course focuses on theoretical and practical concerns in science education. Research, conceptual frameworks and policy issues will be introduced, as well as teaching and learning activities for elementary and secondary science classrooms.

EDCI 531 CONTEMPORARY ISSUES IN EDUCATION
Su 3 cr. LEC 3
- This course is designed to establish the necessary social, technical, and research foundations for cohort groups in the Masters degree program. This course will examine critical issues in education including advanced pedagogy, Indian Education for All, and school law.

EDCI 532 GENERAL SCHOOL CURRICULUM
S 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- A survey of developments in curriculum theory and the role of curriculum reform in school improvement initiatives. Also treated is the relationship between curriculum reform and implementation.
EDCI 533 MIDDLE YEARS SCHOOL
Su alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: EDU 495, graduate standing.
- History, philosophy and organization of Junior High and Middle schools, emphasizing curriculum and instruction based on the characteristics and needs of 10 to 13 year olds.

EDCI 534 LITERACY ASSESSMENT AND INSTRUCTION
Su 3 cr. LEC 3
PREREQUISITE: EDU 350, EDU 451, teaching experience.
- Current theory and techniques in assessment of reading. Emphasis on instructional strategies and assessment tools developing the literacy of all students. A practicum is included.

EDCI 535 NEEDS ASSESSMENT IN EDUCATION
On Demand 3 cr. LEC 3
PREREQUISITE: EDCI 532 or EDLD 540 or EDLD 501 or EDLD 505, graduate standing.
- Understanding the strategies and techniques for determining educational needs in a variety of settings, and disseminating and utilizing the data and information for program planning and development.

EDCI 536 CONSTRUCTION OF CURRICULUM
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- The development and evaluation of curriculum based on psychological and social foundations of curriculum, curriculum theory, developmental models, design issues, purposes, implementation plans and techniques for assessing the impact of curriculum change.

EDCI 537 CONTEMPORARY ISSUES IN SCIENCE EDUCATION
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate Standing.
- This seminar style course focuses on current problems and controversial issues in science education. Emphasis is placed on those issues which relate directly to teaching, learning and curriculum. Students investigate a variety of issues especially as they relate to their own teaching practices and student learning in their classroom.

EDCI 540 AMERICAN INDIAN STUDIES FOR EDUCATORS
Su,F,S 3 cr. LEC 3
PREREQUISITE: Graduate standing or the consent of the instructor.
- To equip teachers with the skills, knowledge, and dispositions to meet Indian Education for All requirements. Instruction pertains to the history, traditions, customs, values, beliefs, and contemporary affairs of American Indians, particularly tribal groups in the Northern Plains Region.

EDCI 541 HISTORY & PHILOSOPHY OF EDUCATION
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- In its classical obligation, philosophy meant “a love of learning.” This course traces the growth of cultural and intellectual awareness in human civilizations and examines how we humans learned to create tools for the mind. Teachers learn to see the nature of formal cultural systems in the way they developed, and to recognize the central concepts that are the key to learning any subject.

EDCI 542 CREATIVE PROCESSES IN EDUCATION
On Demand 3 cr. LEC 3
PREREQUISITE: EDU 495, Graduate Standing.
- Reviews historical and current issues in art education, aesthetic education and related areas which inform how we know our world and construct meaningful ways to pursue creative endeavors. Emphasizes documentation and research while acknowledging growth as teachers and artists.

EDCI 544 PHILOSOPHICAL ISSUES IN EDUCATION
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- An examination of contemporary educational issues using the perspectives of traditional and contemporary philosophical documents.

EDCI 545 ORGANIZATION OF INFORMATION IN SCHOOL LIBRARY MEDIA CENTERS
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: EDU 370 or equivalent and graduate standing.
- In this course students learn application of descriptive and subjective cataloging content and procedures including: Dewey Decimal Classification, Library of Congress headings, AACR II rules, and examine technology issues for automation and management of library holdings. Restricted to BATE Library Media program students.

EDCI 546 THE SCHOOL LIBRARY MEDIA SPECIALIST
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: EDU 370 or equivalent and graduate standing.
- This course will examine the management and leadership role of the school library media specialist and how the library media center fits into the educational setting. Restricted to BATE Library Media program students.

EDCI 547 INFORMATION INQUIRY AND EDUCATIONAL CHANGE
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: EDU 370 or equivalent and graduate standing.
- This course presents prospective school library media specialists with content and strategies for working with teachers to incorporate information literacy and media literacy into a changing curriculum and explore information inquiry models. Also included are topics affecting change in libraries and education such as filtering, censorship, digital ethics, new technologies and other topics as relevant to inquiry and integration. Restricted to BATE Library Media program students.

EDCI 548 MANAGEMENT OF INFORMATION AND RESOURCES
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: EDU 370 or equivalent and graduate standing.
- Students learn the management, development, use, and evaluation of materials for building library collections in K-12 library media centers. Restricted to BATE Library Media program students.

EDCI 549 APPLICATIONS OF LITERATURE FOR CHILDREN AND YOUNG ADULTS
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: EDU 370 or equivalent and graduate standing.
- This course presents an overview of materials for educational, informational, and literary use by children and young adults (YA) with an emphasis on critical selection and analysis, knowledge of age-level developmental stages, and motivational techniques in libraries. Restricted to BATE Library Media program students.

EDCI 551 EDUCATIONAL TECHNOLOGY: CREATIVE INTEGRATION
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- Strategies to harness the power of technology to enhance teaching and learning while promoting 21st century skills, productivity, assessment and communication.

EDCI 552 SOCIOCULTURAL PERSPECTIVES IN LITERACY
On Demand 3 cr. LEC 3
PREREQUISITE: EDCI 551.
- This course introduces graduate students in education to contemporary theories and research in literacy studies, with a specific focus on critical literacy.

EDCI 564 THE COMPREHENSIVE PORTFOLIO
Su cr. LEC 3
PREREQUISITE: For NPTT candidates: EDCI 552, EDCI 555, EDCI 554, EDCI 555, EDCI 556, EDCI 558, EDCI 559.
- This course provides advanced training on the preparation of a professional teaching portfolio for candidates in the NPTT program or final project portfolio in the practitioner stand of the master’s degree in Curriculum & Instruction. Based upon the standards and practices established by the National Board for Professional Teaching Standards (NBPTS), the Interstate New Teacher Assistance and Support Consortium (INTASC), and the National Council for Accreditation of Teacher Education (NCATE) these portfolios are designed to provide comprehensive evidence of effectiveness in practice, the habit of reflection, and a command of the knowledge, skills, and dispositions expected of professional educators as developed in the student’s graduate program. Portfolios developed in this course may in turn serve as the basis for the student’s comprehensive exam.

EDCI 571 IN-SERVICE EDUCATION
On Demand 1 - 4 cr. RCT/DS/LAB
PREREQUISITE: Graduate standing and employment by sponsoring school organization.
- An approved supervised group study of an educational problem within a local school supervised by an MSU faculty member which culminates in a special report to be filed with the local district and the Department of Education.

EDCI 575 PROFESSIONAL PAPER/PROJECT
F,S 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, EDCI 506.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.
EDCI 577 INTERNSHIP OPI
TEACHER CERTIFICATION
F, S, Su 1 IND 1
PREREQUISITE: Consent of instructor and approval of department head.
- An internship course restricted to OPI teacher certification students.

EDCI 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; maximum 5 cr.
- Courses offered on a one-time basis to fulfill professional development needs of in-service educators. A specific focus is given to each course which is appropriately subtitled.

EDCI 589 GRADUATE CONSULTATION
F, S, Su 3 cr. TUT Maximum 3 cr.
PREREQUISITE: Master’s standing and approval of the department head.
- This course may be used only by students who have completed all of their coursework (and thesis if on a thesis plan) but who need additional faculty or staff time or help.

EDCI 590 MASTER'S THESIS
F, S, Su 1 - 10 cr. IND Maximum 6 cr.
PREREQUISITE: Upper division courses and as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EDCI 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. END Maximum 6 cr.
PREREQUISITE: Master’s standing, Restricted Entry: Requires contract with major advisor.

EDCI 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing and as determined for each offering.
- Topics offered at the graduate level that are not covered in regular courses. Students participate in preparing and presenting discussion material.

EDCI 598 INTERNSHIP
F, S, Su 1 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: Graduate standing, consent of instructor, and approval of department head.
- An individualized assignment arranged with a school, agency, business or other organization to provide guided experience in the field.

EDCI 607 QUANTITATIVE EDUCATIONAL RESEARCH
F or On Demand 5 cr. LEC 3
PREREQUISITE: EDCI 502, EDCI 506, graduate standing
- This course explores the implications of and application of the quantitative research paradigm to systematic inquiry within the field of education. The course includes quantitative designs, design-related data collection and management methodologies, appropriate data analysis and writing strategies, and the role of quantitative research in decision-support. Students will plan and complete a quantitative research project. Course will address responsible conduct of research.

EDCI 680 ADVANCED EDUCATIONAL RESEARCH
F, S 3 cr. LEC 3
PREREQUISITE: EDCI 502, EDCI 507, EDCI 607.
- Doctoral Students will operationalize a research plan proposed in EDCI 507 or EDCI 607. Specifically, they will refine their research proposals to produce a dissertation proposal that is defensible by piloting research procedures, data collection methods, data analysis techniques, and presentation of results in written and oral formats.

EDCI 680 DOCTORAL THESIS
F, S 3 -10 cr. IND May be repeated.
PREREQUISITE: Doctoral standing, Restricted Entry: Requires contract with major advisor. Course will address responsible conduct of research.

EDEC Education - Early Childhood
formerly part of HDCF

EDEC 160 EARLY CHILDHOOD THROUGH ADOLESCENT DEVELOPMENT
F, S 3 cr. LEC 3
- This course focuses on the development of children in early childhood, middle childhood and adolescence. Cognitive, psychosocial, moral and physical domains are examined in addition to developmental processes related to culture, gender, SES, ethnicity and education. Theory, research and application for practitioners are emphasized.

EDEC 271 PARAPROFESSIONAL EXPERIENCE IN EARLY CHILDHOOD
F, S 1 cr. LAB 1
PREREQUISITE: EDEC 160, sophomore standing and consent of instructor.
- Work directly with young children, learn and use strategies of positive and supportive interactions with teachers, families, and children. Form foundational understanding of the complex roles of early childhood educators.

EDEC 288 SIGNING FOR EARLY CHILDHOOD EDUCATORS
F 3 cr. LEC 3
- Provides Level I skill acquisition in sign language to meet federal demand for inclusion practices in ECE and public school settings for hearing impaired, cognitive and language disorders, pervasive developmental disorders, etc.

EDEC 291 EARLY CHILDHOOD INDEPENDENT STUDY
F, S 1-4 cr. END may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

EDEC 350 ENVIRONMENTS AND MANAGEMENT IN EARLY CHILDHOOD EDUCATION
F 3 cr. LEC 3
PREREQUISITE: EDEC 271 and junior standing.
- Current issues, research, theory, and practice related to planning and preparing learning environments for young children. Management principles including developmentally appropriate practices promoting positive guidance, teacher-child relationships, learning environments in early childhood settings, nurturing diversity and social justice, promoting positive guidance, family-school relationships, ethics and professionalism.

EDEC 362 DEVELOPMENT, EDUCATION, AND WELL-BEING OF NATIVE AMERICAN CHILDREN
Su on demand 3 cr. LEC 3
PREREQUISITE: Junior standing in major.
- The course emphasizes well-being indicators in Native American children from a developmental, educational, and community perspective. Exploration and understanding of deficit models and strength models of well-being are examined within the context of tribal communities.

EDEC 385 INTEGRATED CURRICULUM IN EARLY CHILDHOOD EDUCATION
S 4 cr. LEC 3 LAB 1
PREREQUISITE: EDEC 350
- Curriculum planning, implementation, and evaluation in early childhood classrooms. Laboratory experience in an early childhood classroom is required.

EDEC 450 SOCIAL COMPETENCE IN EARLY CHILDHOOD
F alternate years, offered odd years 3 cr. LEC 3
PREREQUISITES: Junior standing in major or consent of instructor.
- Understanding social competence in young children in relation to familial, social and cultural contexts. Development of social skills, self-concept, peers and friendships, emotional development and resiliency.

EDEC 450 LITERACY IN EARLY CHILDHOOD
F alternate years, offered odd years 3 cr. LEC 3
PREREQUISITES: Junior standing in major or consent of instructor.
- The course will focus on the development of literacy from birth to eight by integrating early childhood education and community literacy into a unified approach to literacy that supports early childhood education and family literacy. Scientifically-based reading, literacy research, policy and advocacy, literacy development in children and adults, learning environments, community supports and identification and development of early literacy materials.

EDEC 453 HEALTH & MOVEMENT IN EARLY CHILDHOOD
F alternate years, offered odd years 3 cr. LEC 2 LAB 1
- This course will focus on developmentally appropriate movement and health related activities in early childhood education including: designing physical activity programs and effective movement curricula in early childhood settings, appropriate teaching practices, understanding movement concepts, and helping guide children in becoming physically active and healthy for a lifetime.

EDEC 490B UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND May be repeated. Maximum 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

EDEC 492 INDIVIDUAL PROBLEMS
PREREQUISITE: Consent of instructor.
- An individualized assignment with a professional agency to provide a guided field experience. All students must receive department permission prior to registration.
EDEC 494 EC SEMINAR  
On Demand 1 cr. SEM 1 Maximum 4 cr.  
PREREQUISITE: Senior standing.  
- Topics offered at the upper division level that are not covered in regular courses. Students participate in preparing and presenting class materials.

EDEC 496 PRACTICUM IN EARLY CHILDHOOD  
F, S 3 - 6 cr. LAB Maximum 6 cr.  
PREREQUISITE: Senior standing in major and student teaching applicant screening required.  
- Senior capstone course. Supervised experience in programs for young children. Students will be responsible for lesson planning, teaching, supervising, and evaluation of young children in an NAECY-accredited classroom.

EDEC 498 INTERNSHIP  
F, S, Su 1 - 12 cr. IND.  
PREREQUISITE: Consent of instructor.  
- An individualized assignment with a professional agency to provide a guided field experience. All students must receive department permission prior to registration.

EDEC 499 SENIOR SEMINAR-PROFESSIONAL ISSUES  
On demand 4 cr. LEC 1 LAB 3  
PREREQUISITE: Senior standing.  
- Senior capstone course. Establishing a professional identity and transitioning to a career in the field of early childhood education and child services.

EDEL - Elementary  
graduate level only; EDU for undergrad  

EDELD 501 FOUNDATIONS OF ADULT EDUCATION  
On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing.  
- A survey of the field and profession of adult education as part of lifelong learning. Professionalism in adult education is approached through the study of related adult education; historical and philosophical foundations; providers and programs; issues and trends.

EDELD 503 COMMUNITY EDUCATION  
On Demand 2 cr. LEC 2  
PREREQUISITE: EDELD 501.  
- Emphasis on the historical and philosophical development, understanding the concept, goals and objectives, emerging models and institutions and agencies of community education.

EDELD 504 TEACHING AND LEARNING IN ADULT EDUCATION  
On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing.  
- This is a study of the adult learner, adult learning theories, and teaching strategies appropriate for adult education strategies. Practice teaching will be evaluated.

EDELD 505 HISTORY AND PHILOSOPHY OF AMERICAN HIGHER EDUCATION  
On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing.  
- This course is an in-depth past-to-present study of the historical and philosophical development of American higher education set against the backgrounds of political, social, economic, cultural, and intellectual landscapes.

EDELD 507 FOUNDATIONS OF EDUCATIONAL LEADERSHIP  
Su & On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing, BA/BS in Education.  
- This is the entry course for the K-12 Educational Leadership program. Topics include: leadership theory and practice; instructional leadership; basic organization theory; working with students, staff, parents, and community; creating a vision and a strategic plan for realizing the vision; and the identification and initial development of leadership skills, including a personal and professional code of ethics.

EDELD 508 SUPERVISION OF INSTRUCTION  
Su & On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing, BA/BS in Education.  
- This course emphasizes the improvement of teaching and learning. There is emphasis on supervision of instruction, professional development, creating a learning community, and leading schools to meet high academic standards. School and staff accountability is also included.

EDELD 509 ISSUES AND TRENDS IN HIGHER EDUCATION  
On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing.  
- An in-depth and contemporary exploration of critical issues, trends, and forces facing and influencing higher education with an emphasis on current issues. The theme is addressing the ways in which institutions respond to these issues.

EDLD 510 ORGANIZATION AND ADMINISTRATION OF HIGHER EDUCATION  
On Demand 3 cr. LEC 3  
- In this course students will examine the different organizational structures that characterize and govern American higher education. In this introduction to the field of higher education governance, organization and change structures and influences will be examined.

EDLD 511 PLANNING PROGRAM ASSESSMENT  
On Demand 3 cr. LEC 3  
PREREQUISITE: EDLD 506 and graduate standing or consent of instructor.  
- In course, students learn about the literature, models, standards, strategies, and skills to plan and implement an assessment or program evaluation of educational programs, services and administration. Students evaluate literature and conduct an original assessment project.

EDLD 512 FINANCE AND ADMINISTRATION IN HIGHER EDUCATION  
On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing.  
- The study of financial governance across higher education: from macro-systems (national and state governing boards) to micro-systems (university, college, and department). In the course, students assess the impact of various decisions and levels of funding on students and an institution's financial status.

EDLD 513 RESOURCE AND PROGRAM MANAGEMENT  
On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing.  
- The study of program/department management in higher and adult education for both academic and administrative support units. Includes issues that deal with leadership, the management of faculty, support personnel, programs, and budgeting.

EDLD 515 PLANNED CHANGE  
S & On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing.  
- A study of the change process as applied to schools. Includes the theory and process of change, research about change, roles and practice, change models and systems, and leadership in school improvement planning and implementation, and evaluation of changed systems.

EDLD 529 SCHOOLS AND DIVERSE COMMUNITIES  
Su & On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing, BA/BS in Education.  
- This course reviews the techniques for connecting the school with all parents in a diverse community. Students will learn various models that promote community involvement in teaching, community use of school facilities, responding to community interests, and using the news media. Developing effective communication with various cultural, ethnic, racial, and special interest groups in the community will be stressed along with issues of social justice.

EDLD 524 INSTRUCTIONAL LEADERSHIP IN THE ELEMENTARY SCHOOL  
Su & On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing.  
- A study of principal leadership responsibilities in improving elementary school student achievement with focus on how principals impact their schools by shaping school goals; providing direction, structure, and organizational and social networks; by guiding school policies, procedures, curriculum and learning.
EDLD 525 INSTRUCTIONAL LEADERSHIP
IN THE SECONDARY SCHOOL
Su & On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- A study of principal leadership responsibilities in improving student achievement at the high school level. The course focuses on improving secondary schools through collaborative leadership, effective learning communities, personalization, and curriculum and instruction which contribute directly to student learning.

EDLD 526 EVALUATING SCHOOL PROGRAMS
Su & On Demand 3 cr. LEC 3
PREREQUISITE: Graduate Standing and EDLD 534: Data Driven Decision Making
- This course will examine evaluation and reporting techniques for school programs. Students will be required to use data to evaluate and report on an existing school program.

EDLD 528 COLLEGE STUDENTS
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This foundations course reviews theory and research on undergraduate college students’ learning, development, culture, demographics, and subpopulations which inform current educational practice.

EDLD 529 POST SECONDARY
DISTANCE DELIVERED EDUCATION
On Organization, LEC 3
PREREQUISITE: Graduate standing.
- Higher, Continuing, and Adult Education professionals will study the literature, strategies, and practices involved in delivering post-secondary education at a distance.

EDLD 530 COLLEGE TEACHING
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course explores the learning-teacher nexus with special attention to effective teaching practices and models, learning and assessment theories, and effective course design. Topics are approached in the spirit of the scholarship of teaching and learning and with attention to traditional and diverse learners.

EDLD 531 THEORETICAL FOUNDATIONS
OF COLLEGE STUDENTS
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course will introduce the theories which have been advanced regarding college students and the professional practice of student affairs. The course will examine the similarities and differences among college student and the impact which different environments and policies may have on student psychosocial development, learning attitudes, values, behaviors, and satisfaction with college.

EDLD 532 SCHOOL LAW
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- A general examination of law and court decisions relative to the administration of K-12 schools. Specific attention is given to Montana school law.

EDLD 533 LAW AND POLICY
IN HIGHER EDUCATION
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- Analysis and interpretation of landmark legislation affecting American higher education since 1960 and the resulting policies that govern the management of universities and colleges. Topics include: separation of church and state, access, collective bargaining, intercollegiate athletics, affirmative action, and relations with state and federal governments.

EDLD 534 DATA DRIVEN DECISIONS
S & On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- The course focuses on acquiring, synthesizing, assessing, and using a variety of data to facilitate sound decision making as regards to student achievement and program improvement. Special attention will be paid to systems for collecting, analyzing and using data to continuously improve schools.

EDLD 535 STUDENT SERVICES
Su On Demand 3 cr. LEC 3
PREREQUISITE: Graduate Standing.
- Students will examine philosophical, organizational and programmatic aspects of post-secondary student services and the ethical and legal dimensions of student affairs professional practice.

EDLD 537 INSTITUTIONAL
RESEARCH AND ASSESSMENT
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- Students will explore the roles of institutional research and assessment in higher education identifying appropriate measures for academic and administrative assessment, internal and external data sources, analytic techniques, and the communication of information to academic and administrative decision makers.

EDLD 538 COLLEGE CURRICULUM
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course considers the definition, philosophical and historical roots, disciplinary organization, current issues, designs, administration, and evaluation of the college curriculum.

EDLD 545 SOCIAL JUSTICE IN EDUCATION
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- Consideration of social equity issues in education to include disabilities, gender, ethnic, social, and economic issues.

EDLD 555 SCHOOL FINANCE
F, S 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course prepares school leaders to identify and analyze sources of fiscal and non-fiscal revenue and resources for schools and school districts, to manage financial and material assets, to develop an efficient budget planning process, and to perform a variety of budget management functions. Course emphasis is on Montana school finance.

EDLD 564 THE COMPREHENSIVE PORTFOLIO
Su & On Demand, Variable Credit 2-5 cr.
PREREQUISITE: Consent of Instructor.
- Students create a professional portfolio to evidence their vision of learning, the culture of teaching and learning, community/school relationships, and the social, cultural, ethical, legal, political, and economic context of schooling.

EDLD 571 IN-SERVICE EDUCATION
On Demand 1 - 4 cr. RCT/LAB Maximum 6 cr.
PREREQUISITE: Graduate standing and employment by sponsoring school organization.
- A carefully supervised group study of an educational problem. The study will culminate in a special report, syllabus, blueprint, course of study or guide book or report to be filed with the local administrator and with the Department of Education.

EDLD 574 FIELD EXPERIENCE
IN EDUCATIONAL LEADERSHIP
F, S, Su 1-6 cr. LAB 1-6
PREREQUISITE: 15 Credits of EDLD Course Work.
- This is a course that offers students the opportunity for guided field experience as a principal or superintendent in K-12 schools.

EDLD 575 RESEARCH OR
PROFESSIONAL PAPER/PROJECT
F, S, Su 1-3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major adviser and graduate committee.

EDLD 588 PROFESSIONAL DEVELOPMENT
On Demand 1-3 cr. May be repeated; maximum 3 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies.
- Courses offered on a one-time basis to fulfill professional development needs of in-service educators. A specific focus is given to each course which is appropriately subtitled.

EDLD 589 GRADUATE CONSULTATION
F, S, Su 1-3 cr. TUT
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

EDLD 590 MASTER’S THESIS
F, S, Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.
- This course will address responsible conduct of research.

EDLD 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EDLD 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of the Dean of Graduate Studies.
- Directed research and study on an individual basis.

EDLD 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 3 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering. Consent of instructor.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.
COURSE DESCRIPTIONS: EDLD, EDSD, EDU

EDLD 598 INTERNSHIP
On Demand 5 - 18 cr. IND Maximum credits may be restricted by program.
PREREQUISITE: Graduate standing, consent of instructor and approval of advisor. Note: OPI Interns must have EDLD 507, EDLD 508, EDLD 532.
– This internship course is designed for those required to include practical experience as part of their degree. Course content is informed by bridging theory with practice and the on-the-job expectations and responsibilities.

EDLD 610 LEADERSHIP AND ORGANIZATIONAL THEORY
F & On Demand 3 cr. LEC 3
PREREQUISITE: MA in Educational Leadership, or Principal’s Certification, EDLD 507.
– The course will provide existing school leaders with theories, concepts, and behaviors of effective leadership that addresses the challenges of schools today. The course encourages a deeper understanding of personal beliefs, style, values, and ethics required of school leaders. The development of a shared vision and strategic plan will be emphasized.

EDLD 620 THE SCHOOL SUPERINTENDENT
On Demand 3 cr. LEC 3
PREREQUISITE: Principal’s Certification, or concurrent enrollment in EDLD 520.
– This course focuses on the leadership skills necessary for the school superintendent. There is emphasis on superintendent relations with the school board and the school community, and on working with stakeholders to identify school priorities. The development of effective and appropriate communication strategies and interpersonal skills that promote public confidence for schools is stressed.

EDLD 630 SUPERVISION AND INSTRUCTIONAL LEADERSHIP
Su alternate years, or On Demand 3 cr. LEC 3
PREREQUISITE: MA in Educational Leadership or Principal’s Certification, and EDLD 508.
– The course focuses on increasing the knowledge and skills of supervising and leading instruction on a district or school systems basis. Emphasis is given to dimensions of leadership at the district level including supervision of the leadership team, aligning the vision, mission, and strategic plan with student needs, professional growth, and maximizing resources to support teaching and learning.

EDLD 645 PERSONNEL MANAGEMENT IN EDUCATION
F & On Demand 3 cr. LEC 3
PREREQUISITE: Principal’s Certification or concurrent enrollment in EDLD 508.
– This course is designed to prepare educational leaders to apply effective job analysis procedures, to understand performance appraisal for instructional and non-instructional staff, formulate professional growth plans, negotiate union agreements, and apply appropriate policies, criteria, processes for recruitment, selection, induction, and compensation of personnel with an emphasis on equity and diversity.

EDLD 650 MT FINANCE AND FACILITIES
F alternate years & On Demand; Su 5 cr. LEC 3
PREREQUISITE: Masters degree in Educational Leadership, state licensure as a principal, or concurrent enrollment in EDLD 555.
– This course is designed to facilitate a more in-depth understanding of the efficient and effective use of finances, facilities, and other tangible and intangible resources at the school district level. An emphasis will be placed on Montana school finance structures, equitable distribution of resources and the alignment of resources to strategic plans and district vision. This course fulfills the Montana Chapter 57 licensure requirements for superintendents educated in out of state preparation programs.

EDLD 655 MT LEGAL AND POLICY STUDIES
S & On Demand 3 cr. LEC 3
PREREQUISITE: Masters degree in Educational Leadership, state licensure as a principal, or concurrent enrollment in EDLD 532.
– This course is designed to facilitate a more in-depth understanding of legal issues relative to education in Montana and their policy implications. Students will increase their understanding of how legal decisions impact their school. They will explore policy analysis and implementation and develop an understanding of how laws, policies, and systemic organizational life are intertwined. This course fulfills the Montana Chapter 57 licensure requirements for superintendents educated in out of state preparation programs.

EDLD 690 DOCTORAL THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing. Restricted Entry.
– This course will address responsible conduct of research.

EDSU Education - Secondary
graduate level only; EDU for undergrad

EDSU 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
– Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EDSU 592 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Good standing, consent of instructor, and approval of department head.
– Directed research and study on an individual basis.

EDSU 594 SEMINAR
F, S, Su 1.6 cr. IND May be repeated. Max 12 cr.
– Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

EDU Education
formerly EDCL, EDEL, EDSD

EDU 101 US TEACHING & LEARNING: A CRITICAL INTRODUCTION TO THE EDUCATION PROFESSION
F 3 cr. Seminar 3
– This course is an introduction to the profession of public school teaching. Topics treated include the nature of knowledge, the development of public education, the training of teachers, the nature of schools today, education policy, and society’s expectations of schools.

EDU 202 EARLY FIELD EXPERIENCE
F, S 1 cr. LAB 1
– Students will explore the profession of teaching by attending an orientation, conducting in-school observations and interviews, recording personal reflections in a portfolio, and participating in two seminar sessions to debrief/discuss their experiences.

EDU 204A CREATIVE ARTS & LIFELONG LEARNING
F, S 3 cr. LEC 3
– This course explores how dance, drama, music and the visual arts offer students expressive ways to learn and inquire about themselves, their social and physical worlds. Students engage in creative arts by exploring content, practicing critical inquiry skills and reviewing aesthetic perspectives.

EDU 211D MULTICULTURAL EDUCATION
F, S 3 cr. LEC 3
PREREQUISITE: Sophomore Standing.
– Examination of the school/society relationship in the United States and of the many issues and variables embedded in this relationship, including equal opportunity, human diversity, ideology, politics and social change. Foundational perspectives (historical, political, social, and policy) will be explored.

EDU 222S EDUCATIONAL PSYCHOLOGY & DEVELOPMENT CHILD DEVELOPMENT
F, S 3 cr. LEC 3
– Human growth and psychological development of school age students, to include physical, cognitive, and psychosocial development within an educational, familial, and societal context.

EDU 223S EDUCATIONAL PSYCHOLOGY AND ADOLESCENT DEVELOPMENT
F, S 3 cr. LEC 3
– An examination of theory and research related to the development, learning and motivation of middle and high school students. Implications for effective classroom teaching will be identified throughout the course.

EDU 263 METHODS OF TEACHING GRAMMAR
On demand 3 cr. LEC 3
– This course explores the structure and function of the English language. In particular, study of grammar including the eight parts of speech, types of phrases and clauses, sentence structure and fluency, word usage, and other language conventions will be addressed.

EDU 290R UNDERGRADUATE RESEARCH
F, S 1.6 cr. IND may be repeated
– Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.
EDU 291 SPECIAL TOPICS
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EDU 292 INDEPENDENT STUDY
F, S 3 cr. LEC 3
PREREQUISITE: Sophomore Standing.
- Examination of the school-society relationship in the United States and of the many issues and variables embedded in this relationship, including equal opportunity, human diversity, ideology, politics and social change. Foundational perspectives (historical, political, social, and policy) will be explored.

EDU 330 EMERGENT LITERACY
F, S alternate years, to be offered even years 5 cr. LEC 5
PREREQUISITE: EDU 331, EDU 382, and good standing in Teacher Education Program.
- Current theory concerning emergent literacy and developmentally appropriate classroom practices. Emphasis is on a balanced approach which includes phonological awareness as school law and policy and with colleagues, parents, and the community, and cultural aspects of the arts.

EDU 351 LITERATURE & LITERACY FOR CHILDREN
F, S 3 cr. LEC 3
PREREQUISITE: EDU 222 or EDU 223 and junior standing.
- A survey of children's books with an emphasis on their use in classrooms. Introduces the history and current genres of children's literature, selection criteria, award-winning books, and strategies for sharing books with students.

EDU 342 MANAGING THE LEARNING ENVIRONMENT
F, S 3 cr. LEC 3
PREREQUISITE: EDU 382 and good standing in the Teacher Education Program.
COREQUISITE: EDU 395.
- This course examines key factors in establishing a healthy learning environment for K-12 students. The course will explore factors that contribute to students' success, the role of school law and policy and their relationship to the establishment effective and respectful management, engaging classroom instruction, and meaningful learning for all students.

EDU 370 INTEGRATING TECHNOLOGY INTO EDUCATION
F, S, Su 2 cr. LEC 1 LAB 1
PREREQUISITE: EDU 222 or EDU 223, Exploration of technology use in society and effects on teaching and learning. Includes strategies for developing technology-rich curriculum and techniques for enhancing learning through integration of technology and 21st century skills.

EDU 382 ASSESSMENT, CURRIC. INSTRUCTION
F, S, Su 3 cr. RCT 3
PREREQUISITE: EDU 222, EDU 223, EDU 370.
COREQUISITE: EDU 370.
- Fundamental concepts of differentiated educational assessment for classroom teachers including the alignment of assessment to curriculum standards and essential understandings, quality of assessment, principles of item construction, evaluation of student responses, interpretation of results, and improvement of techniques.

EDU 395 PRACTICUM: 5-12
F, S, Su 1-3 cr. LAB 1-3
PREREQUISITE: EDU 382, good standing in Teacher Education Program.
- Students will be assigned to school classrooms to observe children, teachers, and teaching strategies. Students will teach lessons in the subject area corresponding to the methods class in which they are currently enrolled.

EDU 395 PRACTICUM: K-8
F, S 1-3 cr. LAB 1-3
PREREQUISITE: EDU 382 and good standing in Teacher Education Program.
COREQUISITE: Methods course in teaching major.
- Students will be assigned to school classrooms to observe children, teachers, and teaching strategies, and to serve as teacher aids. Students will teach lessons in the subject area corresponding to the methods class in which they are currently enrolled (45 contact hours required).

EDU 397 METHODS: K-8 SOCIAL STUDIES
F, S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: Completion of social science core including PSCI 210, one additional restricted social science elective course, and good standing in the Teacher Education Program.
- Identification of goals, objectives, and instructional strategies for elementary social studies.

EDU 397 METHODS: K-4 ART
F, S alternate years, to be offered even years 5 cr. LEC 2 LAB 1
PREREQUISITE: EDU 382, and good standing in Teacher Education Program.
- Experiences which enhance student understanding of how children make art, appreciate historical aspects of art, and construct their place in a social world. Students explore these concerns through studio experiences, readings, written reports, and locating and gathering resources for teaching art.

EDU 397 METHODS: K-8 CREATIVE ARTS
F, S 3 cr. LEC 2 LAB 1
PREREQUISITE: EDU 382, and good standing in Teacher Education Program.
- This course provides active engagement with the elements and skills of the creative arts, principally focusing on visual art and music. Teacher candidates prepare to guide school age learners as they engage in creative processes and explore historical and cultural aspects of the arts.

EDU 397 METHODS: K-8 HEALTH ENHANCEMENT
F 3 cr. LEC 3
PREREQUISITE: EDU 382, good standing in Teacher Education Program.
- The theoretical and practical aspects of teaching health enhancement in the elementary schools.

EDU 397 METHODS: K-8 HEALTH ENHANCEMENT
F, S 3 cr. LEC 2 LAB 1
- The class is designed to provide the elementary education student with a conceptual understanding of school-age health enhancement (health and physical education), to include relationships between movement concepts and skill analyses, the ten comprehensive school health areas, and health-related behaviors.

EDU 397 METHODS: K-8 LANGUAGE ARTS
F, S 3 cr. LEC 3
PREREQUISITE: EDU 330, EDU 331, and good standing in Teacher Education Program.
- This course provides instruction in best practices for teacher candidates, which links current theory and practice of literacy instruction in grades K-8. Through experiential learning, students will explore methods and approaches to teaching English language arts.

EDU 397 METHODS: K-8 MATH
F, S alternate years, to be offered even years 5 cr. LEC 3
PREREQUISITE: EDU 382, M 131, and good standing in Teacher Education Program.
- M methods and materials for the prospective elementary teacher. Classroom organization, operation, management, applied technology, evaluation, and current theory.

EDU 397 METHODS: K-8 MUSIC
F, S, Su alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: EDU 382, good standing in Teacher Education Program.
- Improving musical skills to incorporate methods of integrating music into the elementary classroom through singing, listening, instrument playing, creating, and movement in order to further the goals and standards of the elementary music program as well as the general elementary curriculum.

EDU 397 METHODS: K-8 SCIENCE
F, S alternate years, to be offered odd years 5 cr. LEC 2 LAB 1
PREREQUISITE: EDU 382 and good standing in Teacher Education Program.
- This course focuses upon methods of teaching science inquiry skills, content, and attitudes in the elementary classroom.

EDU 401 INTRODUCTION LITERATURE EDUCATION
S 3 cr. LEC 3
PREREQUISITE: EDU 370, EDU 331 and EDU 330 or EDU 431 or consent of instructor.
- This course will introduce students to the role and responsibilities of reading specialists in the professional school setting. Topics include collaborating with colleagues, parents, and the community, current practice in literacy professional development, and reading policy.

EDU 408 PROFESSIONAL ISSUES: S-12
F, S 2 cr. LEC 2
PREREQUISITE: Senior standing, completion of all EDSD special methods courses, and good standing in Teacher Education Program.
COREQUISITE: EDU 495.
- Senior capstone course. Role of the teacher in the contemporary secondary school. Overview of salient issues to include applied evaluation, classroom management and discipline, cooperative learning, law, contracts, certification, professional organizations, ethics, resume, job seeking, and professionalism.

EDU 409 PROFESSIONAL ISSUES: K-8
F, S 2 cr. LEC 2
PREREQUISITE: Senior standing, completion of all required EDSD methods courses, and good standing in Teacher Education Program.
COREQUISITE: EDU 495.
- Senior capstone course. Review of the role of teachers and elementary school; school law; teacher contracts; certification; professional organizations; ethics; job seeking; job success; cooperative learning; and other critical issues for elementary education majors.
EDU 422 EDUCATIONAL COMPUTING
F, S 1 - 3 cr. IND Maximum 3 cr.
PREREQUISITE: EDU 370.
- A flexible format that allows the student to select hands-on learning modules based on student need and interest in educational technology and 21st century skills.

EDU 432 LITERATURE & LITERACY FOR YOUNG ADULTS
F alternate years, to be offered even years 3 cr. RCT 3
PREREQUISITE: EDU 331
- Survey of materials for young adult readers. Includes literary analysis, pedagogy, electronic resources, and motivational strategies.

EDU 438 LITERACY ASSESSMENT, DIAGNOSIS
F, S 3 cr. LEC 2 LAB 1
PREREQUISITE: EDU 330 or EDU 431.
- Current theory and techniques in literacy assessment and individualization. Emphasis will be on specific instructional strategies that focus on independence in reading and writing. A practicum is included.

EDU 446 TEACHING THE PRIMARY GRADES
F 3 cr. LEC 3
PREREQUISITE: EDU 370, and either HDCF 150 or PSYX 100.
- Preparing teachers to teach kindergarten and the primary grades one through three. Understanding of the characteristics of the age-level child; establishing curriculum methods, materials, learning environments, and activities for teaching; and investigation of the relevant subject areas.

EDU 470 ADVANCED EDUCATION TECHNOLOGY
F, S 3 cr. LEC 2 LAB 1
- Hands on experiences in the production of advanced instructional media materials. Emphasis on exploration of techniques using current and cutting edge technologies. Appropriate for media specialists, teachers, trainers and communicators interested in using the new technology tools.

EDU 471 MEDIA DESIGN: ACROSS THE CURRICULUM
S 3 cr. LEC 2
PREREQUISITE: EDU 330 or EDU 431.
- Techniques, materials, organizations, and theory in teaching effective reading skills in all content fields, grades 3-12.

EDU 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

EDU 491 SPECIAL TOPICS
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EDU 492 INDEPENDENT STUDY
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

EDU 493 STUDY ABROAD
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

EDU 494 SEMINAR: LAB SAFETY
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

EDU 495 STUDENT TEACHING: 5-12
F, S, Su 5 - 12 cr. IND
PREREQUISITE: Senior standing, completion of all required EDSD special methods courses, and good standing in Teacher Education Program.
- Observation and teaching in a classroom setting; preparation and delivery of lesson plans. The student teaching experience will occur under the supervision of experienced teachers and MSU staff supervisors. Observational participation at grades five and/or six also takes place.

EDU 495 STUDENT TEACHING: K-8
F, S, Su 5 - 12 cr. IND
PREREQUISITE: Senior standing, completion of all required EDU methods courses, and good standing in Teacher Education Program.
- Observation and teaching in a classroom setting; preparation and delivery of lesson plans. The student teaching experience will occur under the supervision of experienced teachers and MSU staff supervisors.

EDU 496 METHODS: AG & TECH ED
F 3 cr. LEC 3
PREREQUISITE: EDU 382, 20 or more credits in subject area and good standing in Teacher Education Program.
COREQUISITE: EDU 395 (for teaching majors in this subject).
- Directed research and study on an individual basis.

EDU 497 METHODS: 5-12
S 3 cr. LEC 2 LAB 1
PREREQUISITE: EDU 382, 20 or more credits in subject area and good standing in Teacher Education Program.
COREQUISITE: EDU 395 (for teaching majors in this subject).
- Emphasizes the teacher-artist as the essential resource for art experiences in the schools. Readings and written assignments, exploring curriculum content and program implementation, media, resources, content reading, lesson/unit planning and evaluation issues in art education. Includes classroom paraprofessional experience.

EDU 497 METHODS: 5-12 ENGLISH
S 3 cr. LEC 3
PREREQUISITE: EDU 382, 20 or more credits in subject area and good standing in Teacher Education Program.
COREQUISITE: EDU 395 (for teaching majors in this subject).
- Teaching strategies, methods and materials for planning (including lesson/unit); implementing and evaluating English language arts instruction. Includes components on course design, writing, reading, literature, speaking and media instruction, and professional development. Includes classroom paraprofessional experience.

EDU 497 METHODS: 5-12 SOCIAL STUDIES
F, S 3 cr. LEC 3
PREREQUISITE: EDU 382, 20 or more credits in subject area and good standing in Teacher Education Program.
COREQUISITE: EDU 395 (for teaching majors in this subject).
- Teaching strategies, methods and materials for planning (including lesson/unit); implementing, teaching, and evaluating social studies programs in secondary schools. Includes classroom paraprofessional experience.

EDU 497 METHODS: FAMILY AND CONSUMER SCIENCES
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EDU 382, 20 or more credits in subject area, and good standing in Teacher Education Program.
COREQUISITE: EDU 395 (for teaching majors in this subject).
- Teaching strategies, methods, materials, and content reading for planning (including lesson/unit); implementing and evaluating family and consumer science programs. Includes classroom paraprofessional experience.
### COURSE DESCRIPTIONS: EDU, ELE

**EDU 497 METHODS: 5-12 MATHEMATICS**
- 3 cr. LEC 2 LAB 1
- **PREREQUISITE:** EDU 382, 20 or more credits in subject area, and good standing in Teacher Education Program.
- **COREQUISITE:** EDU 395 (for teaching majors in this subject).
- Effective techniques in presenting materials, and planning class activities (including lesson/unit). Methods of teaching and evaluating algebra, geometry, trigonometry, probability/statistics; application of current mathematics education research and reading in the content area of mathematics. Includes classroom paraprofessional experience.

**EDU 497 METHODS: 5-12 HEALTH ENHANCEMENT**
- 3 cr. LEC 3
- **PREREQUISITE:** EDU 382, 20 or more credits in subject area, and good standing in Teacher Education Program.
- Developing pedagogical content knowledge by focusing on research based instructional strategies, methods, materials, and content reading for planning, implementing, and evaluating health enhancement lessons, units, and programs in secondary schools. Includes classroom paraprofessional experience.

**EELE 497 METHODS: 5-12 SCIENCE**
- F, S 3 cr. LEC 2 LAB 1
- **PREREQUISITE:** EDU 382, 20 or more credits in subject area, and good standing in Teacher Education Program.
- **COREQUISITE:** EDU 395 (for teaching majors in this subject).
- Effective techniques in presenting materials, planning class activities, and admission to the Teacher Education Program.
- **COREQUISITE:** For science majors
- Focuses on methods of planning (including lesson/unit), teaching, and evaluating science inquiry skills, content, attitudes, and safety in the secondary classroom.

**EELE 497R METHODS: 5-8 MATHEMATICS**
- S 3 cr. LEC 3
- **PREREQUISITE:** EDU 382, 20 or more credits in subject area, and good standing in Teacher Education Program.
- Effective techniques in presenting materials, planning class activities, and creating good learning experiences. Methods of teaching and evaluating arithmetic, remedial mathematics, basic geometry, introductory algebra, and reading/writing mathematics.

**EDU 498 INTERNSHIP**
- On Demand 2-5 cr. IND Maximum 5 cr.
- **PREREQUISITE:** EDU 382, consent of instructor, and approval of department head.
- An individualized assignment with a professional agency to provide a guided field experience.

**EELE 101 INTRODUCTION TO ELECTRICAL FUNDAMENTALS**
- F, S 2 cr. LEC 1 LAB 1
- **PREREQUISITE:** M 151 or equivalent.
- Lecture/laboratory introduction to electrical fundamentals including Kirchhoff’s and Ohm’s Laws, using meters and oscilloscopes, time-varying signals in electric circuits, inductors and capacitors, series and parallel circuits, introduction to digital circuits, problem solving including computer applications, technical communications, team work.

**EELE 201 CIRCUITS I FOR ENGINEERING**
- F, S 4 cr. LEC 3 LAB 1
- **PREREQUISITE:** EELE 101, M 172.
- **COREQUISITE:** PHSX 222.
- Introduction to circuit analysis, Ohm’s and Kirchhoff’s Laws, nodal and mesh methods, network theorems; resistors, capacitors, inductors, dependent sources, ideal op-amps; the complete response of first order circuits; complex frequency and phasors; steady-state AC circuits, coupled inductors and ideal transformers.

**EELE 203 CIRCUITS II FOR ENGINEERING**
- S 4 cr. LEC 3 LAB 1
- **PREREQUISITE:** EELE 201, M 274.

**EELE 217 THE SCIENCE OF SOUND**
- S 2 cr. LEC 2
- **PREREQUISITE:** M 121, M 155, or M 145, or the equivalent.
- Introduction to the principles of musical acoustics, sound systems, and audio technology for non-engineering students. This course is particularly geared toward students in the College of Arts and Architecture and in the Music Technology program.

**EELE 250 CIRCUITS, DEVICES, AND MOTORS**
- F, S 4 cr. LEC 3 LAB 1
- **PREREQUISITE:** M 166 or M 172 and PHSX 207 or PHSX 222.
- Introduction for non-majors to electrical circuit principles, voltage and current laws, frequency response; introduction to electronic circuits including operational amplifiers, and power electronics; introduction to electromechanical energy conversion devices, DC and AC machines.

**EELE 261 INTRODUCTION TO LOGIC CIRCUITS**
- F, S 3 cr. LEC 3
- **COREQUISITE:** M 171.
- An introductory course in the fundamental concepts of classical digital design. Course covers design and implementation of combinational logic circuits, synchronous sequential circuits and information storage circuits. Basic concepts of programmable logic devices and computer-aided design tools are presented.

**EELE 282 INTRODUCTION TO LOGIC CIRCUITS LABORATORY**
- F, S 1 cr. LEC 1
- **PREREQUISITE:** EELE 281.
- Application of digital circuit theory and logic circuit design, utilizing both discrete and programmable logic. Design of IC timing circuits for digital clock applications.

**EELE 290 UNDERGRADUATE RESEARCH ACTIVITY**
- F, S 1-6 cr. IND May be repeated
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

**EELE 291 SPECIAL TOPICS**
- On Demand 1-4 cr. Maximum 12 cr.
- **PREREQUISITE:** None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

**EELE 292 INDEPENDENT STUDY**
- On Demand 1-2 cr. IND Maximum 6 cr.
- **PREREQUISITE:** Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

**EELE 308 SIGNAL AND SYSTEM ANALYSIS**
- F 5 cr. LEC 3
- **PREREQUISITE:** EELE 203, M 273.
- Discrete and continuous time signals and systems. Properties, application, synthesis and analysis for the CT and DT Fourier Series, the Fourier Transform, the DTFT, z and Laplace transform. Applications in differential and difference equations, sampling, feedback, and communications. Introduction to the DFT.

**EELE 317 ELECTRONICS**
- F 4 cr. LEC 3 LAB 1
- **PREREQUISITE:** EELE 203.
- This is an introductory course in electronics. It introduces diodes, bipolar junction transistors, field effect transistors and bipolar and MOS analog and digital circuits.

**EELE 321 INTRODUCTION TO FEEDBACK CONTROLS**
- S 4 cr. LEC 3 LAB 1
- **PREREQUISITE:** EELE 308 or consent of instructor.
- Classical continuous-time, transfer function approach to control systems engineering. Approximations, linearization, and time response. Design and analysis via root-locus, Nyquist, and Bode methods. Proportional, dominant pole, lead, lag, PID, and minor loop compensation. Describing functions. Lab exercises incorporate a variety of hand-on control systems.

**EELE 334 ELECTROMAGNETIC THEORY I**
- F 3 cr. LEC 3
- **PREREQUISITE:** PHSX 222, M 273.
- Basic electric and magnetic fields including transmission lines. The materials covered will include both static and dynamic fields, traveling waves, and transmission line concepts such as impedance, reflection coefficient, and transient response.
COURSE DESCRIPTIONS: EELE

EELE 354 ELECTRIC POWER APPLICATIONS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: M 166 or M 171 and PHSX 207 or PHSX 222.
- An applied study of electricity and electrical power circuits, with laboratory experience, for that person not expected to deal with electronics or advanced circuit techniques. Topics covered include electrical circuit laws; power and energy; alternating current circuits; residential, commercial and industrial wiring; energy conversion devices; and application of transformers and electric motors.

EELE 355 ENERGY CONVERSION DEVICES
S 4 cr. LEC 3 LAB 1
PREREQUISITE: EELE 203.
- Three-phase power; electromechanical energy conversion devices and motor drives; introduction of power electronic converters for power control and motor drive applications. Laboratory experience includes power measurements; experience with transformers and motor-generator operational characteristics and DC and AC motor drives operation.

EELE 357 LOGIC DESIGN
S 4 cr. LEC 3 LAB 1
PREREQUISITE: EELE 202 and EELE 351.
- Advanced combinational and sequential logic design, Hardware descriptive language (HDL) programming knowledge. Laboratory experience implementing advanced logic designs using FPGAs.

EELE 359 MULTI/DISCIPLINARY SEMINARS
F 1 cr. SEM 1
PREREQUISITE: Junior standing.
- Students attend seminars presented by a variety of departments and disciplines to gain an appreciation of multidisciplinary environments leading to a greater understanding of the impact of engineering solutions in a global and societal context.

EELE 407 INTRODUCTION TO MICROFABRICATION
F 3 cr. LEC 2 LAB 1
PREREQUISITE: Junior standing and PHSX 222 or PHSX 297.
- Provide an introduction to clean room safety protocol and micro fabrication. Lectures will introduce micro fabrication methods, models and equipment. Laboratories will perform the steps to produce and characterize a metal-oxide-semiconductor transistor.

EELE 408 PHOTOVOLTAIC SYSTEMS
S 3 cr. LEC 2 LAB 1
PREREQUISITE: PHSX 222.
- Provide a basic understanding of the design, fabrication and operating principles of solar cells and how they are integrated into photovoltaic systems. Laboratories will perform the steps required to produce and characterize silicon solar cells.

EELE 409 EI MATERIAL SCIENCE
F 3 cr. LEC 3
PREREQUISITE: EELE 317.
- Basic material properties of dielectrics, magnetic materials, conductors, and semiconductors. Practical applications of materials to semiconductor devices.

EELE 411 ADVANCED ANALOG ELECTRONICS
S 3 cr. LEC 3
PREREQUISITE: EELE 317.
- This course covers differential and multistage amplifiers, frequency response, feedback, analog integrated circuits, filters, and tuned circuits, analog to digital and digital to analog conversion, noise in electronics, current topics.

EELE 414 INTRODUCTION TO VLSI DESIGN
F 3 cr. LEC 3
PREREQUISITE: EELE 202, EELE 317.
- Introduction to the fundamentals of CMOS VLSI circuit design. This course covers CMOS device characteristics and timing, CMOS fabrication, CAD tools, design rules, simulation and layout, CMOS combinational and sequential logic, SRAM and DRAM memory, and dynamic logic design.

EELE 417 ACOUSTICS/AUDIO ENGINEERING
S alternate years, to be offered even years 3 cr.
LEC 3.
PREREQUISITE: PHSX 222.

EELE 422 INTRODUCTION TO MODERN CONTROL
F 3 cr. LEC 3
PREREQUISITE: EELE 321.

EELE 423 APPLIED ELECTROMAGNETICS
S 3 cr. LEC 3
PREREQUISITE: EELE 314 or PHSX 423.
- Advanced study of electromagnetic wave propagation, including polarization, reflection and refraction at interfaces, and cavities and multilayer structures, to investigate a number of practical devices with applications related to electrical engineering and optics, such as waveguides, fiber optics, and antennas.

EELE 433 PLANAR MICROWAVE CIRCUIT DESIGN
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EELE 334.
- An introductory course on microwave circuits emphasizing the design, fabrication and measurement of planar circuits (matching networks, filters, couplers, mixers, etc.) for frequencies above 1 GHz. Students will learn to use state-of-the-art CAD tools and a vector network analyzer.

EELE 445 TELECOMMUNICATIONS SYSTEMS
S 4 cr. LEC 3 LAB 1
PREREQUISITE: EELE 308, EELE 317.
- Introduction to analog and digital communication systems with lab. Topics include signals in communication; noise characteristics; bandwidth considerations; probability of error; analog and digital modulation; frequency domain analysis; matched filter applications. Experiments involve modulation, demodulation, A/Ds, sampling theory, and aliasing.

EELE 447 MOBILE WIRELESS COMMUNICATIONS
F 3 cr. LEC 3
PREREQUISITE: EELE 445.
- Characteristics of the radio environment, propagation, cellular concepts, channel allocation, modulation techniques, multiple access techniques, Shannon’s Capacity Theorem, error correcting codes, data compression, spread spectrum modulation, current wireless communication systems.

EELE 451 POWER ELECTRONICS
S alternate years, to be offered even years 3 cr.
LEC 2 LAB 1
- Introduction to solid-state power devices; topologies, operating principles, modeling and control, and design of basic power converters; magnetic design; applications of power converters in renewable energy source power systems, electric and hybrid electric vehicles, and other residential, commercial, and industrial systems; laboratory experience with basic power converters.

EELE 454 POWER SYSTEMS ANALYSIS
F 3 cr. LEC 3
PREREQUISITE: EELE 355.
- Power system components, transmission system design, power flow studies, automatic generation control, symmetrical components, faulted power systems, protection, introduction to transient stability.

EELE 455 ALTERNATIVE ENERGY POWER GENERATION
S, alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: EELE 355 or equivalent.
- Exploration and analysis of alternative power generation sources and systems such as wind, solar, microturbine, and fuel cells, combined sources and their design, power electronic interfacing, and energy storage systems.

EELE 461 DIGITAL SYSTEM DESIGN
S, alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: EELE 308 and EELE 334 and EELE 371.
- Analysis and design of high speed digital systems including chip-to-chip signal propagation, transmission lines, IC package interconnect, printed circuit board design, state-of-the-art simulation tools, and measurement techniques using Time Domain Reflectometry (TDR).

EELE 465 MICROCONTROLLER APPLICATIONS
S 4 cr. LEC 2 LAB 2
PREREQUISITE: EELE 371.
- Lecture/laboratory exposure to microcontroller hardware and software applications, serial and parallel I/O, timing, interrupts, LCDs, keypads, A to D conversion, and a project realizing a real time control problem.
EELE 466 COMPUTER ARCHITECTURE AND SYSTEM ORGANIZATION
S 4 cr. LEC 3 LAB 1
PREREQUISITE: EELE 367 and CSCI 112.
- Design of computer system instruction sets, data path, storage, memory systems, and interfaces. Cost and speed relations, tradeoffs between hardware and software architectures including CISCs and RISCs, multiprocessors, and distributed processors. Control and implementation tradeoffs. Laboratory experience implementing soft processors and custom logic in FPGAs.

EELE 475 HARDWARE AND SOFTWARE ENGINEERING FOR EMBEDDED SYSTEMS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EELE 367 and CSCI 112.
- Topics in embedded system design, real-time operating systems, high level language programming of embedded systems, software and hardware tradeoffs, and laboratory experience with embedded systems.

EELE 477 DIGITAL SIGNAL PROCESSING
S 4 cr. LEC 3 LAB 1
PREREQUISITE: EELE 308.
- Analysis and design of discrete-time systems, including frequency response. Sampling and reconstruction of continuous signals. Analysis, design, and applications of FIR and IIR digital filters. Properties and applications of the discrete Fourier transform. Laboratory experience implementing off-line and real-time digital signal processing algorithms.

EELE 482 ELECTRO-OPTICAL SYSTEMS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EELE 334 or PHSX 425 or equivalent.
- Provides an overview of electro-optic systems and components. Lectures cover ray optics, scalar wave optics, laser and Gaussian beam optics, optical polarization and polarization devices, light sources, detectors, and electro-optic and acoustic-optic photonic devices. Laboratory experiments introduce basic photonic instrumentation and measurement techniques.

EELE 484 LASER ENGINEERING
S alternate years, to be offered even years 3 cr.
LEC 3.
PREREQUISITE: PHSX 222.
- The laser engineering course provides a basic understanding of the design and operational principles of lasers. Discussions of design and operation of several types of lasers will be covered including solid state lasers, gas lasers, and semiconductor lasers.

EELE 487 PROFESSIONALISM, ETHICS AND ENGINEERING PRACTICES
S 1 cr. LEC 1
PREREQUISITE: Junior standing.
- Engineers from industry and others give presentations on professionalism, ethics, and engineering practices. Included are specific well-known, historical engineering ethics cases and professional practices of engineering, intellectual property issues, and new developments.

EELE 488R ELECTRICAL ENGINEERING CAPSTONE DESIGN I
F, S 2 cr. SEM 2
PREREQUISITE: EELE 317 and ENGR 310.
- Part I of a two consecutive semester senior capstone design sequence in Electrical Engineering. Students, under the guidance of a faculty supervisor, formulate a solution to a real-world design problem culminating in a critical design review.

EELE 490R ELECTRICAL ENGINEERING CAPSTONE DESIGN II
F, S 2 cr. SEM 2
PREREQUISITE: EELE 488R.
- The second of a two consecutive semester senior capstone design sequence in Electrical Engineering. Students, under the guidance of a faculty supervisor, realize, assess and document the performance of their solution to a real-world design problem.

EELE 499R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND May be repeated. Max 6 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

EELE 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EELE 492 INDEPENDENT STUDY
On Demand 1 - 2 cr. IND Maximum 4 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

EELE 494 SEMINAR/WORKSHOP
S 1 cr. LEC 1
PREREQUISITE: Junior standing.
- Engineers from industry and others give presentations on professionalism, ethics, and engineering practices. Onsite, one semester practicum under guidance of employer designated mentor.

EELE 499R CAPSTONE: ELECTRICAL ENGINEERING DESIGN II
F, S 3 cr. LEC 1 LAB 2.
PREREQUISITE: ENGR 310.
- Senior capstone course. A design project culminates with the actual construction and demonstration of the results. Design teams report progress to the design supervisor periodically. Students are required to write a technical paper, participate in a Design Fair, and generate complete technical documentation for the project.

EELE 505 ADVANCED ANALOG CIRCUIT DESIGN
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: EELE 317.
- Solid state device models, p-spike and other computer simulations, single and multiple state amplifier design, current sources, operation amplification design, frequency response, feedback and feedforward amplifier analysis, noise and distortion in electronics.

EELE 505 MEMS SENSORS AND ACTUATORS
S alternate years, to be offered odd years 3 cr.
LEC 2 LAB 1.
PREREQUISITE: EELE 499.
- Micro fabrication of electrical and mechanical devices. Theory of various mechanical transducers and physical sensors including optical MEMS, RF MEMS, and Bio/Chemical MEMS.

EELE 522 ADAPTIVE CONTROL
S alternate years, to be offered even years 3 cr.
PREREQUISITE: EELE 422.
- On-line parameter estimation, self tuning regulators, model reference adaptive controls. Robust control.

EELE 525 SYSTEM IDENTIFICATION
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: EELE 422.

EELE 526 SEQUENTIAL STATE ESTIMATION
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: EELE 422.
- Sequential state estimation, with emphasis on Kalman filtering and smoothing. Continuous and discrete time.

EELE 528 ADVANCED TOPICS - CONTROLS & SIGNALS
On Demand 3 cr. LEC 3 Max 6 cr.
PREREQUISITE: EELE 422 or equivalent.
- Reading, discussion and exploration of original source material on advanced control systems and signal processing. Topics selected to compliment current interest and existing courses; for example, computational statistical methods, estimation, modeling, compression, advanced analytical techniques, multi-dimensional systems, spectral analysis, and implementation.

EELE 533 ANTENNA ENGINEERING
F alternate years, to be offered even years 3 cr.
LEC 3.
PREREQUISITE: EELE 334 or equivalent.
- Introduction to the electromagnetic theory and practice of antenna design and analysis. Common antenna structures are studied, including dipoles, arrays, horns, and reflectors. Applications will be explored in wireless communication, remote sensing, and related fields. Numerical electromagnetic simulation techniques are used for antenna modeling.

EELE 538 ADVANCED TOPICS IN ELECTROMAGNETICS AND OPTICS
On Demand 3 cr. LEC 3 Max 6 cr.
PREREQUISITE: None.
- Advanced topics in applied electromagnetics and optics, chosen to represent current research in this field.
ELEE 541 ADVANCED COMMUNICATION THEORY
F alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: ELEE 445.
- Signal spectrum analysis, random processes, correlation functions, functional transformations of random variables, optimal linear filtering and estimation, statistical analysis of digital and analog modulation systems, orthogonality and related signals: time, bandwidth, and dimensionality.

ELEE 545 ADVANCED TELECOMMUNICATIONS SYSTEMS
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: ELEE 445.
- Digital and analog switching systems, packet and circuit telecommunication transmission networking and media selection (fiber optics, cable, microwave and satellite), network configuration, network technologies, equipment selection, system design examples and project.

ELEE 547 AD HOC WIRELESS SENSOR NETWORKS
S alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: ELEE 447 and ELEE 543.
- Stationary and mobile sensor network topologies, RF technologies, frequency selection, link layer and media access protocols, energy management techniques, mobility management, standards and applications.

ELEE 548 ADVANCED TOPICS IN COMMUNICATIONS SYSTEMS
S alternate years, to be offered odd years 3 cr. SEM 5 Max 6 cr.
PREREQUISITE: EE 543 or equivalent.
- Reading and discussion of original source material on advanced communications systems topics including digital communications systems, optical technologies and systems, packet networks, IP networking, wireless systems, ad hoc networks.

ELEE 552 ADVANCED POWER SYSTEMS ANALYSIS & CONTROL
On Demand 3 cr. LEC 3
PREREQUISITE: ELEE 452. On Demand 3 cr. LEC 3
PREREQUISITE: ELEE 452.
- Representation of power system elements, fast-decoupled power flow, optimal power flow, voltage control, load-frequency control, control of active and reactive power flow, application of FACTS devices in power flow control, electrical faults and contingency calculations, transient stability, dynamic stability.

ELEE 555 ALTERNATIVE ENERGY DISTRIBUTED GENERATION SYSTEMS
S alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: ELEE 355.
- Exploration and analysis of alternative power generation sources and systems such as wind, solar, microturbine, and fuel cells, combined sources and their design, power electronic interfacing, and energy storage systems.

ELEE 556 ADVANCED POWER ELECTRONICS
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: ELEE 451.
- Mathematical modeling of switching power converters, advanced power converter topologies, design constraints and control methods, design-oriented analysis techniques for applications in electronic systems, power systems, transportation systems, etc.

ELEE 558 ADVANCED TOPICS - ELECTRICAL POWER
On Demand 3 cr. LEC 3 Max 6 cr.
PREREQUISITE: ELEE 454 or equivalent.
- Reading, discussion and exploration of advanced electrical power topics including power system operation and control, power dynamics, power markets, protection, electric drives, or power electronics.

ELEE 561 DIGITAL SYSTEM DESIGN
S, alternate years, to be offered every even years 5 cr.
SEM 3
PREREQUISITE: ELEE 306 and ELEE 334 and ELEE 371.
- Analysis and design of high speed digital systems including chip-to-chip signal propagation, transmission lines, IC package interconnect, printed circuit board design, state-of-the-art simulation tools, and measurement techniques using Time Domain Reflectometry (TDR) and Vector Network Analyzers. Research of modern topics.

ELEE 565 PARALLEL PROCESSING
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: ELEE 466.
- Architecture and applications of parallel processors, major design issues, fault tolerant computing, performance measures of parallel systems, and issues in concurrent programming.

ELEE 570 INDEPENDENT STUDY
On Demand 1 - 6 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

ELEE 575 RESEARCH OR PROFESSIONAL PAPER, PROJECT
F, S, Su 5 - 6 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

ELEE 577 ADVANCED DIGITAL SIGNAL PROCESSING
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: ELEE 477.
- Advanced topics in digital signal processing, Review of LTI discrete-time systems; signal and coefficient quantization; sample rate conversion and multirate filter structures; time-varying and adaptive systems; Fast algorithms; system implementation alternatives; DSP applications in current research.

ELEE 578 SPEECH SIGNAL PROCESSING
F alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: ELEE 477.
- Digital signal processing techniques that are used to analyze, code, and manipulate speech signals will be covered. Topics include modification, coding, enhancement, and recognition of speech signals.

ELEE 580 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ELEE 581 FOURIER OPTICS AND IMAGING THEORY
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: ELEE 334 or consent of instructor.
- Optical propagation and diffraction using scalar wave approach and Fourier Theory of imaging. Introduces concepts of pupil function, point and line spread function and optical transfer function, image formation with coherent and incoherent light, holography and diffractive optical elements.

ELEE 582 OPTICAL DESIGN
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: ELEE 482 or PHSX 327.
- Optical design using geometric optics and computer ray-tracing software. Introduces ray and wave front aberrations, control of aberrations in optical systems, designing for system requirements, and analytic tools including the modulation transfer function for describing the imaging and beam-conditioning properties of typical optical systems, including lenses, mirrors, cameras, and telescopes.

ELEE 583 REMOTE SENSING SYSTEMS
S alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: ELEE 334 or PHSX 425 or equivalent.
- Design, analysis, and calibration of electromagnetic remote sensing systems. A detailed coverage of radiometry and optical detectors is combined with an introduction to atmospheric propagation principles to analyze remote sensing systems. The course considers the full electromagnetic spectrum, but emphasizes optical systems at ultraviolet, visible, and infrared wavelengths, including cameras, spectrometers, radiometers, polarimeters, multispectral and hyperspectral imagers, laser radars, etc.

ELEE 589 GRADUATE CONSULTATION
F, S, Su 1 - 1 cr. IND Maximum 3 cr.
PREREQUISITE: Graduate standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their course work (and thesis if on a thesis plan) but who need additional faculty or staff time or help.

ELEE 590 MASTER'S THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's standing.

ELEE 690 DOCTORAL THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

EENV ENGINEERING - ENVIRONMENTAL

EENV 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

EENV 340 PRINCIPLES OF ENVIRONMENTAL ENGINEERING
F, S 5 cr. LEC 3
PREREQUISITE: CHEM 143 or CHEM 155
COREQUISITE: EGEN 335
- Fundamentals of environmental engineering with emphasis on water and wastewater.
EENV 432 ADVANCED ENGINEERING HYDROLOGY
S 3 cr. LEC 3
PREREQUISITE: EENV 340.
COREQUISITE: EENV 332.
- Hydrology emphasizing engineering design.
Topics include modern techniques for flow estimation, flood routing and sediment yield; design of conveyance structures; and water project development.

EENV 434 GROUND WATER SUPPLY AND REMEDIATION
S 3 cr. LEC 3
PREREQUISITE: EGEN 355.
- Contemporary groundwater topics including water supply, contaminant transport, and remediation technologies.

EENV 440 WATER CHEMISTRY FOR ENVIRONMENTAL ENGINEERS
F 3 cr. LEC 3
PREREQUISITE: EENV 340.
- Fundamentals of aquatic chemistry and principles of water technology for environmental engineers. Based on chemical thermodynamics. Students learn to quantify water quality and control parameters characterizing water quality. Co-convened with ENVE 540. Students enrolled in this course will not be able to take ENVE 540 and have it count toward degree requirements.

EENV 441 NATURAL TREATMENT SYSTEMS
F 3 cr. LEC 3
PREREQUISITE: EENV 340.
- Planning, design, and operation of remediation facilities emphasizing natural versus mechanical elements. Specific topics include stabilization ponds, constructed wetlands, land treatment, and on-site domestic systems.

EENV 445 AIR POLLUTION CONTROL
F alternate years, to be offered even years
5 cr. LEC 3
PREREQUISITE: EGEN 335, CHMY 141 and CHMY 151 or EGEN 324 or equivalent.
- Fundamentals of air quality management with emphasis on the design of processes and equipment for controlling gaseous and particulate emissions.

EENV 445 HAZARDOUS WASTE TREATMENT
F alt. years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: EENV 340 or equivalent.
- Principles, theory, and practice of treating hazardous materials.

EENV 447 HAZARDOUS WASTE MANAGEMENT
S 3 cr. LEC 3
PREREQUISITE: Junior standing and one of the following: CHMY 211 or EGEN 335.
- Introduction to the technologies, regulations, political and social issues, and environmental impacts of hazardous wastes. Management approaches are developed through fundamental studies and review of case histories.

EENV 490 UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

EENV 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EENV 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 4 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of Department Head.
- Directed research and study on an individual basis.

EENV 534 ENVIRON ENG INVESTIGATION
F 3 cr. LEC 3
PREREQUISITE: EENV 340 and one of the following: EENV 431, EENV 454, EENV 455.
- Laboratory and field investigations for design and analysis of environmental engineering systems.

EENV 540 WATER CHEMISTRY FOR ENVIRONMENTAL ENGINEERS
F 3 cr. LEC 3
PREREQUISITE: EENV 340.
- Fundamentals of aquatic chemistry and principles of water technology for environmental engineers. Based on chemical thermodynamics. Students learn to quantify water quality and control parameters characterizing water quality. Co-convened with EENV 440. Students enrolled in this course will not be able to take EENV 440 and have it count toward degree requirements.

EENV 561 ENVIRON ENG REACTOR THEORY
F 2 cr. LEC 2
PREREQUISITE: EENV 430.
- Theory and mathematics of reactors commonly used in water and wastewater operations.

EENV 562 WATER TREATMENT PROCESS/DESIGN
S 3 cr. LEC 3
PREREQUISITE: EENV 561.
- Principles, theory, and practice of water treatment plant design.

EENV 563 WASTEWATER TREAT PROC/DESIGN
S 3 cr. LEC 3
PREREQUISITE: EENV 561.
- Principles, theory, and practice of wastewater treatment plant design.

EENV 565 CHEM SENS/INSTR ENVIR BIOTECH
S alt. years, to be offered even years 2 cr. LEC 2
PREREQUISITE: CE 340 or consent of instructor.
- The course provides the knowledge necessary to design, manufacture, and use chemical sensors in the area of environmental biotechnology. Principles of manufacture and examples of application of chemical sensors along with the principles of measurement, signal conditioning, and data acquisition are presented to an extent that is necessary for the operation of sensors. The measurement techniques are preceded with an adequate theoretical introduction. Demonstrations of the sensors are given in the Microsensors Laboratory located at the Center for Biofilm Engineering.

EENV 575 RESEARCH OR PROF PAPER/PROJECT
F, S, Su 1-4 cr. IND
Max 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major adviser and graduate committee.

EENV 589 GRADUATE CONSULTATION
On Demand 3 cr. IND
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

EENV 590 MASTER’S THESIS
On Demand 1-10 cr. IND
PREREQUISITE: Master’s standing. May be repeated.

EENV 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: EENV 340.
- Fundamentals of aquatic chemistry and principles of water technology for environmental engineers. Based on chemical thermodynamics. Students learn to quantify water quality and control parameters characterizing water quality. Co-convened with EENV 440. Students enrolled in this course will not be able to take EENV 440 and have it count toward degree requirements.

EENV 592 INDEPENDENT STUDY
On Demand 1 - 8 cr. Maximum 8 cr.
PREREQUISITE: Admission to graduate program.
- Directed graduate research and study of architectural, urban design or historic preservation issues on an individual basis.

EENV 598 INTERNSHIP
On Demand 2 cr.
PREREQUISITE: Graduate standing, consent of instructor and approval of Department Head.
- An individual assignment arranged with an agency, business or other organizations to provide guided experience in the field.

EGEN Engineering - General
formerly EM, ENGR

EGEN 102 INTRODUCTION TO ENGINEERING COMPUTER APPLICATIONS
S 2 cr. LEC 2
COREQUISITE: M 171Q.
- Effective methods for applying the computer to common numerical problems encountered in chemical engineering. Chemical engineering examples will provide a basis for more comprehensive problems encountered in the other professional level courses.

EGEN 105 INTRODUCTION TO GENERAL ENGINEERING
F, S 2 cr. LEC 1 LAB 1
- Provides students an opportunity to explore the fields of engineering, engineering technology, and computer science. Other topics include engineering design, career opportunities, professionalism, and ethics.

EGEN 115 ENGINEERING GRAPHICS
F, S 1 cr. LEC 1
- Introductory course developing freehand sketching for engineering design graphics. Skills will be developed for sketching and interpreting dimensioned multi-view drawings, pictorials, sections, and assemblies.
EGEN 116 ENGINEERING GRAPHICS LABORATORY
F S 1 cr. LAB 1
COREQUISITE: EGEN 115 or consent of instructor.
- Hands-on laboratory experience in two-dimensional computer-aided design (CAD) for engineering design graphics.

EGEN 117 ENGINEERING DESIGN GRAPHICS
On Demand 1 cr. LEC 1
- Introductory course developing freehand sketching and computer-aided modeling techniques for engineering design graphics. Skills will be developed for sketching and interpreting dimensioned multi-view drawings, tolerancing, specifications, pictorials, and assemblies for mechanical designs.

EGEN 118 ENGINEERING DESIGN GRAPHICS LABORATORY
On Demand 1 cr. LAB 1
COREQUISITE: EGEN 115, or EGEN 117, or consent of instructor.
- Hands-on laboratory experience in three-dimensional and parametric constraint-based modeling for engineering design.

EGEN 125S TECHNOLOGY, INNOVATION, AND SOCIETY
F S 3 cr. LEC 3
- This course explores the innovative engineering processes that connect the creative elements of science and engineering with solving problems of everyday life. Topics include understanding the role of creativity, public safety and ethics in creating technological solutions. Case studies are investigated, including applying critical thinking to exploring how innovation can help society.

EGEN 200 DESIGNING OUR COMMUNITY
F S 1 cr. SEM 1
- This course is designed to explore issues in engineering and college academics for American Indian students in the Designing Our Community Program. The course will provide a learning community among students to ensure success in achieving their professional goals. Spring semester focuses on service learning projects.

EGEN 201 ENGINEERING MECHANICS/STATICS
F S Su 3 cr. LEC 3
PREREQUISITE: PHSX 220 or PHSX 240.
COREQUISITE: M 275 or M 283.
- Equilibrium of particles and rigid bodies; static analysis of structures including trusses, beams, frames and machines; coulomb friction; area and mass centroids, moments and products of inertia.

EGEN 205 MECHANICS OF MATERIALS
F S Su on demand 3 cr. LEC 3
PREREQUISITE: EGEN 201 or EGEN 221.
- Stress and strain, Hookes Law, thermal strain, torsion, bending of beams, combined stress, limit analysis, energy methods, virtual work, column theory.

EGEN 288 APPLIED STRENGTH OF MATERIALS
F S 3 cr. LEC 3
PREREQUISITE: EGEN 201 or EGEN 203 or EGEN 221.
- Equilibrium and deformation of structural elements; concepts of stress and strain and interrelationship; representation and transformation of combined stress states; axial, torsional and flexural stresses and deformation; column buckling.

EGEN 221 HONORS STATICS
F 3 cr. LEC 2 SEM 1
PREREQUISITE: PHSX 220 or PHSX 240 and good standing in University Honors.
COREQUISITE: M 275 or M 283.
- Honors offering of engineering statics, including topics dealing with equilibrium of particles and rigid bodies; static analysis of structures including trusses, beams, frames and machines; coulomb friction; area and mass centroids, moments and products of inertia.

EGEN 290R UNDERGRADUATE RESEARCH
F S 1-6 cr. IND may be repeated
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

EGEN 291 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department. Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EGEN 292 INDEPENDENT STUDY
On Demand 1-2 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

EGEN 324 APPLIED THERMODYNAMICS
S 3 cr. LEC 3
PREREQUISITE: PHSX 205 or PHSX 220.
COREQUISITE: M 166 or M 172.
- General treatment of the basic laws of thermodynamics and engineering applications with introduction to heat transfer for curricula not requiring EMEC 320/EMEC 321 series.

EGEN 325 ENGINEERING ECONOMIC ANALYSIS
F S 3 cr. LEC 3
PREREQUISITE: Junior standing, M 171 or M 165, WRIT 101W, COM 110 or CLS 101; or instructor approval.
- Methods for comparing and evaluating capital investment alternatives. Concepts include the time value of money, rates of return, cash flows, incremental analysis, depreciation, influences of taxes, inflation and deflation, depreciation, replacement analysis. Emphasis is placed upon evaluating various engineering alternatives. Some open-ended design problems are included.

EGEN 331 APPLIED MECHANICS OF FLUID
F S 3 cr. LEC 3
PREREQUISITE: EGEN 208 or EGEN 205.
- Basic principles of fluid mechanics: pressure measurement, forces on submerged areas, fluid flow through conduits, parallel pipe systems, open channel flow, forces caused by fluids in motion, pumps, flow of air in ducts.

EGEN 335 FLUID MECHANICS
F S 3 cr. LEC 3
PREREQUISITE: EGEN 202, EGEN 205.
- Introduction to modern fluid mechanics.

EGEN 350 APPLIED ENGINEERING DATA ANALYSIS
F S Su 2 cr. LEC 2
PREREQUISITE: M 166 or M 172.
- An overview of data variability and applied statistical experimental design with analysis techniques for a broad range of engineering disciplines. Topics include essential probability distributions, experimental design strategies, hypothesis testing, and regression with applications to traditional engineering functions.

EGEN 415 ADVANCED MECHANICS OF SOLIDS
F 3 cr. LEC 3
PREREQUISITE: EGEN 205.
- Advanced topics in deformation mechanics of materials; application to contemporary engineering problems. Computer applications.

EGEN 510R MULTIDISCIPLINARY ENGINEERING DESIGN
F S S 3 cr. LEC 2 RGT 1
PREREQUISITE: Junior standing in an Engineering curriculum or consent of instructor.
- Introduces engineering students to topics such as design process, creative design, project management, teamwork, and technical leadership while highlighting the skills needed to work in a multidisciplinary environment.

EGEN 435 FLUID DYNAMICS
S 3 cr. LEC 3
PREREQUISITE: EGEN 335.
- Equations governing steady and unsteady fluid flow; applications to contemporary engineering problems. Computer applications.

EGEN 488 FUNDAMENTALS OF ENGINEERING EXAM
F S 0 cr. IND 0
PREREQUISITE: Must be in final two semesters of program.
- Student participation in engineering program assessment. Requirement to complete the Fundamentals of Engineering (FE) examination or the Major Field Test in Computer Science (CS majors only). Applications for the exams must be obtained from the students’ departments. Application deadlines: fall semester - May 15th; spring semester - December 15th.

EGEN 490R UNDERGRADUATE RESEARCH
F S Su 1-4 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis.
EIND 101 INTRODUCTION TO INDUSTRIAL ENGINEERING
F 1 cr. LEC 1
PREREQUISITE: Must be taken the first year enrolled in IE program.
- Overview of the industrial engineering profession. Lectures will concentrate on tools and methods of industrial engineering, and their application in manufacturing and service industries.

EIND 142 INTRODUCTION TO SYSTEMS ENGINEERING
S 2 cr. LEC 1 LAB 1
PREREQUISITES: Must be taken the first year enrolled in IE program.
- Overview of the industrial engineering profession. Lectures will concentrate on tools and methods of industrial engineering, and their application in manufacturing and service industries.

EIND 290R UNDERGRADUATE RESEARCH F S 1-6 cr. ENRD may be repeated
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

EIND 313 WORK DESIGN & ANALYSIS F S 3 cr. LEC 3
PREREQUISITE: Junior standing or above.
- Applications of ergonomics and human factors engineering to contemporary problems and environments.

EIND 354 ENGINEERING PROBABILITY AND STATISTICS I F 3 cr. LEC 3
PREREQUISITE: M 172, junior standing, or instructor approval.
- Understanding the statistical nature of engineering processes. Emphasis on proper data collection and classification, characteristics of variables and their distributions, joint probability distributions, and establishing hypotheses and statistical significance in engineering design specifications.

EIND 410 INTERACTION DESIGN F 3 cr. LEC 3
PREREQUISITE: Junior standing. Course will address responsible conduct of research.
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

EIND 571 INTRODUCTION TO COMPUTER INTEGRATED MANUFACTURING F 3 cr. LEC 2 LAB 1
PREREQUISITE: ETME 215 or consent of instructor.
- Introduces core concepts of computer controlled manufacturing systems and their applications. Topics include fundamentals of automation, programmable logic controllers, numerical control, industrial robotics, material handling and storage, and flexible manufacturing systems. Laboratories require students to apply course concepts in solving problems and implementing hardware-software solutions to meet state objectives.
### COURSE DESCRIPTIONS: EIND

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Lecture</th>
<th>Recitation</th>
<th>Independent Study</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIND 434</td>
<td>PROJECT AND ENGINEERING MANAGEMENT</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>- Fundamental principles of planning, estimating, budgeting, scheduling, implementing, evaluation, and controlling engineering and research projects. Common engineering management concerns such as labor scheduling, human resources management, and related governmental compliance also explored.</td>
</tr>
<tr>
<td>EIND 442</td>
<td>FACILITY AND MATERIAL HANDLING SYSTEMS DESIGN</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>- Senior capstone course. The first course in the senior capstone sequence. Principles and techniques for planning and designing production facilities and material handling systems. Product and process analysis, requirements, layout and support facilities.</td>
</tr>
<tr>
<td>EIND 454</td>
<td>ENGINEERING PROBABILITY AND STATISTICS II</td>
<td>S 3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>- General markov processes. Nonlinear and integer programming algorithms. and operations management decision making. -- Advanced formulation of models, algorithms, and computerized design and decision making. Decision support systems.</td>
</tr>
<tr>
<td>EIND 458</td>
<td>PRODUCTION AND ENGINEERING MANAGEMENT</td>
<td>S 3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>- Design and management of efficient production/delivery systems for goods and services, emphasizing quantitative analysis and systems approaches. Topics include forecasting, inventory management, production planning, scheduling, material planning, and lean manufacturing systems; plus introduction to organization and management theory.</td>
</tr>
<tr>
<td>EIND 464</td>
<td>PRINCIPLES OF OPERATIONS RESEARCH II</td>
<td>S 3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>- Advanced formulation of models, optimization techniques and application to engineering design and operations management decision making. Nonlinear and integer programming algorithms. Stochastic models including advanced queuing and general markov processes.</td>
</tr>
<tr>
<td>EIND 471</td>
<td>COMPUTER INTEGRATED MANUFACTURING</td>
<td>On Demand</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>- Computers and their applications to computer-integrated manufacturing systems. Fundamentals of manufacturing, automation, numerical control production systems, industrial robotics, material handling and storage, flexible manufacturing systems, CAD/CAM, and future automated factories. Laboratories include software design and implementation, as well as the application of &quot;off the shelf&quot; software emphasizing creativity in the control of industrial machines.</td>
</tr>
<tr>
<td>EIND 477</td>
<td>QUALITY ASSURANCE</td>
<td>S 3</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>- Statistical and non-statistical aspects of quality assurance assessment. Includes classical SPC and process improvement via control charts. Also includes product and process design through planned experimentation and simple experimental designs (ANOVA). Limited use of case studies. A design project or course capstone paper demonstrating significant elements of the course is required.</td>
</tr>
<tr>
<td>EIND 490</td>
<td>UNDERGRADUATE RESEARCH</td>
<td>F S, Su</td>
<td>1 - 6</td>
<td>cr</td>
<td>IND</td>
<td>- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.</td>
</tr>
<tr>
<td>EIND 491</td>
<td>SPECIAL TOPICS</td>
<td>On Demand</td>
<td>1 - 4</td>
<td>cr</td>
<td>-</td>
<td>- Advanced topics and methods in ergonomics and human factors engineering as applied to human error and safety in complex systems. Basic and applied issues of human error and safety are explored through seminars, laboratory demonstrations and case studies.</td>
</tr>
<tr>
<td>EIND 499</td>
<td>CAPSTONE: INDUSTRIAL ENGINEERING DESIGN</td>
<td>S 3</td>
<td>3</td>
<td>1 RCT 1</td>
<td>IND</td>
<td>- Directed research and study on an individual basis. Course project is required.</td>
</tr>
<tr>
<td>EIND 500</td>
<td>ADVANCED DESIGN &amp; CONTROL OF MANUFACTURING SYSTEMS</td>
<td>On Demand</td>
<td>3</td>
<td>cr</td>
<td>-</td>
<td>- Advanced economic analysis topics, including: examination of assumptions in standard engineering economy approaches, cost of capital determination, treatment of risk and uncertainty, sensitivity analysis, advanced modeling techniques, multi-attribute methods. Special emphasis is given to decision-making in modern manufacturing and service systems.</td>
</tr>
<tr>
<td>EIND 509</td>
<td>SYSTEMS SIMULATION</td>
<td>On Demand</td>
<td>3</td>
<td>cr</td>
<td>-</td>
<td>- Usability engineering is an iterative design process that applies human-centered design principles integrated with user participation (usability testing) to produce usable, desirable, and sustainable products, services and systems. This project-based course will use a seminar format with industry guest-speakers and case studies.</td>
</tr>
<tr>
<td>EIND 510</td>
<td>USABILITY ENGINEERING</td>
<td>F</td>
<td>alternate</td>
<td>years 3 cl.</td>
<td>LEC 3</td>
<td>- Usability engineering is an iterative design process that applies human-centered design principles integrated with user participation (usability testing) to produce usable, desirable, and sustainable products, services and systems. This project-based course will use a seminar format with industry guest-speakers and case studies.</td>
</tr>
<tr>
<td>EIND 511</td>
<td>ADVANCED METHODS IN HUMAN FACTORS &amp; ERGONOMICS</td>
<td>S, alternate</td>
<td>even</td>
<td>years 3 cl.</td>
<td>LEC 3</td>
<td>- Advanced economic analysis topics, including: examination of assumptions in standard engineering economy approaches, cost of capital determination, treatment of risk and uncertainty, sensitivity analysis, advanced modeling techniques, multi-attribute methods. Special emphasis is given to decision-making in modern manufacturing and service systems.</td>
</tr>
<tr>
<td>EIND 513</td>
<td>HUMAN FACTORS IN SAFETY OF COMPLEX SYSTEMS</td>
<td>F</td>
<td>alternate</td>
<td>years 3</td>
<td>LEC 3</td>
<td>- Advanced research methods applied to areas where ergonomics and human factors is playing a key role in increasing effectiveness, efficiency and safety of human-based systems. Example application areas include: (1) transportation systems; (2) health care systems; and (3) occupational work.</td>
</tr>
<tr>
<td>EIND 525</td>
<td>ECONOMIC &amp; MULTIATTRIBUTE ANALYSIS OF ADVANCED MANUFACTURING SYSTEMS</td>
<td>F</td>
<td>alternate</td>
<td>years 3</td>
<td>LEC 3</td>
<td>- Advanced economic analysis topics, including: examination of assumptions in standard engineering economy approaches, cost of capital determination, treatment of risk and uncertainty, sensitivity analysis, advanced modeling techniques, multi-attribute methods. Special emphasis is given to decision-making in modern manufacturing and service systems.</td>
</tr>
<tr>
<td>EIND 554</td>
<td>DESIGN &amp; DECISION SUPPORT SYSTEMS</td>
<td>S</td>
<td>alternate</td>
<td>years 3</td>
<td>LEC 3</td>
<td>- Web-based decision support system design for engineering and management. Computer-aided design and decision making; decision support system hardware and software architectures; data management, models, search, and user interfaces.</td>
</tr>
</tbody>
</table>
EIND 540 LOGISTICS AND SUPPLY CHAIN MANAGEMENT
On Demand 3 cr. LEC 3
PREREQUISITE: CSCI 111 or equivalent, and EIND 364; or consent of instructor.
– Introduction to logistics and supply chain management problems, performance, measures, system design and operation methods; fleet management, vehicle routing, crew scheduling and related problems.

EIND 548 PLANNING AND SCHEDULING
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: CSCI 111 or equivalent, and M 221 or EIND 364; or consent of instructor.
– Introduction to planning and scheduling problems; formulation, objectives, and constraints; manual and computer scheduling methods; general purpose scheduling algorithms; industrial applications.

EIND 554 APPLICATION & DESIGN OF INDUSTRIAL EXPERIMENTS
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: EIND 354 or EIND 454.
– Statistical analysis for managerial decision making as applied to engineering and industry. Hypotheses testing, multifactor ANOVA, randomized complete block designs, full-blocked and fractional factorial designs with blocking and confounding, random factors experiments, and introductions to nested and split-plot designs.

EIND 558 MANAGERIAL FORECASTING & DECISION ANALYSIS
On Demand 3 cr. LEC 3
PREREQUISITE: EIND 354 or EIND 454.
– Time series analysis through classical approaches including regression, smoothing models, and advanced time series models. Technical applications emphasized in concepts, tools, and methods. Includes investigations into financial and dependent data. Approaches designed for managers to test real applications for making decisions.

EIND 560 OPTIMIZATION TECHNIQUES
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: EIND 364, CSCI 111 or equivalent.
– Classical principles of differential calculus are applied in solving nonlinear optimization problems. Search strategies for identifying local and global optima are developed for presentation as algorithms. Motivates the use of more accurate nonlinear models for cost revenue, design, etc.

EIND 574 MANAGEMENT ENGINEERING SYSTEMS
F alternate years, to be offered even years 5 cr. SEM 5
PREREQUISITE: EIND 458, or instructor approval.
– Students will explore various facets of designing effective organizational and management systems. Topics will include: classical and open system organization theory, socio-technical systems theory, congruence, technology and innovation management, knowledge management, and continuous improvement in organizations. Students will complete an independent research project in addition to course readings and in-class discussion.

EIND 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1-4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
– A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student, major advisor, and graduate committee.

EIND 577 QUALITY ASSURANCE & VARIABILITY REDUCTION
On Demand 3 cr. LEC 3
PREREQUISITE: EIND 477, or instructor approval.
– Theory, applications, and case studies in quality assurance and reliability. Topics include variability reduction, Total Quality Management. Quality function deployment; Shainin, Shewhart, and other techniques; sequential experimentation; other experimental designs are emphasized. A capstone course design project is required.

EIND 589 GRADUATE CONSULTATION
F, S, Su 1-3 cr. IND
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
– This course may be used only by students who have completed all of their coursework (and thesis if on a thesis plan) but who need additional faculty or staff time or help.

EIND 590 MASTER’S THESIS
F, S, Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.

EIND 591 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EIND 592 INDEPENDENT STUDY
On Demand 1-5 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor and approval of graduate program coordinator.
– Directed research and study on an individual basis.

EIND 598 INTERNSHIP
On Demand 1-3 cr. IND
PREREQUISITE: Graduate standing, consent of instructor and approval of graduate program coordinator.
– An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

EIND 600 DOCTORAL THESIS
F, S, Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

EMAT 251 MATERIALS STRUCTURES AND PROPERTIES
F, S 3 cr. LEC 3
PREREQUISITE: CHMY 141 or CHMY 121.
COREQUISITE: M 165Q or M 171Q.
– Chemistry and internal structure of solids and the relationship of structure to physical and mechanical properties of metals and nonmetallic solids.

EMAT 252 MATERIALS STRUCTURES AND PROPERTIES LAB
F, S 1 cr. LAB 1.
PREREQUISITE: WRIT 101W and US core for ME.
COREQUISITE: EMAT 251, EMEC 205 for ME or ETME 202 for MET.
– This course is intended to supplement current materials lecture course offerings. Provides students with hands-on lab experience to identify and quantify physical, electrical, and mechanical properties of metallic and non-metallic materials via experimental measurements. Experimental procedures and reporting are emphasized.

EMAT 254 ADVANCED MATERIALS STRUCTURES AND PROPERTIES
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: EMAT 251.
– Application of materials selection to the engineering design process. Development of microstructure-processing-properties relationships on the mechanical and functional behavior of materials.

EMAT 460 POLYMERIC MATERIALS
F 3 cr. LEC 3
PREREQUISITE: EMAT 251, ECHM 215.
– The nature and special characteristics of synthetic high polymers and the technology of their manufacture and processing.

EMAT 483 COMPOSITE MATERIALS
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: EMAT 251.
– Structure and properties of composite materials and design procedures for composite structures.

EMAT 511 CATALYSIS AND APPLIED SURFACE CHEMISTRY
On Demand 3 cr. LEC 3
PREREQUISITE: ECHM 328.
– The fundamental principles of catalysis, surface chemistry, and reactor design at a working research level.

EMAT 519 SURFACE ENGINEERING
On Demand 3 cr. LEC 2 LAB 1
PREREQUISITE: Graduate standing.
– Consideration of chemistry and instrumentation needed in engineering design and research, including surface science, and materials.

EMAT 550 FAILURE OF MATERIALS
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: One of the following: EMAT 463, EGEN 415, or EMAT 452.
– Concepts of brittle and ductile fracture, fatigue, creep-rupture and environmentally assisted fracture. Applications to metals, polymers, ceramics and composite materials.
EMAT 551 ADVANCED COMPOSITE MATERIALS
S alternate years, to be offered even years
5 cr. LEC 3
PREREQUISITE: EMAT 463.
- Advanced treatment of composite materials, including constituent properties, interfaces, micro-mechanics, microscopic behavior, modes and mechanisms of failure.

EMAT 552 ADVANCED CERAMICS
F, alternate years, offered odd years 3 cr. LEC 3
PREREQUISITE: EMAT 251, 252, 350.
- Advanced treatment of ceramic material including phase transformations, defect chemistry, thermodynamics, synthesis/processing, sintering theory, grain growth, and characterization. Emphasis is placed on functional properties of oxide ceramics for applications in energy conversion.

EMAT 553 ADVANCED COMPOSITE MATERIALS
Even years, S 3 cr. LEC 5
PREREQUISITE: EMAT 463.
- Advanced treatment of composite materials, including constituent properties, interfaces, micro-mechanics, microscopic behavior, modes and mechanisms of failure.

EMEC 551 ADVANCED COMPOSITE MATERIALS
F, S 3 cr. LEC 3
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

EMEC 552 CAE III-SYSTEMS ANALYSIS
F, S 3 cr. LEC 3
PREREQUISITE: EEME 225, M 274, M 275.
- Course focuses on enhancing the appreciation of mathematics in ME and advancing the knowledge of mathematical methods in engineering analysis. Topics include introduction to mathematical modeling of engineering systems, linear algebra techniques, numerical methods, method of Laplace transformation, Fourier analysis, with classic and modern engineering applications.

EMEC 553 THERMODYNAMICS I
F, S 3 cr. LEC 3
PREREQUISITE: EGEN 205.
- Basic thermodynamic concepts, first and second laws, open and closed systems, properties of ideal and real substances, work, heat, irreversibility, and availability.

EMEC 554 THERMODYNAMICS II
F, S 3 cr. LEC 3
PREREQUISITE: EGEN 201.
- Introduction to the finite element method.
EMEC 443 MECHANICAL ENGINEERING DESIGN I
On Demand 3 cr. LEC 2 RCT 1
PREREQUISITE: EMEC 320, EGEN 335. COREQUISITE: Concurrent enrollment in or prior completion of EMEC 342.
- Mechanical Engineering design project experience emphasizing design of a formal design process, presentations, and documentation. Includes coverage of industry machining and welding practices.
- MS program for Mechanical Engineering.

EMEC 444 MECHANICAL BEHAVIOR OF MATERIALS
F, S 3 cr. LEC 3
PREREQUISITE: EMEC 251.
- Analysis of high temperature behaviors of materials such as metals, polymers, ceramics, and composites.
- Examination of the mechanical properties of materials.

EMEC 445 MECHANICAL VIBRATIONS
F, S 3 cr. LEC 3
PREREQUISITE: EMEC 303. Requires completion of all 100-200 level courses (except Core).
- Vibration problems of single and multiple degrees of freedom. Introduction to vibration of continuous bodies. Analysis of free and forced vibration problems. Effects of damping.

EMEC 447 AIRCRAFT STRUCTURES
On Demand 4 cr. LEC 3 RCT 1
PREREQUISITE: EMEC 341 or instructor approval.
- An introduction to the current practices in the design and analysis of aircraft metallic and composite structures. Overview of aircraft design, analysis, testing, and certification with examples. Static and dynamic load condition analysis.

EMEC 465 BIO-INSPIRED ENGINEERING
F 3 cr. LEC 3
PREREQUISITE: EGEN 335, EMEC 320, EGEN 310 for majors; consent of instructor for non-majors.
- Addresses design in nature and resultant solutions as inspiration for solving engineering design problems. Structural, thermal, and fluid concepts in nature will be applied to engineering. Smart structures, self-healing materials, and robotics will be introduced.

EMEC 467 MICRO ELECTRO MECHANICAL SYSTEMS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: Senior standing; EELE 250 and EGEN 205; or consent of instructor.
- Introduction to sensors and actuators and their working principles. MEMS (microelectromechanical systems) fabrication procedures. MEMS Materials and their mechanical properties. Mechanical Behavior of Microsystems. MEMS Packaging and thermal-mechanical stresses in MEMS packages. Reliability issues in MEMS.

EMEC 468 INTRODUCTION TO WAVE PROPAGATION AND ULTRASONICS
On Demand 4 cr. LEC 3 LAB 1
PREREQUISITE: EMEC 360, or equivalent, and EMEC 365, or equivalent.
COREQUISITE: EMEC 445, or equivalent.
- Analysis of wave phenomena in elastic solids including propagation, reflection, transmission, dispersion, impedance, etc. Development of the governing equations describing the propagation of waves in strings, rods, and two-dimensional solids. Application of the basic principles to ultrasonic testing of materials.

EMEC 499R CAPSTONE: MECHANICAL ENGINEERING DESIGN I
F, S 2 cr. LEC 1 RCT 1
PREREQUISITE: EGEN 310, EMEC 326, ME majors only.
COREQUISITE: Concurrent enrollment in or prior completion of EMEC 321, EMEC 342, EMEC 360, EMEC 445.
- Senior capstone design experience in Mechanical Engineering. Students, under the guidance of a faculty supervisor, solve real-world design problems.

EMEC 491 SPECIAL TOPICS
On Demand 1 - 12 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EMEC 492 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

EMEC 495 STUDENT TEACHING: ME CONSULTATION
On Demand 1 - 5 cr. IND Maximum 5 cr.
PREREQUISITE: Sophomore standing in EMEC/ETME curriculum and consent of supervising faculty.
- Students enrolled in this class will provide technical support for selected ME/MET courses.

EMEC 498 INTERNSHIP
On Demand 1 - 12 cr. IND
PREREQUISITE: Junior standing and consent of instructor.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

EMEC 499R CAPSTONE: MECHANICAL ENGINEERING DESIGN II
F, S 3 cr. LEC 1 RCT 1 LAB 1
PREREQUISITE: EMEC 449 or consent of instructors. ME majors only.
- Senior capstone design experience in Mechanical Engineering. Students implement and test the function of design prototypes, under the guidance of a faculty supervisor.

EMEC 520 ADVANCED THERMODYNAMICS
On Demand 3 cr. LEC 3
PREREQUISITE: EMEC 321.
- First and second laws of thermodynamics, uniform flow and general open systems, real gases, mixtures, reacting processes, phase and chemical equilibrium.

EMEC 521 STATISTICAL THERMODYNAMICS
On Demand 3 cr. LEC 3
PREREQUISITE: EMEC 520.
- Kinetic theory of gases, distribution functions, thermodynamic properties in terms of partition functions, reactions, phase transition.

EMEC 525 CONDUCTION HEAT TRANSFER
F 3 cr. LEC 3
PREREQUISITE: EMEC 326.
COREQUISITE: EMEC 510.
- Advanced topics in conduction heat transfer with emphasis on analytical techniques including separation of variables, Duhamel's theorem, two-phase problems, and numerical techniques.

EMEC 526 CONVECTION HEAT TRANSFER
On Demand 3 cr. LEC 3
PREREQUISITE: EMEC 326.
- Advanced topics in convection heat transfer including both internal flows and external flows, introduction to the theory of laminar boundary layer stability, determination of turbulent transition, and analytical models of turbulent flows.

EMEC 527 RADIATION HEAT TRANSFER
On Demand 3 cr. LEC 3
PREREQUISITE: EMEC 326.
- Advanced topics in radiation heat transfer including detailed specification of radiative surface properties, development of energy equations for diffuse gray enclosures and nondiffuse nongray enclosures, development of energy equations for combined modes of heat transfer, introduction to Monte Carlo method.

EMEC 530 ADVANCED FLUID MECHANICS I
On Demand 3 cr. LEC 3
PREREQUISITE: EGEN 335 or CHBE 322.
COREQUISITE: EM 525 or consent of instructor.
- Review of conservation equations, laminar and turbulent internal flows, potential flows, and Stokes flow.

EMEC 531 ADVANCED FLUID MECHANICS II
On Demand 3 cr. LEC 3
PREREQUISITE: EGEN 335 or CHBE 322.
COREQUISITE: EM 525.
- Laminar boundary layer and free shear flows, internal and external compressible flows.

EMEC 532 TURBULENCE
On Demand 3 cr. LEC 3
PREREQUISITE: ME 531.
- Modern turbulence theory, turbulence modeling.

EMEC 533 TRANSPORT PHENOMENA
On Demand LEC 3
PREREQUISITE: EMEC 531.
- Comprehensive treatment of mass, momentum, and energy transport. This course is cross-listed with CHBE 530.

EMEC 534 APPLIED FLUIDS & THERMODYNAMICS
On Demand 3 cr. LEC 3
PREREQUISITE: EGEN 335.

EMEC 535 VISCOUS FLUID DYNAMICS
On Demand 3 cr. LEC 3
PREREQUISITE: EGEN 335.
EMEC 536 COMPUTATIONAL FLUID MECHANICS
On Demand 3 cr. LEC 3
PREREQUISITE: EMEC 531.
- Numerical solutions of fluid flows, discretization methods, solution algorithms, aspects of turbulent flows.

EMEC 539 PHYSICAL ACOUSTICS
On Demand 3 cr. LEC 3
PREREQUISITE: EMEC 510 or equivalent, EMEC 530 or EM 525.

EMEC 545 ADVANCED MECHANICAL VIBRATIONS
On Demand 3 cr. LEC 3
PREREQUISITE: EMEC 445.
- Advanced topics in mechanical vibrations. Multidegree of freedom systems, continuous systems, generalized coordinates. Introduction to non-linear vibrations.

EMEC 550 SMART STRUCTURES
On Demand 3 cr. LEC 3
PREREQUISITE: EMEC 503 and EMEC 542 and EMEC 445, or equivalent.
- Analysis and design of intelligent structures for aerospace, mechanical, and civil applications. Topics include piezoelectricity, shape memory effects, magnetorheology, and biomimicking.

EMEC 567 MECHANICS OF ELECTRONICS & MEMS PACKAGING
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: ELE 250, EMEC 341, and EMEC 445 or instructor approval.
- Stress and strain analysis of microelectronic and MEMS (micro-electromechanical systems) packages and assemblies using analytical, experimental, and numerical methods.

EMEC 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1-10 cr. IND
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee. This course can be used toward fulfilling the requirements for the Master of Science in Mechanical Engineering for non-thesis option students.

EMEC 589 GRADUATE CONSULTATION
F, S, Su 1 - 3 cr. IND
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

EMEC 590 MASTER’S THESIS
F, S, Su 1 - 10 cr. IND May be repeated.
PREREQUISITE: Master’s standing.

EMEC 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

EMEC 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

EMEC 594 SEMINAR
On Demand 1 cr. SEM 1
- Directed research and study on an individual basis.

EMEC 597 INDEPENDENT STUDY
On Demand 1-12 cr. IND Maximum 12 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting the discussion material.

EMEC 598 INTERNSHIP
On Demand 1 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: Graduate standing, consent of instructor and approval of graduate program coordinator.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

EMEC 690 DOCTORAL THESIS
F, S, Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

ENGL

English

modestly graduate level; see also LIT and WRIT

ENGL 236 THEORETICAL METHODS IN LINGUISTICS
F, S 3 cr. LEC 3
- Examines the nature and function of linguistic systems, the psychology of language, the relationship between language and culture, usage patterns, linguistic variety and change, and levels of linguistic analysis.

ENGL 258 THE STRUCTURE AND FUNCTION OF LANGUAGE
F 3 cr. LEC 3
- Focused study of how meaning is made in the English language, primarily through grammar. From parts of speech to sentence construction, this course will assist students in evaluating literary writing styles as well as in improving their own.

ENGL 290 UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated.
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

ENGL 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by the department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ENGL 338 LANGUAGE AND ENGLISH EDUCATION
F 3 cr. RCT 3
PREREQUISITE: WRIT 101.
-Explores the various roles language has in second-language education.
- Explores practical issues related to teaching textual consumption within secondary English classrooms, including, but not limited to the following: creating assignments, assessing and evaluating student textual production, standardized writing assessments, and multilingual and digital composing processes.

ENGL 385 HISTORY OF THE ENGLISH LANGUAGE
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: ENGL 256, or ENGL 238, or ENGL 336.
- Development of the English language from Old English to contemporary English, with focus on structure, phonology, dialects, and external influences. Readings in Old and Middle English.

ENGL 445 TEACHING READING AND LITERATURE IN SECONDARY SCHOOLS
S 3 cr. RCT 3
PREREQUISITE: WRIT 101 and LIT 201.
COREQUISITE: ENGL 445.
- Explores theoretical and practical issues related to teaching textual consumption within secondary English classrooms, including, but not limited to the following: reading strategy instruction, applying literary theories to the teaching of literature, and linking literary and literature pedagogy.

ENGL 450 HISTORY AND THEORY OF RHETORIC/COMPOSITION
F alternate years, to be offered even years 3 cr.
PREREQUISITE: WRIT 201 or WRIT 221.
- Intensive study in composition/rhetorical theory, with attention to writing pedagogy.

ENGL 461R ISSUES IN ENGLISH EDUCATION
F 3 cr. RCT 3
PREREQUISITE: EDU 497 and senior standing.
- Senior capstone course for senior English teaching majors and minors. Explores current trends and issues within the field of English Education. At least one-third of this course will focus on students’ original research related to English Education.

ENGL 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department chair.
- Directed research and study on an individual basis. May not be used in lieu of another required course in the English curriculum.

ENGL 592 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by the department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.
ENGL 498 INTERNSHIP
On Demand 1 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor and approval of department chair.
- An individual assignment arranged with an agency, business or other organization to provide guided experience in the field.

ENGL 480 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ENGL 490R UNDERGRADUATE RESEARCH
F, S. Su 1-6 cr. IND May be repeated, Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

ENGL 510 STUDIES IN CRITICAL THEORY AND PRACTICE
S 3 cr. SEM 3 Max 6 cr.
PREREQUISITE: Graduate standing and upper division literary theory courses.
- Topics in critical theory and practice. Explores how historical and contemporary theories of literature have shaped the ways readers, teachers, and critics have thought about such fundamental questions as canon formation, pedagogical practice, and the goals and purposes of literary studies as a field.

ENGL 520 PEDAGOGY THEORY & PRACTICE
Su 3 cr. IND 1 RCT 1 SEM 1
PREREQUISITE: Graduate standing and ENGL 501 or equivalent.
- Topics in pedagogical theory and practice. Examines the ways English has been defined and taught over the years, including the philosophies and pedagogical theories that have driven that development.

ENGL 530 STUDIES IN WRITING THEORY AND PRACTICE
F 3 cr. SEM 3 Max 6 cr.
PREREQUISITE: Graduate standing and upper division writing courses.
- Topics in rhetoric and composition. Examines a variety of models that have historically governed composition theory and writing practice.

ENGL 540 LITERARY HISTORY
F alternate years, to be offered every even years 3 cr. SEM 3 Maximum 6 cr.
PREREQUISITE: Graduate standing and upper division literary history courses.
- Topics in the theory and practice of literary history. Examines debates in the discipline on topics such as the production and reception of literary texts, the practice of periodization, and the relationship between literary studies and historiography.

ENGL 550 FOCUSED RESEARCH SEMINAR
S,F alternate years F odd years 3 cr. SEM Maximum 6 cr.
PREREQUISITE: Graduate standing. Course prerequisites as determined for each offering.
- Topics offered at the graduate level not covered in the required courses. Involves directed research resulting in paper, as well as participation in preparing and presenting discussion material. Topics will vary.

ENGL 575 PROFESSIONAL PAPER
F, S. Su 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

ENGL 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; maximum 5 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies.
- Courses offered on a one-time basis to fulfill professional development needs of in service educators. A specific focus is given to each course, which is appropriately subtitled.

ENGL 590 MASTER'S THESIS
F, S. Su 1 - 10 cr. IND
PREREQUISITE: Graduate standing.
- A thesis dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

ENGL 591 SPECIAL TOPICS
On Demand 1 - 4 cr. SEM Maximum 12 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Advanced study of topics in the discipline, in courses not required in any curriculum, including experimental offerings of visiting professors, trial offerings of new courses, or one-time offerings of current topics.

ENGL 592 INDEPENDENT STUDY
On Demand 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department chair and Dean of Graduate Studies.
- Directed research and study on an individual basis.

ENGL 594 GRADUATE SEMINAR
F, S, Su 1-10 cr. IND May be repeated; maximum 12 cr.
PREREQUISITE: Doctoral standing or consent of instructor.
- Seminar experience. For students enrolled before 8/07, initial enrollment immediately follows completion of ENGR 610. First time students will present and defend their thesis topics (1 credit). The second enrollment will be taken the semester prior to the student’s comprehensive exam where they will prepare and defend a formal research proposal (1 credit). For students enrolling after 8/07, ENGR 600 will be taken once as a two credit class the semester prior to scheduling the comprehensive exam; the course is designed to help the student prepare their proposal.

ENGR Engineering - General

ENGR 610 RESEARCH AND METHODS IN ENGINEERING
F 3 cr. LEC 3
PREREQUISITE: Doctoral standing.
- Exploration of experimental design, statistical methods, models, and teaching issues. Methods of modern information access will also be covered.

ENGR 685 MENTORED TEACHING FOR PHD CANDIDATES
F 1 cr. IND 1
PREREQUISITE: PhD student standing in the College of Engineering and EGEN 610.
- Students desiring a mentored teaching experience at the college level will have primary responsibility for a portion of a course and will be mentored and assisted by the instructor of the course. Students will develop assignments, deliver lectures, meet students in the practicum course, and receive intensive mentoring from the faculty.

ENGR 694 SEMINAR
S 3-12 cr. SEM Required, 2 cr. total
PREREQUISITE: Doctoral standing or consent of instructor.
- Seminar experience. For students enrolled before 8/07, initial enrollment immediately follows completion of ENGR 610. First time students will present and defend their thesis topics (1 credit). The second enrollment will be taken the semester prior to the student’s comprehensive exam where they will prepare and defend a formal research proposal (1 credit). For students enrolling after 8/07, ENGR 600 will be taken once as a two credit class the semester prior to scheduling the comprehensive exam; the course is designed to help the student prepare their proposal.

ENSC Environmental Sciences

ENSC 110 LAND RESOURCES & ENVIRONMENTAL SCIENCES
F LEC 3 cr.
- Introduction to environmental science associated with managed and natural ecosystems. Students will learn how to identify scientific questions from issues, and how to develop scientifically-based objective information for answering environmental and land management questions. The class is a survey of the department’s majors in agroecology, environmental biology, geospatial sciences, land rehabilitation, and soil and water science. Students must be proficient in basic algebra and have an understanding of biological principles.

ENSC 253N SOILS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: M 097 or equivalent.
- Soils and their properties as components of landscapes and ecosystems. Application of soils knowledge to problems in environmental sciences and management of agricultural, wildland, and urban landscapes.
COURSE DESCRIPTIONS: ENSC

ENSC 272CS WATER RESOURCES
F 3 cr. LEC 3
-An introduction to the science, uses, policy and management of fresh water resources, including hydrologic and ecological processes, and related historic, policy, law and socioeconomic aspects. The course is intended for majors in the sciences, social sciences, and other disciplines.

ENSC 290R UNDERGRADUATE RESEARCH
F, S, Su 1 - 4 cr. IND May be repeated. Maximum 12 cr.
PREREQUISITE: Freshman or sophomore standing and approval of instructor. Course will address responsible conduct of research.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or other creative project.

ENSC 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required, but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ENSC 292 INDEPENDENT STUDY
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

ENSC 298 INTERNSHIP
On Demand 2 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience within the field.

ENSC 355 ENVIRONMENTAL BIOGEOCHEMISTRY
F 3 cr. LEC 3
PREREQUISITE: CHMB 143, ENSC 245.
- Foundational course will cover mechanisms controlling the behavior of inorganic and organic constituents in soil and water systems. Applications will focus on integrating biological and chemical processes to understand biogeochemical cycling, nutrient bioavailability, and the fate and transport of chemicals.

ENSC 407 ENVIRONMENTAL RISK ASSESSMENT
F alternate years to be offered odd years 3 cr. LEC 3
PREREQUISITE: BIOB 170 and BIOE 370.
- Principles of risk analysis, including risk assessment, perception, communication, and management. Emphasis on human toxicology, exotoxinsology, dose-response relationships, exposure analysis, environmental fate, and deterministic and probabilistic risk assessment.

ENSC 410R BIODIVERSITY SURVEY AND MONITORING METHODS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: NRSM 240 or BIOE 370; BIOE 318 or STAT 216; GPHY 284 and BIMO 230 preferred.
- Biodiversity survey and monitoring designs, sampling methods, and data evaluation techniques are introduced. Emphasis is on plants but other taxa are addressed for agricultural, rehabilitation and wildland systems. One week of fieldwork required prior to semester; course completion early October.

ENSC 443 WEED ECOLOGY & MANAGEMENT
F 3 cr. LEC 2 LAB 1
PREREQUISITE: M 121, STAT 216 or BIOB 318
- The principles of weed ecology including plant population demographics, biotic and abiotic regulating mechanisms, and plant community temporal and spatial dynamics in managed ecosystems. Weed population model construction, spreadsheet calculations and thorough assessment of pest threshold theory. The study of ecologically-based weed management approaches including cultural, mechanical, biological, and chemical control practices.

ENSC 444 WATERSHED HYDROLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: GPHY 111, ENSC 110, ENSC 245 (or equivalent understanding)- Introduction to watershed hydrology. The course will examine how rainfall and snowmelt become streamflow, evapotranspiration, and groundwater with an emphasis on hydrological processes. Discussion will revolve around state of the science, linkages to other disciplines, and management implications. Topical areas include: water balances, snow hydrology, hydrogeology, hyporheic zones, riparian zones, runoff process, and biogeochemical budgets.

ENSC 445 WATERSHED ANALYSIS
S 3 cr. LEC 3
PREREQUISITE: ENSC 444 and STAT 216 or BIOB 318 or permission of instructor.
- Conceptual and quantitative analysis of watershed processes with an emphasis on modeling surface water hydrology and water resources management. Watershed modeling concepts including analysis of time series, spatially variable data, model calibration, and uncertainty analysis will be studied and demonstrated.

ENSC 448 STREAM RESTORATION Ecology
F 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOB 170, and either NRSM 240 or BIOE 370.
COREQUISITE: ENSC 461 or BIOE 428 or consent of instructor.
- Students will critically assess the definitions, assumptions, goals, appropriateness, and outcomes implicit in stream restoration projects in relation to ecosystem processes and dynamics in rivers and streams. Students will synthesize course concepts in the creation of a restoration proposal to be submitted to a local stream manager for consideration.

ENSC 454 LANDSCAPE PEDOLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: ENSC 245.
- Processes leading to the formation and spatial distribution of soils on the landscape. Describing, classifying, and mapping soils. We explore classical approaches to evaluating soil development using concepts of soil age and residence time; and variation of soil properties with climate, geomorphic and hydrologic context, plant communities, and parent material. The course includes a substantial hands-on field component. Land use and soil management for agriculture/forestry are considered in the context of larger scale controls on soil development and distribution.

ENSC 458 TEACHING APPLICATIONS IN LRES
F S 1-3 cr. RCT 1 LAB 1-2
- Application of teaching philosophies and methods through classroom, laboratory, and field teaching experiences.

ENSC 460 SOIL REMEDIATION
S 3 cr. LEC 3
PREREQUISITE: ENSC 245.
- Principles of soil remediation in impacted landscapes. Soil reconstruction practices are presented for drastically disturbed lands. Treatment science is presented to repair soil systems contaminated by metals and salt as a result of resource extraction and landscape disturbance by humans. Protection of water resources are examined as related to sediment loss control, acid rock drainage science and treatment, and selective handling of geologic stratum. A field trip to a contaminated landscape will demonstrate ongoing soil remediation practices.

ENSC 461 RESTORATION ECOLOGY
F 3 cr. LEC 3
PREREQUISITE: BIOB 170, and either NRSM 240 or BIOE 370.
- Review of ecosystem structure and function, and community and population processes in intact systems, along with the effects of major disturbances on natural systems. Restoration amendments will be discussed in terms of their effects on ecosystem structure and function. The course includes case studies, and focuses on plant and soil systems.

ENSC 465 ENVIRONMENTAL BIOPHYSICS
S 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOB 170 or equivalent and PHYS 205 (can be taken concurrently).
- The study of physical relationships between organisms, ecosystems, and the physical environment. Focuses on principles of Micrometeorology, Biometeorology, Ecological Climatology, and Biophysical Ecology as applied to contemporary ecological challenges. Laboratory sessions will focus on computer exercises using ecosystem models and field observations.

ENSC 468 ECOSYSTEM BIOGEOCHEMISTRY AND GLOBAL CHANGE
S 3 cr. LEC 3
PREREQUISITE: GPHY 111, ENSC 353.
- Introduction to the study of biogeochemistry and ecosystem dynamics from an Earth-systems perspective. Discussion will emphasize factors governing the "grand elemental cycles" of carbon, nitrogen, and phosphorus of Earth's major ecosystems and how modern human activities are affecting these cycles.

ENSC 490R UNDERGRADUATE RESEARCH
F S 1 - 4 cr. IND May be repeated. Maximum 12 cr.
PREREQUISITE: Junior or Senior standing and approval of instructor.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. USP scholarships or project support grants are available in many cases. Course will address responsible conduct of research.

ENSC 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ENSC 492 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.
ENTO 510 INSECT ECOLOGY
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: BIO 100 and one of the following: STAT 140, STAT 142.

ENTO 514 INSECT PHYSIOLOGY
F alternate years, to be offered even years 5 cr.
LEC 3
PREREQUISITE: BIO 263 and one of the following: BSEO 390, BSEO 412, BSEO 415, BSEO 435, BSEO 463, ENTO 510, or ENTO 525.
– The course focuses on a systems physiology approach, emphasizing the principles of insect physiology and insect physiological ecology. Material covered will include the digestive, respiratory, excretory, and circulatory processes, neurophysiology and communication, endocrinology, reproductive systems, muscular systems and locomotion, defensive mechanisms, and water balance. The basic course goal is to provide a strong fundamental understanding of insect physiological function as it relates to the environment. Emphasis will be placed on process comprehension.

ENTO 520 INSECT PHYSIOLOGY
F alternate years, to be offered even years 5 cr.
LEC 3
PREREQUISITE: BIO 263 and one of the following: BIOH 340, BIOO 412, BIOO 413, BIOO 435, AGSC 454, BIOO 435.

ENTO 525 INSECT MORPHOLOGY
S alternate years, to be offered even years 2 cr.
LEC 1 LAB 1
PREREQUISITE: ENTO 204 and one of the following: BIO 310, BIO 420, ENTO 401, ENTO 432, ENTO 510, ENTO 514, ENTO 516, or ENTO 520.
– The principles of insect morphology and the evolutionary principles behind the diversity of form and function of the major insect and arthropod groups.

ENTO 590 MASTER’S THESIS
F, S, Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.

ENTO 592 INDIVIDUAL PROBLEMS
On Demand 1 - 3 cr. IND Maximum 4 cr.
PREREQUISITE: Graduate standing, consent of instructor.
– Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ENTO 594 SEMINAR
F, S 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
– Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ENTO 597 INTERNSHIP
F, S 4 cr. LEC 3 RCT 1
– Directed research and study on an individual basis.

EQUH 100 - WESTERN EQUATION
Department of Animal & Range Sciences
F, S 2 LAB
– Western equestrian techniques including introductory training techniques.

EQUH 114 - BEGINNING ENGLISH EQUATION
Department of Animal & Range Sciences
F, S 2 LAB
– Beginning English equitation technique, including horse behavior, horse handling, equipment and basic horse anatomy.

EQUH 201 - INTERMEDIATE WESTERN EQUATION
Department of Animal & Range Sciences
F, S 2 LAB
PREREQUISITE: EQUH 110 or permission of instructor.
– Students will learn advanced movements and maneuvers such as collection, roll-backs, turn-arounds, and lead changes. Students must have secure seat and hands. Training methods for the green horse and tuning techniques for the older broke horse will be covered.

EQUH 253 - STARTING COLTS
Department of Animal & Range Sciences
F, S 2 LAB
PREREQUISITE: EQUH 110.
– Principles and techniques of breaking and training young horses.

EQUH 256 DEVELOPING THE YOUNG HORSE
Department of Animal & Range Sciences
S, 2 LAB
– Advanced techniques and training for reining, cutting, or working cow horses. For experienced riders.

EQUH 314 - EQUESTRIAN INSTRUCTION METHODS
Department of Animal & Range Sciences
F, S 2 LAB
– The object of this course is to develop competent riding instructors who can communicate effectively and motivate students to higher riding skills.

ERTH 201 IN HONORS
ERTH 201 IN HONORS
ERTH SYSTEM SCIENCE
F 4 cr. LEC 5 LAB 1
PREREQUISITES: Enrollment in the MSU Honors Program.
– This Honors course explores the complex interactions occurring at all scales between the Earth’s geosphere, biosphere, hydrosphere, atmosphere, and anthroposphere. The goal of the course is to understand the Earth as a “system” of interconnected sources of energy through deep geologic time and space.

ERTH 212RN YELLOWSTONE SCIENTIFIC LAB
F 4 cr. LEC 5 RCT 1
– The Yellowstone region is an unparalleled laboratory for earth scientists. The volcanic, glacial, climatic, and ecological processes that shaped the region will be introduced through lecture, discussions, and projects. Recitation sections and field trips provide additional hands-on experiences.

ERTH 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
– Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.
F, 3 cr.

ERTH 303 WEATHER AND CLIMATE
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITES: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ERTH 307 PRINCIPLES OF GEMORPHOLOGY
F 4 cr. LEC 3 LAB 1
PREREQUISITE: GEO 101 and GPHY 111; familiarity with spreadsheets and word-processing is assumed. Junior standing
- Framework, process, system, and time as factors which control the generation of land forms.
- Laboratories involve field trips and map interpretation, and computer modeling.

ERTH 450R SNOW
On Demand 3 cr. LEC 2 LAB 1
PREREQUISITE: Senior Standing; GEO 101 or BIOC 101 or consent of instructor.
- Senior capstone for the Snow Science Option. The accumulation, redistribution, and metamorphosis of snow as related to humans. Avalanche, recreation, agriculture, silviculture, runoff, and the alpine environment.
- Field studies are conducted on a regular basis under rigorous field conditions.

ERTH 455 PHYSIOGRAPHY OF THE UNITED STATES
On Demand 3 cr. LEC 2 LAB 1
PREREQUISITE: junior standing, ERTH 307.
- The physiographic provinces of the United States, their physical characteristics, evolution, and identification.

ERTH 498 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

ERTH 502 FLUVIAL GEOMORPHOLOGY
On Demand 3 cr. LEC 3
PREREQUISITE: ERTH 307 or other introduction to fluvial systems or instructor permission.
- This course provides a foundation for understanding fluvial processes, interpreting fluvial forms, and teaches basic tools for use in watershed and river assessment.
- Course will cover drainage networks, channel form, and apply these concepts to a river assessment problem.

ERTH 505 GEOMICROBIOLOGY
S alternate years, to be offered every even years 3 cr.
- The course will examine geochemical and microbial interactions that control earth surface processes and ultimately major biochemical cycles.
- The course will study integrated approaches to research problems using geochemistry, stable isotope geochemistry, culture-based and molecular microbial techniques.

ERTH 512 MOUNTAINS AND PLAINS RIPARIAN PROCESSES
Su On Demand 2 cr. SEM
PREREQUISITE: Introductory geology (GEO 101), secondary teaching certification plus two years teaching experience; recommended ERTH 516 and access to the world wide web.
- Riparian hydrologic and geomorphic processes with examples drawn from the mountains and plains.
- Ground-water recharge and discharge; Horton overland flow; partial variable runoff areas; riparian management practices; sapping, types of springs; sediment from slopes. K-12 riparian science education.

ERTH 516 NORTHERN ROCKY MOUNTAIN GEOLOGY
Su 2 cr. SEM 1 LAB 1
PREREQUISITE: Introduction to physical geology (GEO 101), intro to physical geography (GPHY 111), early history and evolution (GEO 211); graduate standing; secondary teaching certification plus two years teaching experience; a computer with modern.
- Geologic history of Northern Rocky Mountains, and landscapes from Archean to present. Structural, tectonic, and surficial elements. Field examination of geologic evidence for history of the Gallatin Range, Bridger Range, and Yellowstone National Park. Exploration and development of teaching methods and resources for the K-12 classroom.

ERTH 517 ELECTRONIC HYDROLOGY
Su On Demand 2 cr. SEM 2
PREREQUISITE: GEO 101, GPHY 111; secondary teaching certification plus two years teaching experience; access to the world wide web linked with the net. Recommended ERTH 511 or ERTH 519.
- Electronic acquisition, analysis, and interpretation of hydrologic data for K-12 teachers. Data acquired through the world wide web and telnet. Students will learn to download, analyze and interpret data including rainfall, snowfall, precipitation probability, temperature, stream flow, flood frequency, evapotranspiration, and reservoir capacity.

ERTH 519 HYDROLOGY OF STREAMS AND LAKES
Su On Demand 3 cr. SEM 3
PREREQUISITE: Introductory geology/physical geography; two years K-12 teaching experience; recommended ERTH 516, and a basic course in physics.
- Streams lakes in the mountains and plains; drainage basin analysis, stream hydraulics, slope, channel plan, channel cross section, channel types, geologic origin, evaporation, ground water recharge/discharge. Applications in the K-12 science classroom (habits of a scientific mind).

ERTH 551 SNOW SCIENCE SEMINAR
On Demand 1 cr. SEM 1
PREREQUISITE: Graduate Standing; PHSX 220, STAT 332 or STAT 401; Interest in snow science.
- Seminar-style discussion of recent developments in snow science based upon current literature, important journal articles, and newly published about to be published literature regarding snow science.
- Topics will depend upon the interests of the instructor and students in the course.

ERTH 582 QUATERNARY PALEOECOLOGY & VEGETATION HISTORY
F alternate years, to be offered every even years 3 cr.
PREREQUISITE: ERTH 101 or BIOB 101 or equivalent.
- Course examines the history and development of modern biomes and the causes and consequences of long-term ecological change.

ERTH 583 TOPICS IN PALEOECOLOGY
F alternate years, to be offered odd years 3 cr.
PREREQUISITE: ERTH 101 or BIOB 101 or equivalent.
- Course examines important themes in paleoecology. Topics change on a yearly basis addressing needs and interests of current students. It is intended for students with an interest in ecology, paleontology and environmental history.

ERTH 585 QUATERNARY ENVIRONMENTS OF THE WESTERN UNITED STATES
F, alternate years, to be offered every even years 3 cr.
PREREQUISITE: ERTH 101 or BIOB 101 or equivalent.
- This graduate course examines current research and recent developments in Quaternary paleoclimatology in the western U.S. The seminar will be centered around weekly discussions of the primary literature, hands-on experience with international data bases, and class paper and presentation.

ERTH 585 ADVANCES IN GEOBIOLOGY
F, to be offered every even years 1 cr. SEM 1
- Discussion of recent developments in paleontolgy, paleoecology, biogeography, and biogeography based on current literature and presentation of faculty and student works in progress.

ERTH 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; maximum 5 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies.
- Courses offered on a one-time basis to fulfill professional development needs of in service educators. A specific focus is given to each course which is appropriately subtitled.
ERTH 589 GRADUATE CONSULTATION
F, S, Su 3 cr. TUT
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
– This course may be used only by students who have completed all of their course work (and thesis if on a thesis plan) but who need additional faculty or staff time or help.

ERTH 590 MASTER’S THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.

ERTH 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ERTH 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of Department Head and Dean of Graduate Studies.
– Directed research and study on an individual basis.

ERTH 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
– Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ERTH 598 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
– An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

ERTH 605 HISTORY OF GEOLOGICAL CONCEPTS
On Demand 3 cr. LEC 3 cr.
PREREQUISITE: Course limited to graduate students or senior undergraduates with permission.
– Weekly seminars examine the evolution of geological thinking through an exploration of its history and contributions to science. The course enables students to research the origin and importance of concepts in their area of scientific specialization.

ERTH 689 GRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F, S 1 - 5 cr. RCT Maximum 3 cr.
PREREQUISITE: Doctoral candidate standing.
– Directed doctoral research/creative activity projects; may include reading research publications in the field in preparation for beginning dissertation research.

ERTH 690 DISSERTATION RESEARCH
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral candidate standing.

ERTH 694 DOCTORAL SEMINAR
F, S, Su 1 - 3 cr. SEM Maximum 6 cr.
PREREQUISITE: Doctoral candidate standing.

ESL
English as a Second Language
A.C.E. Language Institute
(406) 585-9832

The A.C.E. Language Institute, affiliated with Montana State University, offers a full range of English as a Second Language classes. The Institute is located at 1106 South 6th (across the street from Harmon Hall). Please contact the A.C.E. Language Institute director for a complete list of classes and registration information.

ETCC
Engineering Technology - Civil & Construction
formerly CET

ETCC 173 ARCH CONSTRUCT AND MATERIAL F
– This course is an introduction to construction materials and methods, building systems and construction details. Emphasis is placed on selection of materials and methods. Laboratory section includes site investigations observing materials and their properties.

ETCC 204 APPLIED ANALYSIS AND COMMUNICATION FOR CONSTRUCTION TECHNOLOGISTS F, S 2 cr. LAB 2
PREREQUISITE: M 165 or M 171 or M 181.
– Computer applications in construction technology using contemporary software and solution techniques appropriate to the construction industry. Introduction to written and verbal communication methods with applications appropriate to the construction industry.

ETCC 290R UNDERGRADUATE RESEARCH F, S 1 cr.
– Directed research and study on an individual basis.

ETCC 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ETCC 310 CONCRETE TECHNOLOGY & STRUCTURES
S 3 cr. LEC 2 LAB 1
PREREQUISITE: EGEN 205 or EGEN 208.
– Properties of concrete constituents, mechanical and service properties of concrete, mix design, field practices. Concrete reinforcing requirements and analysis of concrete members.

ETCC 412 STRUCTURAL ELEMENTS
S 3 cr. LEC 5
PREREQUISITE: EGEN 205 or EGEN 208.
COREQUISITE: ETCC 310.

ETCC 490R UNDERGRADUATE RESEARCH
F, S 1 cr.
– Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Will address responsible conduct of research.

ETCC 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ETCC 492 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 4 cr.
– Directed research and study on an individual basis.

ETCC 498 INTERNSHIP
On Demand 1-2 cr. IND Maximum 12 cr.
PREREQUISITE: Sophomore standing, consent of instructor, and approval of Department Head.
– An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field. Students may not take this course the semester they graduate.

ETCC 499R CAPSTONE: CONSTRUCTION ENGINEERING TECHNOLOGY
F, S 5 cr. LEC 2 LAB 1
PREREQUISITE: EGEN 361, EGEN 325, and EGEN 310.
COREQUISITE: ECV 404 and ECV 405; student must be graduating the semester of enrollment in ETCC 499.
– A senior capstone course encompassing total project control through introduction of a professional construction management organization to ensure cost effectiveness and early completion of a project. Construction safety. A requirement of the course is to take the Constructor Qualification Examination Level 1 (CQE) administered by the American Institute of Constructors (AIC).
ETME
Engineering Technology - Mechanical
formerly MET

ETME 100 INTRODUCTION TO MECHANICAL ENGINEERING TECHNOLOGY
F 1 cr. LEC 1
– A seminar course surveying the mechanical engineering technology profession. Topics include an overview of career opportunities, problem solving processes, an introduction to the basic engineering design process, professionalism, professional registration, and ethics.

ETME 202 MET COMPUTER APPLICATIONS
On Demand 1 cr. LAB 1
COREQUISITE: M 176 – Computer methodology, and use of various computer software packages in mechanical engineering technology applications.

ETME 203 MECHANICAL DESIGN GRAPHICS
S 3 cr. REC 2 LAB 1
PREREQUISITE: EMEC 105 – Course emphasizes the design process as it pertains to manufacturability, and the role of graphics to communicate design intent to production. Using 3D software, design method, GD&T, and data management techniques, students will create drawings that communicate their designs.

ETME 215 MANUFACTURING PROCESSES
F, S 3 cr. LEC 3
PREREQUISITE: EMA 251. – Basic methods of processing materials to change shapes, dimensions, and finishes; special attention to attendant forces, temperature, and property changes.

ETME 216 MANUFACTURING PROCESS LABORATORY/MET
S 1 cr. LEC 1
PREREQUISITE: MET majors only; non-majors require instructor approval.
COREQUISITE: ETME 215. – Hands-on applications of the fundamentals of basic manufacturing processes.

ETME 217 MANUFACTURING PROCESS LABORATORY/MET
F, S 1 cr. LAB 1
COREQUISITE: ETME 215. – Course will supplement lecture materials covered in ME 255. Provides students with hands-on experience for performing and analyzing a broad spectrum of manufacturing processes including metal casting, injection molding, powder metallurgy, metal forming, metal removal, inspection and measurement and welding.

ETME 252 MATERIALS STRUCTURES AND PROPERTIES LAB
F, S 1 cr. LAB 1
PREREQUISITE: WRIT 101W and US Core for Majors.
COREQUISITE: EMA 251; ETME 202 or equivalent for MET majors; EMA 203 for ME majors. – Specific hands-on experience with material properties experiments that parallel the lecture portion of EMA 251. Students will analyze mechanical and physical properties of various materials. Students will use various testing apparatus and will conduct both destructive and non-destructive evaluations (NDE).

ETME 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. END may be repeated – Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

ETME 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ETME 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
– Directed research and study on an individual basis.

ETME 303 CAE TOOLS IN MECHANICAL DESIGN
S 3 cr. RCT 2 LAB 1
COREQUISITE: ETME 203 or equivalent, EGEN 208, EGEN 324.
PREREQUISITE: EGEN 331, and ETME 321 or equivalent. – Emphasizes the use of computer aided engineer-ing tools in the design process: understanding proper use and interpretation, gaining experience in how to use them through exercises and projects, modeling for analysis, rapid prototyping, and computer aided manufacturing techniques.

ETME 310 MACHINING AND INDUSTRIAL SAFETY
F 3 cr. LEC 1 LAB 2
PREREQUISITE: ETME 203 or equivalent, or TE 250 for non-majors, or instructor approval.
COREQUISITE: ETME 216. – Introduction to modern machining technology and the key principles of industrial safety, material properties related to machining practices, design, and specifications. Semi-precision and precision layout are covered. An introduction to computer numerically controlled (CNC) technology and operations is included. Specific hands-on experiences included in laboratory.

ETME 311 WELDING PROCESSES
S 3 cr. LEC 1 LAB 2
PREREQUISITE: EMEC 105 or equivalent, or TE 250 for non-majors, or instructor approval.
COREQUISITE: ETME 217. – Introduction to modern science of welding technology, as well as a detailed examination of metalurgy and materials properties as related to welding processes. Welding specification and symbolology are introduced as well as modern welding code usage. Weld design, set-up, preparation, application, and test are emphasized. Specific hands-on experiences in OAW, SMAW, GMAW, GTAW, common separating processes, as well as destructive and non-destructive testing are included in laboratory.

ETME 321 APPLIED HEAT TRANSFER
S 3 cr. LEC 3
PREREQUISITE: EGEN 224 or equivalent.
COREQUISITE: EGEN 351 or equivalent. – Study of the basic mechanisms of heat transfer and its applications. Introduction to equipment that utilize these mechanisms.

ETME 340 MECHANISMS
F 4 cr. LEC 3 LAB 1
COREQUISITE: EGEN 208, ETME 202. – Introduction to mechanisms and machine elements used in the design and synthesis of mechanical devices.

ETME 351 MACHINE DESIGN
S 4 cr. LEC 3 LAB 1
PREREQUISITE: ETME 340 or equivalent. – Application of mechanisms fundamentals, strength of materials, material selection, and tolerances and fits to the design of machines and machine systems. Specific hands-on experiences included in laboratory.

ETME 360 MEASUREMENTS AND INSTRUMENTATION APPLICATIONS
S 3 cr. LEC 2 LAB 1
PREREQUISITE: ELE 250, or equivalent.
COREQUISITE: EGEN 350, EGEN 324 – Theory and application of engineering technology measurement concepts including function and operation of transducers; temperature, pressure, displacement and flow sensing; sensor system calibration; statistical and uncertainty analysis; sampling theory fundamentals; signal conditioning; 1st order response; emphasis on applications involving computerized acquisition of data.

ETME 400 MET SENIOR SEMINAR
F 1 cr. SEM 1
COREQUISITE: ETME 489. – A seminar course focusing on career path development. Students will meet with current industry professionals to discuss specific careers, as well as meet with freshmen students to share undergraduate experiences.

ETME 401 FUNDAMENTALS OF ENGINEERING REVIEW
S 1 cr. LEC 1
– A review of engineering fundamentals presented throughout the mechanical engineering technology curriculum. It serves primarily to prepare students to take the Fundamentals of Engineering Exam, and subsequently prepare them to progress towards becoming registered professional engineers.

ETME 410 CNC & CAM TECHNOLOGY
F, S 3 cr. LEC 1 LAB 2
PREREQUISITE: ETME 310 or instructor approval. – Application and optimization of computer numerical control (CNC) and computer-aided manufacturing (CAM) technology fundamentals as related to turning, milling, and plasma cutting operations. Development of toolpaths and machine code (G&K) from associated CAD models is emphasized. Specific hands-on experiences included in laboratory.

ETME 415 DESIGN FOR MANUFACTURING AND TOOLING
S 3 cr. LEC 2 LAB 1
PREREQUISITE: ETME 215; ETME 216 or ETME 217; ETME 310 for MET majors; or instructor approval.
COREQUISITE: EGEN 350. – Overview of production systems and lean manufacturing fundamentals and principles. Introduction to design for assembly and design for manufacturing principles. Fundamentals of tool design, including tooling materials, workholding principles, jig design, fixture design, assembly tool design, design of tools for inspection and gauge, and tool fabrication techniques. Practical lab experiences will enhance the course material.
ETME 422 PRINCIPLES OF HVAC I
F 3 cr. LEC 3
PREREQUISITE: EMEC 320 or EGEN 324.
- Refrigeration and heating, ventilating and air-conditioning (HVAC) for comfort and industrial applications. Psychrometrics, physiological factors in cooling, HVAC load calculations; modern vapor compression, absorption, low temperature refrigeration cycles; air distribution and fan-duct analysis, design/selection of HVAC equipment and control systems.

ETME 423 PRINCIPLES OF HVAC II
S 3 cr. LEC 2 LAB 1
PREREQUISITE: ETME 422, or consent of instructor.
- Heating, ventilating, and air-conditioning (HVAC) system design/selection as they relate to building performance, energy conservation, and sustainability. Integrated building design, building information modeling and building performance/energy modeling as it applies to various building structures is covered.

ETM 424 THERMAL PROCESSES LAB
S 1 cr. LAB 1
COREQUISITE: ETME 422, ETME 321.
- Laboratory experiences covering topics in heat transfer, thermodynamics, and HVAC areas in support of ETME 321, EGEN 324, and ETME 422.

ETME 425 BUILDING SYSTEMS
F 3 cr. LEC 3
PREREQUISITE: PHSH 207 and junior standing.
- A survey of the systems and equipment for water supply, sanitation, fire protection, electrical service, heating and air conditioning of buildings.

ETME 430 FLUID POWER SYSTEMS DESIGN
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EELE 250, EGEN 331, EMEC 360; or ETME 360; or consent of instructor.
- An introduction to the fundamentals and application of fluid power in industry today. Coverage includes: flow and pressure relationships, fluid properties, heat, filtration, selection of components, electrohydraulic and electro-pneumatic systems, controls, design of hydraulic and pneumatic circuits, and troubleshooting.

ETME 460 ADVANCED INSTRUMENTATION
S 3 cr. LEC 2 LAB 1.
PREREQUISITE: EMEC 360, or ETME 360 or equivalent, or instructor approval.
- An applications-based course in advanced instrumentation and control, focusing on parameter identification, test planning, proper transducer selection, installation, and operation; computerized data acquisition programming and operation; handling and presentation of acquired data. Theory and practice is merged in a project setting.

ETME 470 ALTERNATIVE ENERGY APPLICATIONS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EMEC 360, or ETME 360, ETME 540 or EMEC 341, ETME 321 or EMEC 526; or consent of instructor.
- Experience with energy technologies including wind, solar thermal, solar photovoltaic, fuel cell, biomass, and hydro-electric systems. Lecture covers practical applications, component design, and theory for devices and systems. Social, economic, geopolitical, and environmental considerations are discussed. Hands-on lab activities supplemented with site visits.

ETME 489 CAPSTONE: MECHANICAL ENGINEERING TECHNOLOGY DESIGN I
F 2 cr. LEC 1 RCT 1.
PREREQUISITE: EGEN 310, ETME 380, ETME 310, ETME 311, ETME 341, for MET majors only.
COREQUISITE: EMEC 360 or ETME 560, ETME 490, EGEN 325.
- Senior capstone design experience in Mechanical Engineering Technology. Students, under the guidance of a faculty supervisor, solve real-world design problems.

ETME 498 UNDERGRADUATE RESEARCH
F, S, Su 1-4 cr END May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

ETME 491 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
- Course prerequisites as determined for each.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ETME 492 INDEPENDENT STUDY
On Demand 1-3 cr. IND Maximum 6 cr.
- Directed research and study on an individual basis.

ETME 498 INTERNSHIP
On Demand 1-12 cr. IND
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

F&WL 501 APPLIED POPULATION ECOLOGY
S 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOE 370 or WILD 301.
- An in-depth review of the (1) key theories of population ecology. (2) the application of theory in contemporary population management, and (3) managing populations in the face of uncertainty.

F&WL 504 WILDLIFE-HABITAT RELATIONSHIPS
S 3 cr. LEC 2 LAB 1
PREREQUISITE: Completion of or concurrent enrollment in a 500-level statistics course.
- This course will help students develop a conceptual and practical understanding of wildlife-habitat relationships and the use, application, and limitations of the analytical tools used to analyze these data. Course will be a blend of discussion and lecture; students will be responsible for written assignments based on readings and data sets.

F&WL 510 FISHERIES SCIENCE
S alternate years, to be offered even years 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOE 415, WILD 301.
- An in-depth review of fisheries data types and the analysis and interpretation of those data as it relates to freshwater fisheries research and management.

F&WL 513 FISHERIES HABITAT MANAGEMENT
F alternate years, to be offered even years 5 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
- Techniques of protection, and restoration of stream, lake and reservoir, habitats for management of fishes and other aquatic organisms.

F&WL 525 HUMAN DIMENSIONS OF FISHERIES AND WILDLIFE MANAGEMENT
S, alternate years, to be offered even years 3 cr. LEC 3
- This course provides fisheries and wildlife management graduate students with an understanding of how social, cultural, behavioral, and demographic characteristics of humans affect fisheries and wildlife management.

F&WL 548 RESEARCH PERSPECTIVES
S 2 cr. LEC 2
PREREQUISITE: Graduate standing or consent of instructor.
- This course will provide an introduction to philosophical perspectives of resource science and management with the goal of helping students develop their own philosophical views after surveying philosophical world views and how they influence science from interdisciplinary readings.

F&WL 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1-4 cr. IND Maximum 4 cr.
- A research or professional paper or project dealing with a topic in the field. The topic must be mutually agreed upon by the student and his or her major advisor and graduation committee.

F&WL 591 SPECIAL TOPICS
On Demand 1-3 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.
COURSE DESCRIPTIONS: FILM

FILM 112 AESTHETICS
-- Experience in techniques and concepts of writing
PREREQUISITE: Film or Photo Gate.

FILM 141H M O D E S O F S C R E E N D R A M A
On Demand 3 cr. LEC 2 RCT 1
-- An exploration of traditional and emerging modes of screen narrative including film, television and new media.

FILM 106IA FILM IN AMERICA
F, S on demand 3 cr. LEC 1 RCT 1 LAB 1
-- Survey of the development of the motion pictures as art, a craft and a business in the United States through acting exercises and individual projects, including a unit for acting for the camera.

FILM 259 MULTIMEDIA AUDIO PRODUCTION
S 3 cr. LAB 1 RCT 2
PREREQUISITE: MTEC majors: MTEC major status and MUST 220; SFT majors: FILM 212 or permission of instructor.

FILM 254 ACTING FOR FILM
On Demand 3 cr. LEC 1 LAB 2
PREREQUISITE: Film or Photo Gate.
-- An introduction to the basic skills of acting through acting exercises and individual projects, including a unit for acting for the camera.

FILM 295 PRACTICUM
F, S 1-6 cr IND may be repeated
-- Experience of the historical, artistic and socio-

FILM 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr IND may be repeated
-- An introduction to the aesthetics and practice of filmmaking tools and apply these skills to short productions. The course emphasizes the language of visual/aural storytelling and the development of directorial vision.

FILM 401H INTRODUCTION TO FILM & PHOTOGRAPHY
F, S, Su 3 cr. LEC 2 RCT 1
-- Exploration of the historical, artistic and socio- critical connections between photography and film as profoundly influential media shaping the 20th century and as the foundation of “new media” in the 21st century.

FILM 212 AESTHETICS
-- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

FILM 251 SCRIPTWRITING
F, S 3 cr. LEC 1 LAB 2
PREREQUISITE: Film or Photo Gate.
-- Experience of the historical, artistic and socio-

FILM 351 ADVANCED SCRIPTWRITING
On Demand, 3 cr. LEC 3
PREREQUISITE: Consent of instructor.
-- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

FILM 253 TELEVISION PRODUCTION
PREREQUISITE: Film or Photo Gate.
F 3 cr. SEM 1 LAB 2
-- Students learn to use professional filmmaking tools and apply these skills to short productions. The course emphasizes the language of visual/aural storytelling and the development of directorial vision.

FILM 352 Editing
On Demand, 3 cr. LEC 1 LAB 2
PREREQUISITE: FILM 212.
-- An exploration of the aesthetics and practice of creating documentary films. The course will utilize production exercises, screenings, and presentations to develop understanding of documentary film and video production. Students will work in teams to produce short documentary film projects.

FILM 354 LIGHTING
On Demand, 3 cr. LEC 1 LAB 2
PREREQUISITE: FILM 212.
-- An introduction to the aesthetics and technical principles of lighting for film and theatre with attention to familiarity with basic instruments and a lighting board. The opportunity for an exercise in lighting design will be provided.

FILM 355 CINEMATOGRAPHY
On Demand, 3 cr. LAB 3
PREREQUISITE: FILM 212.
-- An exploration of the aesthetics and practice of cinematography using 16mm film and professional digital video cameras.

FILM 356 PRODUCTION DESIGN
On Demand, 3 cr. LEC 1 LAB 2
PREREQUISITE: FILM 212.
-- An introduction to the aesthetics and technical principles of lighting for film and theatre with attention to familiarity with basic instruments and a lighting board. The opportunity for an exercise in lighting design will be provided.

FILM 357 DIRECTING
On Demand, 3 cr. LAB 3
PREREQUISITE: FILM 212 and 254.

FILM 359 SOUND DESIGN
On Demand, 3 cr. LEC 1 LAB 2
PREREQUISITE: FILM 212.
-- Exploration of the aesthetics and practice of creating documentary films. The course will utilize production exercises, screenings, and presentations to develop understanding of documentary film and video production. Students will work in teams to produce short documentary film projects.

FILM 371 NONFICTION PRODUCTION
S 4 cr. SEM 4
PREREQUISITE: FILM 212, 251, and 254.
-- Exploration of the aesthetics and practice of creating documentary films. The course will utilize production exercises, screenings, and presentations to develop understanding of fictional narrative film and video production. Students will work in teams to produce short fiction film projects.

FILM 381 STUDIES IN FILM
On Demand 3 cr. LEC 2 RCT 1
PREREQUISITE: Any 200-level film studies course or permission of instructor.
-- Studies in film and television genres, directors, national cinemas, movements, problems, etc.

FILM 391 SPECIAL TOPICS
On Demand, 1 - 4 cr. IND
PREREQUISITE: Consent of instructor.
-- Courses not required in a curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

FILM 260D INTERNATIONAL FILM & TELEVISION
-- An intensive intermediate course in the fundamental aspects of film production. Students learn to use professional filmmaking tools and apply these skills to short productions. The course emphasizes the language of visual/aural storytelling and the development of directorial vision.

FILM 372 FICTION PRODUCTION
On Demand, 3 cr. LEC 1 LAB 2
PREREQUISITE: FILM 212.
-- An intensive intermediate course in the fundamental aspects of film production. Students learn to use professional filmmaking tools and apply these skills to short productions. The course emphasizes the language of visual/aural storytelling and the development of directorial vision.

FILM 359 SOUND DESIGN
On Demand, 3 cr. LEC 1 LAB 2
PREREQUISITE: FILM 212.
-- Exploration of the aesthetics and practice of creating documentary films. The course will utilize production exercises, screenings, and presentations to develop understanding of documentary film and video production. Students will work in teams to produce short documentary film projects.

FILM 321 STUDIES IN FILM
On Demand 3 cr. LEC 2 RCT 1
PREREQUISITE: Any 200-level film studies course or permission of instructor.
-- Studies in film and television genres, directors, national cinemas, movements, problems, etc.

FILM 391 SPECIAL TOPICS
On Demand, 1 - 4 cr. IND
PREREQUISITE: Consent of instructor.
-- Courses not required in a curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.
COURSE DESCRIPTIONS: FILM

FILM 394 SEMINAR/WORKSHOP
F, S, Su on demand, 2-4 cr., SEM 2-4. May be repeated, Maximum 12 cr.
PREREQUISITE: Consent of instructor.
- Seminar/Workshop devoted to a specific topic in Film Production or Film Studies. Topics vary.

FILM 395 PRACTICUM
F, S, Su 1-3 cr.; IND, May be repeated, Maximum 6 cr.
PREREQUISITE: Junior standing in Film and consent of Instructor.
- Practical experience associated with production and research projects in motion pictures, television/video, photography, and theatre.

FILM 449 FILM AND DOCUMENTARY THEORY
F, S on demand 3 cr.; LEC 1 RCT 1 LAB 1.
PREREQUISITE: Consent of instructor.
- An intensive survey of major trends in film and media theory, as applied to feature-length fiction, documentary, and experimental cinema. Topics include: feminism, post-colonialism, cultural studies, psychoanalysis, star intertextuality, and cognitive methods.

FILM 481 ADVANCED STUDIES IN FILM
On Demand 3 cr.; LEC 1 RCT 2.
PREREQUISITE: Any 300-level film courses or permission of instructor.
- Studies in film aesthetics, policies of film, international cinema and comparative film analyses.

FILM 490R UNDERGRADUATE RESEARCH
F, S 1-3 cr., IND, May be repeated, Maximum 12 cr.
PREREQUISITE: Consent of instructor.
- Directed undergraduate research that may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

FILM 491 SPECIAL TOPICS
On Demand, 1-4 cr. IND Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in a curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

FILM 492 INDEPENDENT STUDY
On Demand 1-3 cr. IND. May be repeated, Maximum 6 cr. total for FILM, PHOT & THTR 492 combined.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis for advanced students.

FILM 493 STUDY TOUR
On Demand, 3-12 cr., SEM 3.
PREREQUISITE: Consent of instructor.
- This course prepares the students for an intensive encounter with accomplished professionals in the motion picture, video, and television industries.

FILM 494 SEMINAR/WORKSHOP
On Demand, 1-4 cr., SEM, may be repeated, Maximum 12 cr.
PREREQUISITE: Consent of instructor.
- Advanced topics in Film Production or Film Studies. Topics vary.

FILM 496 CAREER INTERNSHIP
F, S, Su 2-12 cr., IND, may be repeated, maximum 12 credits total for FILM, PHOT & THTR 496 combined.
PREREQUISITE: Consent of School Director.
- An individualized assignment arranged with an outside agency, business, or other organization to provide guided experience in the field.

FILM 499 SENIOR PRODUCTION
F, S 5 cr., SEM 5 may be repeated Maximum 10 credits.
PREREQUISITE: Complete 2 of FILM 371, 372 and THTR 304 and Consent of Instructor.
- Senior capstone course. Direction or major production role on a short film, television or stage production.

FILM 504 FILM AND DOCUMENTARY THEORY
F 3 cr.; LEC 3.
- An introduction to the methods developed for studying the fiction, documentary and experimental film over the past 100 years.

FILM 505 CRITICAL APPROACHES TO SCIENCE FILMMAKING
F 3 cr.; LEC 3.
- A close analysis and interpretation of the social function and cultural value of science and natural history films, with a particular emphasis for broadcast nationally and internationally.

FILM 506 CRITICAL APPROACHES TO NATURAL HISTORY FILMMAKING
S 3 cr.; LEC 3
- An advanced introduction to the critical methodologies necessary for intelligently analyzing the representations of science and technology in print and media.

FILM 510 FUNDAMENTALS OF FILMMAKING
F 3 cr.; LAB 3
- Basic field production techniques in film, video, sound, and editing. Training in digital video, 16mm cinematography, analogue and hard disk sound recording, and digital nonlinear editing.

FILM 513 ADVANCED CINEMATOGRAPHY
F 3 cr.; LAB 3
PREREQUISITE: FILM 510, FILM 515.
- This course will teach the aesthetics and craft in effective picture and sound editing. Final Cut Pro editing platform will be used, and architecture and archiving techniques will be stressed. The styles and techniques of well thought-out editing will be examined and practiced.

FILM 517 PRODUCTION MANAGEMENT
S 3 cr.; LEC 3
PREREQUISITE: FILM 510.
COREQUISITE: FILM 515.
- A master class where working professionals and faculty present and examine successful advanced filmmaking logistical, financial, and managerial methodologies. This course is about the business of filmmaking. May include presentations, forums, workshops or seminars designed to explore specific professional film business applications on a variety of documentary genres and scenarios.

FILM 518 WRITING FOR DOCUMENTARY & NON-FICTION FILM
S 3 cr.; LAB 3
PREREQUISITE: FILM 504, FILM 505, and FILM 510.
COREQUISITE: FILM 515.
- Creative non-fiction introduces central concept of narrative common to the science and history film text. The course examines the models of nonfiction writing and explores structural areas such as axis, character, emotional arcs, turning points, emotional emphasis, and information imperatives.

FILM 519 POST PRODUCTION WORKFLOW
S 3 cr.; LAB 3
PREREQUISITE: FILM 504, FILM 505, and FILM 510.
COREQUISITE: FILM 515.
- This class will teach the aesthetics and craft in effective picture and sound editing. Final Cut Pro editing platform will be used, and architecture and archiving techniques will be stressed. The styles and techniques of well thought-out editing will be examined and practiced.

FILM 521 CONTEMPORARY TRENDS IN NONFICTION
F 3 cr.; LEC 3
PREREQUISITE: FILM 504, FILM 505, FILM 510, FILM 515, FILM 517, FILM 518, and FILM 519.
- This course will explore both the history and technological developments in nonfiction film since 1990. The class will deal with digital media, the Internet, apps, mobile media, the Cloud, and contemporary and innovative media delivery systems.

FILM 522 SECOND YEAR FILM PREP
F 2 cr.; SEM 2
PREREQUISITE: FILM 504, FILM 505, FILM 510, FILM 515, FILM 517, FILM 518, and FILM 519.
- This course will prepare second year SNHF MFA students to create their required second year film.

FILM 525 SECOND YEAR FILM PRODUCTION
S 3 cr.; LAB 3
PREREQUISITE: FILM 515.
- The objective of this course is to provide faculty support and supervision of self authored second year MFA candidates’ film projects. Each student will develop and produce their own original short documentary to further develop storytelling acumen and expand their production skill sets and techniques.
COURSE DESCRIPTIONS: FILM, FRCH

FILM 526 ALTERNATIVE NONFICTION
S 3 cr. SEM 3
PREREQUISITE: FILM 504,FILM 510, FILM 515, FILM 517, FILM 518,FILM 519.
COURSE: FILM 506 and FILM 525.
- The purpose of this course is to further the study and production of contemporary documentary films and videos. Graduate students will study a range of contemporary documentary and experimental documentary filmmakers, viewing and analyzing these films. Each student will then develop and produce their own original short documentary works utilizing some aspect(s) of the contemporary works studied.

FILM 533 ADVANCED PROBLEMS IN TELEVISION AND INTERNET SERIES PRODUCTION
F, S, Su 1-9 cr. LAB 1-9.
- The special goals of this course are the teaching of advanced techniques in broadcast and Internet production based on the website, podcast, and Montana PBS broadcast series Terra: The Nature of Our World.

FILM 560 POST PRODUCTION MEETS INFORMATION DESIGN
F 3 cr. LAB 3
PREREQUISITE: Completion of MFA First Year curriculum.
- This course will teach advanced post-production and information design skills to Graduate MFA students. The course is tailored specifically to the needs of students training to be science and natural history filmmakers.

FILM 581 SPECIAL PROFESSIONAL PROJECTS
F, S 1-6 cr. LAB Maximun 6 cr.
PREREQUISITE: FILM 504,FILM 505 and FILM 510 and consent of instructor.
- Special Professional Projects provides students with special funded projects the opportunity for professional level supervision and assistance from the faculty and other students. Funding must be in place before the class begins.

FILM 590 MASTER'S THESIS
F, S, Su 1-9 cr. IND Maximum 6 cr.
PREREQUISITE: Masters Standing.
- Directed research and study on an individual basis.

FILM 592 INDEPENDENT STUDY
On Demand 1-3 cr. IND Maximum 3 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

FILM 598 PROFESSIONAL INTERNSHIP
F, S, Su 1-9 cr. IND 1-9.
PREREQUISITE: FILM 510 and FILM 515.
- This course allows the student to spend a semester working in a professional environment under the guidance of a mentor.

FRCH French

FRCH 101 ELEMENTARY FRENCH I
F, S, Su alternate years 4 cr. RCT 4
NOTE: Offered on a rotating basis with German and Spanish in Summer.
- An elementary level course designed to help students acquire basic proficiency in communicating within culturally significant contexts. An integrated approach to teaching language skills with emphasis on vocabulary acquisition and basic grammatical structures.

FRCH 102D ELEMENTARY FRENCH II
F, S, Su alternate years 4 cr. RCT 4
PREREQUISITE: FRCH 101 or equivalent, or two years of high school French. Offered on a rotating basis with German and Spanish in Summer.
- This course builds upon the foundation established in 101. Greater emphasis is placed upon oral and written expression. Reading and discussions are designed to increase comprehension of more linguistically complex texts and more conceptually complex cultural issues.

FRCH 201D INTERMEDIATE FRENCH I
F, S 3 cr. RCT 3
PREREQUISITE: FRCH 102 or equivalent, or a minimum three years of high school French or placement interview.
- Intensive, methodical review of grammar and syntax combined with the integrated development of proficiency in the four language skills. Expansion of cultural knowledge and functional vocabulary through intermediate readings and discussions. Increased emphasis on written communication.

FRCH 220D FRENCH LANGUAGE & CULTURE
S,F 3 cr. RCT 3
PREREQUISITE: FRCH 201 or equivalent, or placement interview.
- Fourth semester French language course designed to provide basis for advanced level study of French language, literature, and culture. Application of language skills in discussions and explications of selected readings in literature and culture.

FRCH 305 HISTOIRE CIVILISATION
S alternate years, to be offered even years 3 cr. RCT 3
PREREQUISITE: FRCH 200
- Survey of French culture from the middle ages to modern era; focus on historical, artistic, literary, and social developments. Taught in French.

FRCH 3601H FRENCH: FROM REFLECTION TO REVOLUTION
On Demand 3 cr. RCT 3
- Reading and discussion of selected major works from the eighteenth century. All reading and discussions are in English. Majors may be required to do some work in French.

FRCH 320 LA FRANCE AUJOURD'HUI
S alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: FRCH 200
- The French personality today in social, cultural, and political settings. Taught in French.

FRCH 323 FRENCH ADV GRAMMAR & COMP
F alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: FRCH 220
- Intensive review of French grammar to increase proficiency in various forms of written expression including business correspondence, problems of translation, and short essays.

FRCH 324 FRENCH ADV CONVERSATIONS & PHONETICS
F alternate years, to be offered even years 3 cr. RCT 3
PREREQUISITE: FRCH 220
- Intensive conversation coupled with a practical study of French phonetics and contrastive comparison with English for teaching application. Various levels of the spoken language from slang to formal speech.

FRCH 401 FRENCH LITERATURE I
S 3 cr. RCT 3
PREREQUISITE: FRCH 220
- Survey of French literature from the Middle Ages through the 18th century. Taught in French.

FRCH 402 FRENCH LITERATURE II
F alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: FRCH 220
- Survey of French literature of the 19th and 20th centuries. Taught in French.

FRCH 450 SEM: FRENCH LIT AND CULTURE
F 3 cr. SEM 3
COREQUISITE: FRCH 401 or FRCH 402
- Junior/Senior seminar. The study of Francophone literature and culture. Topic varies with instructor. Taught in French.

FRCH 499R UNDERGRADUATE RESEARCH
F 3 cr. SEM 3
PREREQUISITE: FRCH 401 or FRCH 402
- Directed undergraduate research/creative activity. Offered in the study of Francophone literature and culture. Research paper required. Taught in French. Course will address responsible conduct of research.

FRCH 497E EDUCATION METHODS
F, S, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: FRCH 499.
- Classroom instruction associated with directed undergraduate research/creative activity projects.

FRCH 499R SENIOR THESIS/CAPSTONE
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis.
GDSN Graphic Design

GDSN 145RA WEB DESIGN
F, S 3 cr. LEC 2 LAB 1
- Basic design principles and how these principles apply to web site construction. HTML, HTML editors, and Cascading Style Sheets. Laboratory projects reflect practical usage of course concepts. Cross-listed with CS 145.

GDSN 223 DESIGN PRINCIPLES
F 4 cr. RCT 2 STU 2
PREREQUISITE: Art 110 and Art 111 and Art 112.
- Introduction to fundamental design principles, basic layout, tools and techniques, and creative thinking.

GDSN 224 FORM & CONTENT
F 4 cr. RCT 2 STU 2
PREREQUISITE: GDSN 223.
- Further exploration of design principles with increased emphasis on typographic skills and visual communications.

GDSN 360 YELLOWSTONE DIGITAL
Su 3 cr. LAB 3
PREREQUISITE: GDSN 224 or ARTZ 211 or MTA 260 or ARCH 261.
- A field workshop located along the Yellowstone river using either 35mm or a Digital camera to create fine art digital prints. This course is designed for individuals with a working knowledge of photographic basics and a fundamental familiarity with their own equipment that desire to explore the new media of the fine art digital print.

GDSN 361 TETON DIGITAL
Su 3 cr. STU 3
PREREQUISITE: GDSN 224, ARTZ 211, or MTA 260, or ARCH 261.
- An intensive field workshop located in the Jackson, Wyoming area and Grand Teton National Park using a Digital camera to create fine art digital prints. This course is designed for individuals with a working knowledge of photographic basics and a fundamental familiarity with their own equipment that desire to explore the new media of the digital print.

GDSN 366 HISTORY OF GRAPHIC DESIGN
F 3 cr. LEC 3
PREREQUISITE: Junior standing in graphic design option or permission of instructor.
- A historical perspective of work created by graphic designers, over the past 125 years, and more particularly following the creative trends/technological breakthroughs/social achievements in Western art and design that have informed modern American design and designers.

GDSN 367 IDENTITY SYSTEMS
F, Su 5 cr. STU 5
PREREQUISITE: GDSN 224 and passing portfolio review.
- Research and production of large and small-scale identity programs, focusing on how identity functions in the context of graphic design practice.

GDSN 368 ART DIRECTION
F, Su 5 cr. STU 5
PREREQUISITE: GDSN 224 and passing portfolio review.
- The examination of art direction as it relates to the look and feel of contemporary advertising and marketing.

GDSN 369 PUBLICATION DESIGN
F, S, Su 5 cr. STU 5
PREREQUISITE: GDSN 224 and passing portfolio review.
- The research, development, organization, design and presentation of complex print communication documents.

GDSN 371 MOTION GRAPHICS
F, S, Su 5 cr. STU 5
PREREQUISITE: GDSN 224 and passing portfolio review.
- Explores design issues unique to contemporary digital media including organization, narrative, motion and sound.

GDSN 372 ADVANCED WEB DESIGN
F, S, Su 5 cr. STU 5
PREREQUISITE: GDSN 224 and passing portfolio review.
- Explores web design and planning, specifically: wayfinding, navigation, interactivity and content development.

GDSN 373 ILLUSTRATION
F, S, Su 5 cr. STU 5
PREREQUISITE: GDSN 224 and passing portfolio review.
- The investigation of specialized illustration techniques and concepts to create artwork in traditional formats that emphasize realistic modeling, as well as expressive and historical perspectives.

GDSN 374 DIGITAL VISUALIZATION
F, S, Su 5 cr. STU 5
PREREQUISITE: GDSN 224 and passing portfolio review.
- Examining computer based image generation techniques including photography, illustration, 3-D rendering and other digital imaging methods.

GDSN 375 LETTERPRESS
F, S, Su 5 cr. STU 5
PREREQUISITE: GDSN 224 and passing portfolio review or consent of instructor.
- Utilizing vintage presses and a collection of wood and cast type, to explore uncommon aspects of type and print, including the activities of hand-setting type, preparing proof sheets and specimen sheets, and printing small editions.

GDSN 376 SCREENPRINTING
F, S, Su 5 cr. STU 5
PREREQUISITE: GDSN 224 and passing portfolio review.
- Using modern screenprinting technology as a communication medium. Including the preparation of screens, mixing pigments, and printing.

GDSN 377 DESIGN AND SOCIETY
F, S, Su 5 cr. STU 5
PREREQUISITE: GDSN 224 and passing portfolio review.
- The examination of the role of designers with local/national/global communities through a series of practical projects.

GDSN 378 GUERRILLA ADVERTISING
Su 5 cr. STU 5
PREREQUISITE: GDSN 224 or consent of instructor. Photo and marketing majors are highly encouraged.
- Students stretch the boundaries of traditional advertising solutions by placing their work in unusual contexts for maximum impact. The workshop-like atmosphere involves quick-fire problem solving sessions, working outdoors, guest critiques and socially-driven solutions. Graphic Design, Film & Photography, and Marketing majors are particularly encouraged to apply.

GDSN 465 PROFESSIONAL STUDIO
F 5 cr. RCT 2 STU 3 and completion of junior level.
PREREQUISITE: GDSN 223 and GDSN 224.
- Comprehensive projects dealing with a variety of visual communication applications. Emphasis on high standards of typography and graphic design, computer techniques, and presentation. Laptop computers are required for all upper level graphic design courses.

GDSN 491 SPECIAL TOPICS
On Demand 1-5 cr. Maximum 15 cr.
PREREQUISITE: Course prerequisites are determined for each offering.
- Courses not required in any curriculum for which there is a one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

GDSN 492 INDEPENDENT STUDY
On Demand 1-5 cr. IND Maximum 15 cr.
PREREQUISITE: ART 366.
- Course in which student will work on an individual basis with a faculty member in developing imagery and appropriate techniques in a particular area of graphic design. Written, signed contract required prior to registering for this class.

GDSN 498 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of the director.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the graphic design field.

GDSN 499 THESIS AND PORTFOLIO
S 5 cr. RCT 2 STU 3
PREREQUISITE: GDSN 465.
- Senior capstone course. Directed undergraduate research/creative activity which may culminate in a research paper, undergraduate research paper or undergraduate thesis exhibition. Graphic design students must take this course in the spring.
GEOLOGY

GEO 101N INTRODUCTION TO PHYSICAL GEOLOGY
F, S, Su 4 cr. LEC 3 LAB 1
- Examination of basic geologic processes, Earth and planets through geologic time, internal geosystems, and surficial geosystems.

GEO 105 IN OCEANOGRAPHY
F alternate years, to be offered every even years 5 cr. LEC 3
- Introduction to the formation, distribution, history, and resources of the oceans of the world.

GEO 111N DINOSAURS
F alternate years, to be offered odd years 3 cr. LEC 2 RCT 1
- This course provides an introduction to dinosaur paleontology. Students will learn how hypotheses about extinct animals are formulated and tested, with comparisons to modern sedimentary environments and living animals. Recitation sections allow discussion of current research and hands-on experience with sedimentary rocks and fossils. Field trips provide additional education opportunities.

GEO 140N PLANETARY GEOSCIENCE
F alternate years, to be offered odd years 3 cr. LEC 3
- Introduction to the formation, geochemical development, interior and surficial processes, and exobiology of the planets, moons, and other objects of our solar system, as well as known exoplanets. Observations and data relative to planetary interiors, surfaces, and atmospheres, using principles derived from integration of chemical, physical, geologic, biologic, and engineering sciences are addressed.

GEO 205 MINERALOGY
S 4 cr. LEC 2 LAB 2
PREREQUISITE: GEO 101, CHMY 143.
- Identification, properties, occurrence, and associations of the rock-forming minerals; introduction to crystallography (crystal classes, lattice types, and external morphology) and crystal chemistry (bonding and crystal structure types); analytical techniques including mineral optics, x-ray, and SEM analysis. Laboratory fee included.

GEO 211 EARTH HISTORY AND EVOLUTION
S 3 cr. LEC 3
PREREQUISITE: GEO 101.
- Evolution of the earth and its life from origin to present configuration. Role of plate tectonic processes in the geologic development of the continents and ocean basins. Major evolutionary developments and crises in the history of life.

GEO 290R UNDERGRADUATE RESEARCH
S 1-6 cr. IND may be repeated
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

GEO 291 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

GEO 309 SEDIMENTATION AND STRATIGRAPHY
S 4 cr. LEC 3 LAB 1
PREREQUISITE: GEO 211, GEO 307, M 182.
- Physical, chemical, and biological processes and their effects on sediment dispersal, deposition, and diagenesis. Geometry and lateral and vertical relationships between sedimentary rock bodies. Labs emphasize the description and analysis of sedimentary rock bodies.

GEO 310 INVERTEBRATE PALEONTOLOGY
F alternate years, to be offered odd years 3 cr. LEC 2 LAB 1
PREREQUISITE: GEO 211.
- Investigation of invertebrate organisms and their evolution through time as preserved in the sedimentary rock record. Emphasis is on the morphology, paleoecology, evolution, and stratigraphic and environmental significance of important fossil groups. Labs stress fossil recognition.

GEO 312 DINOSAUR PALEONTOLOGY
F alternate years, to be offered odd years 3 cr. LEC 2 LAB 1
PREREQUISITE: GEO 211 and BIOB 170.
- Dinosaur Paleontology covers the origin, evolution, and extinction of dinosaurs. Topics of special emphasis include phylogeny, the origin of birds, and functional adaptations. Labs examine dinosaur skeletons, their novel adaptations and role in developing evolutionary trees.

GEO 313 STRUCTURAL GEOLOGY
S 3 cr. LEC 2 LAB 1
PREREQUISITE: GEO 211; GEO 448 or GEO 450.
- Geometry, kinematics, and dynamics of natural rock deformation. Laboratory will focus on analytical and graphical techniques of modern structural analysis. Field trip fee required.

GEO 316 PALEONTOLOGY LAB TECHNIQUES
F alternate years, to be offered odd years 2 cr. LEC 1 LAB 1
COREQUISITE: GEO 211.
- Provides laboratory and research experience in vertebrate paleontology, including: training in fossil preparation, identification of osteological specimens, documentation (photographic and scientific illustration), molding and casting, specimen curation, and other skills necessary for professional presentation of research.

GEO 411 VERTEBRATE PALEONTOLOGY
S alternate years, to be offered even years 3 cr.
LEC 2 LAB 1
PREREQUISITE: GEO 211, and BIOB 170.
- This course traces the history of vertebrates from the earliest chordates to synapsids, dinosaurs, and hominids. Lectures and labs emphasize phylogeny, anatomy, novel adaptations, and major evolutionary events such as the conquest of land, flight, and mass extinctions.

GEO 413 MACROEVOLUTION/Fossil Record
S alternate years, to be offered odd years 3 cr.
SEM 3
PREREQUISITE: GEO 310 or GEO 312 or BIOB 375.
- Macroevolution explores major trends in evolution through geologic time. The course examines such topics as whether communities evolve, cladogenesis, mass extinctions, rates of speciation and extinction, controls of biodiversity, and the role of sex and body size in evolution.

GEO 417 TAPHONOMY/Fossil Preservation
F alternate years, to be offered even years 3 cr.
LEC 2 SEM 1
PREREQUISITE: GEO 309 or GEO 448.
- Scattered dinosaur bones lie entombed in a rock: what do they mean? Taphonomy examines the processes that act on an organism from the time of its death until its discovery and how these processes bias or help in fossil interpretation.

GEO 419 FIELD PALEONTOLOGY
Su alternate years, to be offered even years 2 cr.
LEC 1 LAB 1
PREREQUISITE: GEO 294.
- This two-week class provides field experience in vertebrate paleontology, including sedimentology, facies analysis, measuring stratigraphic sections, microscope screening, field identification of vertebrate and invertebrate fossils, excavation of fossil specimens, and taphonomic data collecting.

GEO 429 FIELD GEOLOGY
Su 6 cr. LAB 6
PREREQUISITE: ERTH 307, GEO 211, GEO 307, GEO 309, GEO 315. Must receive a minimum grade of “C” in these areas.
- A senior capstone course for the geology, geohydrology and paleontology options. Early summer field course with application of field procedures and mapping techniques to a variety of field problems and exercises. Extensive hiking and outdoor physical challenges require that students be physically fit. A fee for supplies, transportation, and other logistical expenses is required.

GEO 435 GLOBAL TECTONICS
F 3 cr. LEC 5
PREREQUISITE: GEO 315.
- History of tectonic theory; modern view of plate tectonics; in-depth case studies of orogenic belts; neo-tectonics; geophysics.

GEO 439 GEOPHYSICS
On Demand 3 cr. LEC 3
PREREQUISITE: GEO 205, GEO 211, M 171.
PREREQUISITE: PHYS 207.
- Geophysical surveying, seismology, gravity, isostasy, magnetism and paleomagnetism, electrical methods, radioactivity, geothermics, applications of geophysics.
GEO 440 VOLCANOLOGY
F alternate years, to be offered even years 5 cr.
LEC 2 LAB 1
PREREQUISITE: GEO 204 and GEO 302.
- Overview of current ideas concerning volcanic eruptions and their resulting deposits, concentrating on examination of processes as elucidated from the study of modern volcanic environments. Required weekend field trip and field trip fee.

GEO 445 GLACIAL GEOLOGY
S alternate years, to be offered odd years 3 cr.
LEC 1 LAB 1 SEM 1
PREREQUISITE: EARTH 307
- In-depth study of the processes of glaciation and the resulting land forms. Includes class and library readings, quantitative laboratory exercises and modeling, and field examination of features of mountain and continental glaciation.

GEO 448 SEDIMENTARY PETROLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: GEO 302.
- Detailed analysis and interpretation of the mineralogy, fabric, and genesis of terrigenous clastic and carbonate sedimentary rocks. Use of thin-section microscopy, the scanning electron microscope, and x-ray diffraction techniques are emphasized in the laboratory.

GEO 449 METAMORPHIC PETROLOGY
S alternate years, to be offered even years 3 cr. LEC 2 LAB 1
PREREQUISITE: GEO 302.
- Introduction to the principles of metamorphic petrology; metamorphic facies, reactions, phase equilibria, processes, petrographic analysis, deformation, and interpretation of metamorphism in the context of global tectonics.

GEO 450 IGNEOUS PETROLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: GEO 204 and GEO 302.
- Introduction to the distribution, mineral associations, and chemical compositions of igneous rocks in the earth’s crust and upper mantle. Emphasis is on the use of petrographic features and chemistry to identify igneous rocks and interpret rock-forming processes.

GEO 490 UNDERGRADUATE RESEARCH
F, S, Su 1-3 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

GEO 491 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

GEO 492 INDEPENDENT STUDY
On Demand 1-3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

GEO 494 SENIOR GEOLOGY SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Topics at the upper division level not covered in regular courses. Students participate in preparing and presenting discussion material.

GEO 497 GEOLOGY INSTRUCTION
F, S, Su 1-2 cr. LAB
PREREQUISITE: Junior or senior standing in geology and consent of instructor and Department Head.
- Student works as a tutor and undergraduate teaching assistant in a teaching laboratory under close academic supervision. Weekly meeting focuses on geology, teaching, organization of class materials, and student supervision. Weekly lab emphasis on applying active learning concepts in a geologic laboratory context.

GEO 498 INTERNSHIP
On Demand 2-12 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

GEO 499 SENIOR THESIS/CAPSTONE
F, S 5 cr. RCT 3
PREREQUISITE: Senior standing; minimum 3.0 gpa; faculty recommendation.
- Senior thesis provides an opportunity to conduct research under the supervision of a faculty member leading to the production of a research paper ("minor thesis”) and an oral presentation to the department or at a professional meeting. Excellent preparation for graduate school and professional work.

GEO 508 DEPOSITIONAL SYSTEMS
S alternate years, to be offered odd years 3 cr. SEM 3 cr
PREREQUISITE: GEO 309, GEO 310.
- Facies models for terrestrial and marine depositional environments and their application to interpreting the stratigraphic record.

GEO 510 IGNEOUS GEOCHEMISTRY
On Demand 3 cr. LEC 3
PREREQUISITE: GEO 306, consent of instructor.
- Major element, trace element, and isotopic distribution in igneous rocks obtained from natural and experimental systems. Emphasis on models describing the origin of compositional diversity in rock suites.

GEO 511 TECTONICS OF SEDIMENTARY BASINS
On Demand 3 cr. LEC 2 LAB 1
PREREQUISITE: GEO 301 or equivalent.
- Techniques of modern structural analysis, including strain analysis, folds and fractures, and applications of continuum mechanics.

GEO 517 TAPHONOMY: DECIPHERING THE FOSSIL RECORD
F alternate years, to be offered even years 5 cr.
LEC 2 SEM 1
PREREQUISITE: Graduate standing and GEO 307 or GEO 309 and GEO 310 or GEO 312 or GEO 411 or their equivalents.
- Before one can ask questions about a fossil organism’s anatomy, paleoecology or evolution, one must clearly understand its geologic context. Taphonomy investigates the death to discovery history of fossils and the biases created by post-mortem processes to the fossil record.

GEO 520 ANCIENT OCEAN SYSTEMS
S alternate years, to be offered even years 3 cr. SEM 3
PREREQUISITE: Course limited to graduate students or senior undergraduates with permission.
- Seminar on marine geology with emphasis on ancient deep-marine outcrops.

GEO 521 HELL CREEK PALEONTOLOGY
Su 2 cr. LEC 2
PREREQUISITE: GEO 111 and consent of instructor.
- This course is an introduction to Dinosaur Paleontology and Hell Creek Formation of Eastern Montana. It will provide information and hands-on experience in field techniques used in vertebrate paleontology, including interpretation of sedimentary environments and taphonomy.

GEO 522 DINOSAUR PALEONTOLOGY
Su 2 cr. LEC 1 LAB 1
PREREQUISITE: GEO 521 and consent of instructor.
- This course builds on experience and field techniques acquired from GEO 521 through hands-on participation in on-going paleontology research. Students acquire greater understanding of field data collection and formulation and testing of hypotheses; and advanced knowledge of paleoenvironments and geological processes.

GEO 530 TECTONICS OF SEDIMENTARY BASINS
On Demand 3 cr. SEM 3
PREREQUISITE: GEO 307 and GEO 309 and GEO 315.
- History of tectonic theory; modern view of plate tectonics; in-depth case studies of orogenic belts; neotectonics; geophysics. Graduate students will be required to present a term paper and oral presentation on a topic chosen in consultation with the instructor.

GEO 535 ADVANCED STRATIGRAPHY
F alternate years, to be offered odd years 4 cr.
LEC 3 LAB 1
PREREQUISITE: Graduate standing.
- Weekly lecture and lab, including one-week field excursion, examines different approaches in stratigraphy used to reconstruct ancient terrains. Course emphasizes advanced correlation techniques and interpretation methods applied in sedimentary geology.

GEO 540 VOLCANOLOGY
PREREQUISITE: GEO 204 and GEO 302.
F alternate years, to be offered even years 3 cr.
LEC 2 LAB 1
PREREQUISITE: Graduate standing.
- Understand processes by which magma and associated gases rise into the crust and are extruded onto the Earth’s surface and atmosphere, interpret the forms of volcanoes and their magmatic products, and provide the necessary background to perform research in volcanology.

GEO 542 COMPARATIVE OSTEOLOGY
On Demand 3 cr. SEM 3
PREREQUISITE: BIOO 310, BIOL 504.
- Fossil bone histology and comparative osteology including ecomorphological osification, epiphyseal ontogeny, cortical osification, bone remodeling, special bone tissues, fossil bone content, bone architecture and biomechanics, bone chemistry and diagenesis, comparative bone morphology, and functional anatomy.
GEO 550 GRADUATE IGNEOUS PETROLOGY
F alternate years, to be offered even years 3 cr.
LEC 2 LAB 1
PREREQUISITE: GEO 204 and GEO 302.
- Emphasis on the distribution, mineral associations,
and chemical compositions of igneous rocks in the earth’s crust and upper mantle. Emphasis is on the use of petrographic features and chemistry to identify igneous rocks and interpret tectonic processes.

GEO 581 QUATERNARY ENVIRONMENTS
On Demand 3 cr. LEC 2 RGT 1
PREREQUISITE: ERTH 307.
- The last two million years of earth history as interpreted from geologic, biologic, and pedologic proxy data. Includes both global and regional analyses of changing climates and their effects on earth surface processes and land forms.

GEO 583 APPLIED GEOLOGICAL HYDROLOGY
On Demand 3 cr. LEC 2 LAB 1
PREREQUISITE: Graduate standing or GEO 420.
- Application of groundwater principles to groundwater resource, contamination and remediation problems.

GEO 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

GEO 592 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of Department Head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

GEO 594 SEMINAR
On Demand 1cr. SEM 1 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

GEO 598 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

GPHY 111D HUMAN GEOGRAPHY
F 3 cr. LEC 3
- Global geographies of population and economic development; patterns of language and religion; global distributions of agriculture, industry, and urban landscapes; use of human geography to analyze selected world problems.

GPHY 114D WORLD REGIONAL GEOGRAPHY
F, S, Su 3 cr. LEC 3
- Resume of major world regions; their cultures, populations, resources, utilization of land; emphasis on regions outside Anglo-America.

GPHY 282 SPATIAL SCIENCES
TECHNOLOGY AND APPLICATION
S 3 cr. LEC 2 LAB 1
- Fundamentals of GPS, GIS and remote sensing, and their application in a wide range of disciplines. Exploration of the increasing use of geospatial technologies in our world and their impact on our lives. Students will gain hands-on experience with GPS receivers, and GPS, GIS and remote sensing software.

GPHY 298R UNDERGRADUATE RESEARCH
F S 1-6 cr. IND may be repeated
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

GPHY 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

GPHY 312 URBAN GEOGRAPHY
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: GPHY 121 or GEOG 254
- Historical evolution and spatial patterns of urban phenomenon; human-environment interaction in urban area; distribution of economic and social activities in the city; spatial structure of urban system in national and regional background.

GPHY 322 ECONOMIC GEOGRAPHY
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: GPHY 121.
- Contemporary research questions and methodologies in economic geography; geographical distribution of economic activities; principles of spatial interaction; application of locational theory in urban and rural settings.

GPHY 325 CULTURAL GEOGRAPHY
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: GPHY 121.
- American cultural landscape evolution; origins and diffusions of American culture traits; evolution of American culture regions.

GPHY 355 GPS FUNDAMENTALS & APPLICATIONS IN MAPPING
F 3 cr. LEC 1, LAB 2
PREREQUISITE: GPHY 284.
- Theory and application of the global positioning system Global Positioning System (GPS) to mapping in natural resource and land management sciences. Mapping issues and accuracy assessment are emphasized. Labs and term mapping project include hands-on experience with GPS receivers and work with Pathfinder Office and Arc GIS ArcGIS software. Students must be proficient with the latest version of ArcGIS.

GPHY 356 GEOGRAPHICAL PLANNING
S 3 cr. LEC 5
PREREQUISITE: GPHY 141 and GPHY 121.
- Main factors, elements, principles, methods, tools, organization, and issues of urban and rural planning in a geographical context; integration of physical and human variables into the planning process.

GPHY 384 ADVANCED GIS AND SPATIAL ANALYSIS
F S 3 cr. LEC 2 LAB 1
PREREQUISITE: GPHY 284.
- Advanced data model concepts in the context of spatial analysis. Spatial overlay analysis and synthesis in vector and raster. Error and Uncertainty. Data modeling and database design principles to support analysis and modeling applications.

GPHY 411 BIOGEOGRAPHY
S to be offered odd years 3 cr. LEC 3
PREREQUISITE: GPHY 121 or BIOB 170.
- Factors affecting the geography of plants and animals in space and time.

GPHY 425 GEOGRAPHIC THOUGHT
S 3 cr. LEC 3
PREREQUISITE: Senior standing in Geography program.
- A senior capstone course for the geography option. The exploration of the history of geographic thought; the emergence and evolution of modern academic and applied geography. Contemporary trends and issues in geography.

GPHY 426 REMOTE SENSING AND DIGITAL IMAGE PROCESSING
F 3 cr. LEC 2 LAB 1
PREREQUISITE: Junior standing or consent of instructor.
- Theory and application of remote sensing, the electromagnetic spectrum, earth-energy interactions, and operation of multispectral sensors. Applications include satellite image analysis for agriculture, environmental assessment, forestry, geology, rangeland, urban, wildlife, and others.

GPHY 429R APPLIED REMOTE SENSING
S 3 cr. LEC 2 LAB 1
PREREQUISITE: GPHY 426 or consent of instructor.
- Applications of remote sensing, including advanced studies of multispectral and hyperspectral sensors and image processing algorithms. Emphasis is on using remote sensing technologies for solving applied land resource issues.

GPHY 431 HISTORICAL GEOGRAPHY
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: GPHY 121.
- Past geographies of North America. Political, cultural, economic, and urban evolution of North American regions from the colonial era to 1900.
GPHY 441R MOUNTAIN GEOGRAPHY
F alternate years, to be offered odd years 4 cr.
LEC 2 LAB 2
COREQUISITE: ERTH 303.
- Local, regional, and global importance of mountains.
  Geomorphology, climatology, and hydrology of mountain environments, and their relationship to human activities.

GPHY 445 REGIONAL GEOGRAPHY
On Demand 3 cr. LEC 3
PREREQUISITE: Two of the following: GPHY 111, GPHY 141, or GPHY 121.
- A topical and regional analysis of related political subdivisions or other geographical areas. Course may be taken twice if regional emphases differ.

GPHY 446 EAST ASIA IN THE GLOBAL SYSTEM
F alternate years, to be offered every even years 5 cr. LEC 5
PREREQUISITE: GPHY 111, GPHY 141, GPHY 121.
- The geographical perspective on the contemporary East Asia as a region of the world and the countries involved. Systematic themes include physical environment, history, population, culture, economy, politics, social life and international relationship.

GPHY 457 ADVANCED GPS MAPPING FOR GIS
F 3 cr. LAB 3
PREREQUISITE: GPHY 284 and GPHY 357.
- Advanced topics and techniques in GPS/GIS mapping, emphasizing high accuracy data collection, data quality and documentation. Advanced datalogging options, carrier phase and dual-frequency data collection, GPS photo link, and mobile GIS are some of the topics explored. Course includes topic research and presentation, and service-learning project work.

GPHY 461 TOURISM PLANNING
S alternate years, to be offered every even years 3 cr. LEC 3
PREREQUISITE: GPHY 284 and GPHY 365.
- A geographical, economic and planning perspective about the contemporary tourism and recreation of international, national and local scales. Topics include evolution, dynamics, types and patterns, analysis tools, planning issues and policies.

GPHY 484R APPLIED GIS AND SPATIAL ANALYSIS
S 3 cr. LEC 2 LAB 1
PREREQUISITE: GPHY 284 and GPHY 384; STAT 217Q.
- Advanced spatial analysis, synthesis and modeling concepts and methods. Semester projects apply theory and concepts to a project related to student’s discipline. Students learn to develop GIS applications to address a variety of issues.

GPHY 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

GPHY 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

GPHY 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

GPHY 494 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Topics at the upper division level not covered in regular courses. Students participate in preparing and presenting discussion material.

GPHY 497 GEOGRAPHY INSTRUCTION
F, S, Su 1 - 2 cr. LAB 1
PREREQUISITE: Junior or senior standing in geography and consent of instructor and Department Head.
- Student works as a tutor and undergraduate teaching assistant in a teaching laboratory under close academic supervision. Weekly meeting focuses on geography teaching, organization of class materials, and student supervision. Weekly Lab emphasizes applying active learning concepts in a geography laboratory context.

GPHY 498 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

GPHY 499 SENIOR THESIS/CAPSTONE
On Demand
PREREQUISITE: Senior standing; minimum 3.0 GPA; faculty recommendation.
- Senior thesis provides an opportunity to conduct research under the supervision of a faculty member leading to the production of a research paper (“mini-thesis”) and an oral presentation to the department or at a professional meeting. Excellent preparation for graduate school and professional work.

GPHY 501 GIS AND ENVIRONMENTAL MODELING
On Demand 3 cr. SEM 3
PREREQUISITE: Graduate standing.
- Application of field methods, geostatistics, geographic information systems, remote sensing and computer modeling to the geography of landscapes.
- Measurement and modeling techniques applied to land, water and atmosphere as they relate to selected environmental patterns.

GPHY 503 SETTLEMENT GEOGRAPHY
F alternate years, to be offered even years 3 cr. SEM 5
PREREQUISITE: Graduate standing.
- Settlement history and contemporary land use in the trans-Mississippi west. Evolution of cultural landscapes in the Mountainous West.

GPHY 504 GIS RESEARCH FUNDAMENTALS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: Graduate standing.
- Geographic Information Science Fundamentals in the context of developing a research project. Spatial data principles, data models, conversion and sampling strategies, analysis methods and cartography. Lab exercises use GIS software. Students specialize area explored through literature review and individual project.

GPHY 505 BIOCLIMATOGRAPHY
On Demand 3 cr. SEM 3
PREREQUISITE: GEO 211 or BOE 570.
- The distribution of plants, controlled by climate, geologic history and geographic location. Changes over time in distribution patterns as related to climate changes and other human activities.

GPHY 520 LAND USE PLANNING
F alternate years, to be offered odd years 3 cr. SEM 3
PREREQUISITE: Graduate standing.
- History and philosophy of land use planning; application of geographical skills to contemporary land use planning. Selected topics include population pressure and land use planning.

GPHY 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

GPHY 592 INDEPENDENT STUDY
On Demand 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

GPHY 594 SEMINAR
On Demand 1 cr. SEM 1 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

GRMN
German
formerly MLG

GRMN 101 ELEMENTARY GERMAN I
F, S alternate years 4 cr. RCT 4
NOTE: Offered on a rotating basis with French and Spanish in Summer.
- An elementary level course designed to help students acquire basic proficiency in communication within culturally significant contexts. An integrated approach to teaching language skills with emphasis on vocabulary acquisition and basic grammatical structures.

GRMN 102D ELEMENTARY GERMAN II
S alternate years 4 cr. RCT 4
PREREQUISITE: GRMN 101 or equivalent, or two years of high school German. Offered on a rotating basis with French and Spanish in Summer.
- This course builds upon the foundation established in 101. Greater emphasis is placed upon oral and written expression. Reading and discussions are designed to increase comprehension of more linguistically complex texts and more conceptually complex cultural issues.
GRMN 201D INTERMEDIATE GERMAN I
F 3 cr. RCT 3
PREREQUISITE: GRMN 102 or equivalent, or a minimum three years of high school German, or placement interview.
- Intensive methodical review of grammar and syntax combined with the integrated development of proficiency in the four language skills. Expansion of cultural knowledge and functional vocabulary through intermediate-level readings and discussions. Increased emphasis on written communication.

GRMN 210D GERMAN LANGUAGE & CULTURE
S 3 cr. RCT 3
PREREQUISITE: GRMN 201 or equivalent, or a placement interview.
- Designed to follow the third semester review of grammar and basic skills. Taught through a series of carefully selected readings in German culture, civilization, and literature which will provide the basis for writing essays and reports and developing advanced language skills.

GRMN 270H GERMAN-SPEAKING EUROPE FROM THE ENLIGHTENMENT TO THE EUROPEAN UNION
S 3 cr. RCT 3
PREREQUISITE: Sophomore standing or permission of instructor.
- Introduces students to the basic social, philosophical, and cultural concepts that formed the cornerstones of the European Enlightenment and its legacy, with a focus on German-speaking countries and Germany. (Conducted entirely in English).

GRMN 303IH ISSUES OF GERMAN CINEMA
S alternate years, to be offered even years 3 cr. SEM 3
PREREQUISITE: Junior standing or consent of instructor.
- Acquaints students with the traditions of German cinema in national, European, and global contexts. Theoretical film analysis of silent film, propaganda film, post-war cinema, rubble film, censored films, New German Cinema and other genres. All films, readings, and discussions in English. Mandatory weekly evening film screenings.

GRMN 315 SURVEY GERMAN LITERATURE
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: GRMN 220.
- A survey of the major figures and periods of German literature from selected literary periods before 1800.

GRMN 320 CONTEMPORARY GERMAN LITERATURE
On Demand 3 cr. LEC 3
PREREQUISITE: GRMN 220
- Literary and cultural analysis of German literary production in the twentieth century and to present.

GRMN 330 GERMAN: ADVANCED GRAMMAR, CONVERSATION, COMP I
F alternate years, to be offered even years 3 cr. RCT 3
PREREQUISITE: GRMN 220
- In-depth review of grammar, syntax, and idiomatic expression; vocabulary building practice in conversation. Short readings in German as a basis for conversation and composition. Emphasis on accuracy in grammar and expression.

GRMN 350 GERMAN: CULTURE & CIVILIZATION
F alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: GRMN 220
- An overview of some of the great figures and periods of German art, literature, music, and public life in German-speaking countries which have made significant cultural contributions to world civilization up to 1871.

GRMN 360H GERMAN MYTHS: THE LORELI, FAUST, AND VAMPIRES
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: Junior standing or consent of instructor.
- An examination of the German mythical figures in pursuit of love, knowledge, and blood. These themes are explored through the texts from medieval legends through contemporary popular culture. Authors include Goethe, Heine, and others. Films by Murnau and Herzog. All readings and discussions in English.

GRMN 380HMG GERMAN TEXT & CINEMA
S alternate years, to be offered every other year 3 cr. RCT 3
PREREQUISITE: GRMN 220
- Examination of individual growth, development, and wellbeing within families across the lifespan from conception to death. Emphasis on classical and contemporary individual, developmental, and family theories, current research, and practical applications for practitioners, teachers, and parents.

HDCF Human Development - Child & Family
see also EDEC

HDCF 138 SURVEY OF FAMILY FINANCE AND CONSUMER ISSUES
F 3 cr. LEC 3
- If you need to make dollars last throughout the semester, this class is for you! The course combines some basic economics with how to's of becoming financially literate. Covers earning, using credit, spending plans, avoiding fraud, and financial planning.

HDCF 150S INDIVIDUAL AND FAMILY DEVELOPMENT AND WELL-BEING: LIFESPAN
F, S on demand 3 cr. LEC 3
- Examination of individual growth, development, and wellbeing within families across the lifespan from conception to death. Emphasis on classical and contemporary individual, developmental, and family theories, current research, and practical applications for practitioners, teachers, and parents.

HDCF 218 FASHION AND TEXTILES
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HDCF 230 CONTEMPORARY CONSUMER ISSUES
F 3 cr. LEC 3
PREREQUISITE: HDCF 138 or consent of instructor.
- Theories of consumer economics will be introduced and applied to current consumer issues such as housing, food, health care, and energy.

HDCF 261 ADULT DEVELOPMENT AND AGING
S 3 cr. LEC 3
PREREQUISITE: HDCF 150 or HDCF 160 for majors, and social science core for nonmajors.
- Focus on the adult stages of the life span and families with adult children; issues include inter-generational relationships; gender differences in individual, family, and career development; and the demographic and economic consequences of an aging population.
PREREQUISITE: None required but some may be determined necessary by each offering department.

- Courses not required in any curriculum for which there is a particular one-time need or given on a trial basis to determine acceptability and demand before requesting a regular course number.

PREREQUISITE: Consent of the instructor. Necessary by each offering department.

On Demand 1 - 4 cr. IND may be repeated.

- Directed undergraduate research which may culminate in a written work or other creative project.
- Course will address responsible conduct of research.

PREREQUISITE: Sophomore standing.

- Relationship development across the life cycle from a family systems perspective. Relationship dynamics through major relationship transitions including couple formation, cohabitation, marriage, parenthood, death, divorce, and remarriage will be examined. The diversity of family experiences will be emphasized.

HDCF 295 UNDERGRADUATE RESEARCH F, S 1-6 cr. IND may be repeated.

- Directed undergraduate research which may culminate in a written work or other creative project.

PREREQUISITE: Consent of the instructor.

On Demand 1 - 3 cr. IND Maximum 6 cr.

- Consent to become a Certified Family Life Educator. Linking assessment data with intervention techniques, Direct experience with children and adolescents with special needs in infant-preschool settings, public schools, and community-based settings.

HDCF 292 SPECIAL TOPICS F, S 1-4 cr. IND

- An introduction to various family, consumer science, and counseling theories, skills, and modalities. An overview of the helping profession. Development of interpersonal and professional skills for working with others.

PREREQUISITE: Consent of instructor and approval of department head.

- Direct experience with children and adolescents with special needs in infant-preschool settings, public schools, and community-based settings.

HDCF 291 SPECIAL TOPICS On Demand 1 - 4 cr. Maximum 12 cr.

- Consent of instructor.

Course will address responsible conduct of research.

- Directed undergraduate research which may culminate in a written work or other creative project.
- Course will address responsible conduct of research.

PREREQUISITE: Consent of department head.

- Direct experience with children and adolescents with special needs in infant-preschool settings, public schools, and community-based settings.

HDCF 319 THEORIES AND SKILLS F, S 3 cr. LEC 3

- An introduction to various family, consumer science, and counseling theories, skills, and modalities. An overview of the helping profession. Development of interpersonal and professional skills for working with others.

PREREQUISITE: Consent of the instructor.

- Direct experience with children and adolescents with special needs in infant-preschool settings, public schools, and community-based settings.

HDCF 339 PERSONAL AND FAMILY FINANCE I F 3 cr. LEC 3

- Planned use of financial resources to meet the goals of individuals and families. Concepts include time value of money concepts, credit, budgeting, risk management, taxation and basic investments. First in a series of courses to prepare students for the accredited financial counselors exams.

PREREQUISITE: HDCF 138, M core, or permission of instructor.

- Knowledge and skills necessary for establishing and administering various human service programs including early childhood, youth, family, and agency settings.
- Students will design a program including preparation of a grant application.

HDCF 344 CONTEMPORARY HUMAN SERVICE PROGRAMS F 3 cr. LEC 3

- Knowledge and skills necessary for establishing and administering various human service programs including early childhood, youth, family, and agency settings.
- Students will design a program including preparation of a grant application.

HDCF 349 CHEMICAL DEPENDENCY TREATMENT On demand 3 cr. LEC 3

- This course will present an overview of philosophical and procedural components as well as practical applications for providing addictions services: professional characteristics, ethical and legal issues, care options, helping processes, care styles, and case management.

HDCF 357 EXCEPTIONAL CHILDREN F, S 3 cr. LEC 3

- Knowledge and skills necessary for establishing and administering various human service programs including early childhood, youth, family, and agency settings.
- Students will design a program including preparation of a grant application.

HDCF 357 RESEARCH METHODS IN HHF S, Su On Demand 3 cr. LEC 3

- Prepares HHHD students to become informed consumers of research. Research principles for both quantitative and qualitative research are covered. Readings and other class materials ensure that students will understand how research in HHHD enriches human well-being.

HDCF 425R FAMILY LAW AND PUBLIC POLICY F 3 cr. LEC 3

- Examines parenting processes and parent-child relationships based on scientific study of child development and family relations. Diverse parenting issues (e.g., parenting through divorce; parental stress and adaptation) will be explored across the lifespan using family systems and ecological frameworks.

HDCF 435 CURRICULUM DEVELOPMENT IN FAMILY AND CONSUMER SCIENCES EDUCATION S 3 cr. LEC 2 LAB 1

- How to plan, develop, teach, supervise, and evaluate programs in family and consumer sciences education. A second focus will be to learn about responsible actions and decision making as leaders in family, community, and work settings through the use of FCCLA.

HDCF 437 MANAGING WORK AND FAMILY S 3 cr. LEC 3

- This course focuses on how families acquire and use resources from work and the household to meet family goals and demands. Special attention to managing the dual demands of work and family in relation to the family time, money, marital, and child-rearing responsibilities.
HDCF 474 SENIOR SEMINAR—PROFESSIONAL ISSUES  
S,Su 4 cr. EGC 1 LAB 3  
PREREQUISITE: HDCF 571 and screening procedures as specified on the Health and Human Development web site.  
- Senior capstone course. Establishing a professional identity and transitioning to a career in the field of family and consumer sciences. The lab section of this course will entail the scientific application of family and consumer sciences theory and methods. In consultation with course instructor, students will participate in a lab assignment.  

HDCF 490R UNDERGRADUATE RESEARCH  
F, S, Su 1-6 cr. IND May be repeated.  
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.  

HDCF 491 SPECIAL TOPICS  
On Demand 1 - 4 cr. Maximum 12 cr.  
PREREQUISITE: Course prerequisites as determined for each offering.  
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.  

HDCF 492 INDEPENDENT STUDY  
F, S, Su 1 - 3 cr. IND Maximum 6 cr.  
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.  
- Directed research and study on an individual basis.  

HDCF 494 SEMINAR  
On Demand 1 cr. SEM 1 Maximum 4 cr.  
PREREQUISITE: Senior standing.  
- Topics offered at the upper division level that are not covered in regular courses. Students participate in preparing and presenting class materials.  

HDCF 498 INTERNSHIP  
F, S, Su 1 - 12 cr. IND.  
PREREQUISITE: Consent of instructor.  
- An individualized assignment with a professional agency to provide a guided field experience. All students must receive department permission prior to registration.  

HDCF 555 CURRENT RESEARCH IN CHILD AND ADOLESCENT DEVELOPMENT  
On Demand 3 cr. RCT 3  
PREREQUISITE: Graduate standing.  
- Current research, issues and trends in child and adolescent development are examined.  

HDCF 556 EARLY CHILDHOOD EDUCATION: A CONSTRUCTIVIST PERSPECTIVE  
On Demand 3 cr. RCT 3  
PREREQUISITE: Upper division course work in early childhood education or elementary education.  
- To introduce the history, framework, concepts, and critiques of constructivism in early childhood education; to understand recent trends in constructivist early childhood research, theory, and practice; to apply practices in early childhood education to program planning, implementation, and evaluation.  

HDCF 563 MULTICULTURAL AWARENESS  
F 3 cr. LEC 3  
PREREQUISITE: Graduate standing.  
- This course explores the relationships between social organizations, processes of historical change, social stratification (race, gender, sexuality), individuals and family structure.  

HDCF 572 PROFESSIONAL PRACTICUM  
F, S 2 - 6 cr. LAB Maximum 9 cr.  
PREREQUISITE: HDCF 554, HDCF 555, graduate standing and consent of instructor.  
- Practicum experience in the field of human development.  

HDCF 575 RESEARCH OR PROFESSIONAL PAPER, PROJECT  
F, S, Su 1 - 4 cr. IND, Maximum 6 cr.  
PREREQUISITE: Graduate standing.  
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.  

HDCF 588 PROFESSIONAL DEVELOPMENT  
On Demand 1 - 3 cr. May be repeated, Maximum 5 cr.  
- This course may be used only by students who have completed all of their course work (and thesis if on a thesis plan) but who need additional faculty or staff time or help.  

HDCF 589 GRADUATE CONSULTATION  
F, S, Su 1-3 cr. TUT Maximum 3 cr.  
PREREQUISITE: Master’s standing and approval of committee chair.  
- This course may be used only by students who have completed all of their course work (and thesis if on a thesis plan) but who need additional faculty or staff time or help.  

HDCF 590 MASTER’S THESIS  
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.  
PREREQUISITE: Master’s standing.  
- Directed graduate research/creative activity.  

HDCF 591 SPECIAL TOPICS  
On Demand 1 - 4 cr. Maximum 12 cr.  
PREREQUISITE: Upper division courses and others as determined for each offering.  
- Course not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.  

HDCF 592 INDEPENDENT STUDY  
F, S, Su 1 - 3 cr. IND Maximum 6 cr.  
PREREQUISITE: Graduate standing, consent of instructor, and approval of department head.  
- Directed research and study on an individual basis.  

HDCF 594 SEMINAR  
On Demand 1 cr. SEM 1 Maximum 4 cr.  
PREREQUISITE: Senior standing.  
- Topics offered at the upper division level that are not covered in regular courses. Students participate in preparing and presenting discussion material.  

HDCF 598 INTERNSHIP  
F, S, Su 2 - 12 cr. IND Maximum 12 cr.  
PREREQUISITE: Graduate standing, and consent of instructor.  
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.  

HDCO 460 STUDENT LEADER TRAINING  
S 2 cr. EGC 1 RCT 1 Maximum 6 cr.  
PREREQUISITE: Orientation leader status; restricted entry.  
- Knowledge and skills necessary for interaction, presentation, and facilitation with regard to new student group leading, peer advising, and campus representation.  

HDCO 463 STUDENT ASSISTANT TRAINING  
F 1 cr. RCT 1  
PREREQUISITE: Resident Assistant status; restricted entry.  
- Includes training in various aspects related to the performance of the Resident Advisor position duties. It includes areas such as self-understanding, interpersonal skills, intervention techniques, and perspectives on college students and the campus environment, which are fundamental to the effective functioning of Resident Assistants.  

HDCO 464 STUDENT ASSISTANT CANDIDATE TRAINING  
S 1 cr. RCT 1  
PREREQUISITE: Resident Assistant candidate status; pass/fail grading; restricted entry.  
- Course includes exposure to college student development theories, advising, and communication skill development areas within a residence hall setting. Emphasis is given to working with individuals and groups in a peer counseling/educational role. Resident Advisor roles and responsibilities are also addressed.  

HDCO 502 COUNSELING ETHICS AND PROFESSIONAL ORIENTATION  
Su 2 cr. RCT 2  
PREREQUISITE: Graduate standing in counseling program.  
- This course will prepare the student with a strong orientation to professional and ethical issues as they apply to counseling. Contents of the course will examine ethical dilemmas a counselor may face in schools, agencies, and private practice.  

HDCO 503 PROFESSIONAL ISSUES IN COUNSELING  
F 3 cr. SEM 3  
PREREQUISITE: Graduate standing in counseling program.  
- This course focuses on providing students with an understanding of the professional identity and roles of the counselor in prevention, consultation, crisis management, specialization, public policy, legal and ethical issues unique to working with schools, families, and community organizations.  

HDCO 505 PROFESSIONAL ISSUES IN SCHOOL COUNSELING  
F 3 cr. RCT 3  
PREREQUISITE: Graduate standing in counseling program.  
- Presentation of professional and ethical issues in school counseling. Group discussion and various experiential activities will provide students with numerous opportunities to understand current issues and trends in the field of school counseling.
HDCO 506 SCHOOL COUNSELING PROGRAMS
Su 5 cr. LEC 3
PREREQUISITE: Graduate standing in counseling program.
- Foundations of the school counseling profession including historical and conceptual perspectives of the field, and the knowledge and skills necessary to be a professional school counselor. Particular emphasis will be placed on a thorough understanding of planning, design, implementation, and evaluation of comprehensive school counseling programs.

HDCO 508 COUNSELING THEORIES I
Su 5 cr. LEC 3
PREREQUISITE: Graduate standing in counseling program.
- Students will learn a wide range of systems theories used in the diagnosis and treatment of individuals, couples, children, and families.

HDCO 510 COUNSELING THEORIES II
F 3 cr. LEC 3
PREREQUISITE: Graduate standing in counseling program.
- This course provides an overview of the major counseling theories and practical applications with various populations. Teaching modalities will include lecture, class discussion, study of taped counseling sessions, and small group interaction.

HDCO 521 COUNSELING SKILLS LAB
F 1 cr. LAB 1
PREREQUISITE: Graduate standing in counseling program.
- Students will learn, practice, and apply basic counseling skills in preparation for their practicum experience.

HDCO 522 GROUP COUNSELING
F 3 cr. LEC 2 LAB 1
PREREQUISITE: Graduate standing in counseling program.
- The following information will be covered in relation to group counseling: theories, research, developmental stages, therapeutic factors, leadership functions, consultation and ethics. Use of leadership skills in structured and unstructured groups will be practiced.

HDCO 525 ADDICTIONS COUNSELING
S 2 cr. RCT 2
PREREQUISITE: HDCO 510 and graduate standing in counseling program.
- This course is designed to review current developments in the field of addictions, as well as, evaluate research and treatment trends within addiction practice. Students will demonstrate an understanding of addictions theory and apply it to practice cases.

HDCO 524 CONSULTATION: THEORY AND PRACTICE
Su 2 cr. RCT 2
PREREQUISITE: Graduate standing in counseling program.
- The study of consultation theories, strategies, and models. Includes specific applications related to collaboration among schools, mental health agencies, and private practitioners.

HDCO 525 COUNSELING CHILDREN AND ADOLESCENTS
S 3 cr. RCT 3
PREREQUISITE: Graduate standing in counseling program.
- Application of counseling theories and techniques to preschool and school age (K-12) children and their families. A special emphasis will be placed on implementing appropriate intervention strategies according to age, developmental level, and the counseling setting.

HDCO 526 ADVENTURE COUNSELING
On Demand 3 cr. RCT 3
PREREQUISITE: Graduate standing in counseling program.
- An introduction to the theory and practice of adventure-based counseling and experiential learning. The course will focus on the goals, concepts, and techniques of adventure work. Students will learn numerous adventure games, problem-solving initiatives, and how to design adventure programs.

HDCO 530 MIND-BODY MEDICINE AND THE ART OF SELF-CARE
S 3 cr. LEC 1 LAB/STU 2
PREREQUISITE: Graduate standing or consent of the instructor and HDCO 510.
- The objectives of this course are two-fold: 1) familiarize students with mind-body interventions; and 2) practical methods for health care providers to engage in self-care.

HDCO 551 APPRAISAL
Su 5 cr. LEC 2 LAB 1
PREREQUISITE: EDU 421, Graduate standing in counseling program.
- Topics include test standardization, reliability and validity; developing understanding of appraisal instruments and needs assessment used with individuals and systems; using information derived from selected appraisal instruments.

HDCO 554 DEVELOPMENTAL THEORY ACROSS THE LIFESPAN
F 3 cr. LEC 3
PREREQUISITE: HDCO 521 and HDCO 571 and graduate standing in the counseling program.
- An introduction to the complex developmental relationships among individuals in the family across the life span. Systems, developmental, learning and personality theories across the life span are surveyed. Contextual variables on developmental processes are stressed.

HDCO 556 SEXUALITY COUNSELING
S 3 cr. RCT 3
PREREQUISITE: HDCO 510, Graduate standing in counseling program.
- Exploration of sexual issues and the counseling process. Examination of foundations needed to respond to clients' sexual concerns.

HDCO 558 CAREER COUNSELING
Su 2 cr. LEC 2
PREREQUISITE: Graduate standing in counseling program.
- This course will prepare the student in the area of career guidance and counseling. Emphasis will be placed on the understanding of career development theories, use of occupational informational sources including computer programs, assessment of the individual and various working environments, and the design of career developmental programs for elementary school through retirement. The student will also be introduced to the impact social issues have on work, leisure and families.

HDCO 564 DIAGNOSIS AND MENTAL HEALTH
S 3 cr. LEC 5
PREREQUISITE: Graduate standing in counseling program.
- This course will provide students with conceptual understanding of mental disorders within physiological, developmental, familial, and social cultural contexts. Students will learn how to use DSM diagnosis in the appraisal and differential diagnosis of mental disorders.

HDCO 565 MARITAL AND RELATIONSHIP COUNSELING
F 3 cr. LEC 2 RCT 1
PREREQUISITE: HDCO 508 and graduate standing in counseling program.
- Theoretical foundations and interventions for working with marital and intimate relationships. Includes promotion of healthy couple relationships and treatment of couples in crisis and/or transition. Emphasizes gender roles, sexuality, and issues related to intimacy from a systemic perspective.

HDCO 566 SEXUAL ISSUES
On demand 1 cr. RCT 1
PREREQUISITE: Graduate standing in counseling program.
- Theory and practice regarding sexual issues with clients.

HDCO 568 MENTAL HEALTH METHODS & TREATMENT
S 3 cr. LEC 5
PREREQUISITE: HDCO 510 and graduate standing in counseling program.
- Mental health counseling methods for treatment of mental disorders, including adults with serious mental illness and severely emotionally disturbed children. Appraisal, treatment planning, evidence-based interventions, medications, crisis intervention, case management, consultation, referral, and professional issues/ethics in treatment of DSM disorders.

HDCO 569 ADVANCED FAMILY COUNSELING
S 3 cr. RCT 3
PREREQUISITE: HDCO 508 and graduate standing in counseling program.
- Advanced theoretical foundations and interventions for the practice of family therapy. Includes current research regarding family therapy and treatment. Emphasizes assessment and interventions for families dealing with mental health diagnoses, substance abuse, sexual abuse, violence, divorce/remarriage, and child/adolescent issues.

HDCO 571 PROFESSIONAL COUNSELING PRACTICUM
S 3 cr. LEC 5 Max repeat 15 cr.
PREREQUISITE: HDCO 508, HDCO 521, graduate standing in counseling program and consent of instructor.
- Supervised clinical practice with individuals, children, families, and groups. Weekly individual and group supervision.

HDCO 574 ADVANCED COUNSELING PRACTICUM/CONSULTATION
On Demand 1 - 5 cr. LAB
PREREQUISITE: HDCO 571 and graduate standing in counseling program and consent of instructor.
- Supervised experience in the application of advanced counseling techniques and/or consultation. Credit hours and specific requirements are tailored to meet individual needs.
HDCO 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing in counseling program.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major adviser and graduate committee.

HDCO 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; Maximum 5 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a counseling organization, and consent of instructor.
- Courses offered on a one-time basis to fulfill professional development needs of in-service educators or counselors. A specific focus is given to each course which is appropriately subtitled.

HDCO 589 GRADUATE CONSULTATION
F, S, Su 1-3 cr. TUT Maximum 3 cr.
PREREQUISITE: Graduate standing in counseling program and approval of committee chair.
- This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

HDCO 590 MASTER'S THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HDCO 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 4 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HDCO 592 INDEPENDENT STUDY
F, S, Su 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing in counseling program, consent of instructor, approval of department head and Dean of Division of Graduate Education.
- Directed research and study on an individual basis.

HDCO 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing in counseling program or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

HDCO 598 INTERNSHIP
F, S, Su 2 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: HDCO 571 and graduate standing in counseling program and clinical review.
- An individualized assignment arranged with an agency, school or other organization to provide guided experience in the field.

HDFP 505 FAMILY SYSTEMS
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This class explores the family as a system within the broader context of society. The developmental stage of the family will be the framework for studying the family system over the family life cycle and for exploring critical aspects of the family such as communication, economics, relationship quality, and interaction with other systems. We will also explore how Family Science approaches different issues and what scientists choose to study about families. This course is offered as a distance-delivered course from North Dakota State University.

HDFP 510 FUNDAMENTALS OF FINANCIAL PLANNING
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course provides an overview of family financial planning by integrating concepts and issues with planning and counseling applications. Students will be introduced to the key concepts of family financial planning, including insurance, tax investments, retirement, and estate planning. The family financial planning process is introduced with an emphasis on the integration and application of concepts in meeting individual and family financial goals and objectives. Other topics presented include an ethics overview, compensation trends within the industry, and regulatory frameworks. This course is offered as a distance-delivered course from Kansas State University.

HDFP 515 INSURANCE PLANNING FOR FAMILIES
S 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- The course covers risk management concepts, tools, and strategies for individuals and families, as well as ethical consideration. Case studies provide experience in selecting insurance. This course is offered as a distance-delivered course from the University of Nebraska.

HDFP 520 INVESTING FOR THE FAMILY’S FUTURE
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course covers investment concepts, tools, and strategies for individuals and families. Topics include investment analysis, risk management, and emerging topics in the financial planning process. This course is offered as a distance-delivered course from Iowa State University.

HDFP 525 RETIREMENT PLANNING, EMPLOYEE BENEFITS AND THE FAMILY
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course covers retirement planning for the individual and the family. Topics include qualified retirement plans, nonqualified plans, IRAs and other plans that offer tax advantages to the individual and family. This course is offered as a distance-delivered course from the University of Nebraska.

HDFP 530 ESTATE PLAN FOR FAMILY
S 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course covers the basics of estate planning for families including understanding the basic elements of estate planning, analyzing case studies of estate planning situations, and developing skills to work with families on estate planning problems.

HDFP 540 PERSONAL INCOME TAXATION
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course covers the basics of personal income taxation including taxation terminology, taxation issues in investments, taxes and retirement planning, tax management techniques, tax implications in marriage and other close relationships, and other tax topics related to family financial well-being.

HDFP 545 FAMILY ECONOMICS
Su 5 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course covers the major issues relative to the economics of families, including household production and human capital development. It will also cover the economics of crises, public policy and family life cycle spending, saving and borrowing. A theoretical and research perspective will be used to illuminate the concepts in the course. This course is offered as a distance-delivered course from South Dakota State University.

HDFP 550 HOUSING/REAL ESTATE
Su 5 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course will cover the major issues relative to the economics of families, including household production and human capital development. It will also cover the economics of crises, public policy and family life cycle spending, saving and borrowing. A theoretical and research perspective will be used to illuminate the concepts in the course. This course is offered as a distance-delivered course from Oklahoma State University.

HDFP 555 FINANCIAL COUNSELING
S 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course emphasizes the development of professional skills for assisting individuals and families to become responsible financial managers through the financial counseling process. Professionals with financial counseling preparation may assist in preventing, alleviating, and/or eliminating financial problems. This course is offered as a distance-delivered course from North Dakota State University.

HDFP 560 PROFESSIONAL PRACTICES IN FAMILY FINANCIAL PLANNING
S 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course will cover the professional practice of family financial planning including the process of planning and counseling, ethics of professional practice, types of organizations offering planning and counseling services, and the evaluation of effectiveness in planning and counseling. This course is offered as a distance-delivered course from Kansas State University.
COURSE DESCRIPTIONS: HDFP, HDHL

HDFP 572 FINANCIAL PLANNING-CASE STUDIES
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course is a capstone course in the FFP masters and involved the analysis and presentation of case studies that require the application of all material gained in the masters courses to the financial planning process for families. This course is offered as a distance-delivered course form Kansas State University.

HDFP 575 PROFESSIONAL PAPER
F, S 1-3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

HDFP 576 PROFESSIONAL PRACTICUM IN FAMILY FINANCIAL PLANNING
F, S 3 cr. LEC 3
PREREQUISITE: Graduate standing and consent of instructor.
- Practicum experience in the field of family financial planning.

HDHL
Human Development - Health

HDHL 210 FOUNDATIONS OF COMMUNITY HEALTH
F 3 cr. LEC 3
- Introduction to community health discipline outlining the history, evolution, and practice of delivering health information to communities. Principles and practices of community health including multicultural considerations, definitions of health, illness and disease, health education and promotion, demographics, epidemiology and the health of diverse populations throughout the lifespan.

HDHL 230 DRUGS AND SOCIETY
F, S, Su on demand 3 cr. LEC 3
- Individual and social implications of psychoactive drug use. Basic pharmaceutical concepts, legal issues, common pharmaceutical preparations, and over-the-counter products are studied.

HDHL 240 HUMAN SEXUALITY
F, S, Su on demand 3 cr. LEC 3
- A study of all aspects of human sexuality including the sexual reproductive systems, sexual behaviors, contraception, gender roles, sexual functioning, and sexually transmitted diseases.

HDHL 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND Maximum 12 cr.
PREREQUISITE: Consent of instructor.
- Directed undergraduate research which may culminate in a research paper, senior thesis, or other research project. Course will address responsible conduct of research.

HDHL 298 INTERNSHIP
On Demand 2 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: Consent of instructor.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

HDHL 315 HEALTH ADMINISTRATION
S 3 cr. LEC 3
PREREQUISITE: HDHL 263, or HDHL 210 or HDPE 222 and junior standing.
- An introduction to health administration. Management of public health organizations, patterns of health organizations, and various administrative factors involved in the practice of health administration. Issues of budgeting, finance, marketing and public relations will be explored.

HDHL 410 HUMAN RESPONSE TO STRESS
F, S, Su 3 cr. LEC 3
PREREQUISITE: HDHL 263, or HDHL 210 or HDPE 222 and junior standing.
- Analysis of human response to stress in relation to a variety of biophysical factors; techniques for managing stress are also investigated.

HDHL 440 PRINCIPLES OF EPIDEMIOLOGY
S 3 cr. LEC 2 RCT 1
PREREQUISITE: HDLC 371 and HDHL 210 or HDPE 222.
- Senior capstone course. The goal of this course is to provide an introduction to epidemiologic concepts (e.g. incidence, prevalence, bias) and methods (e.g. study designs and measures).

HDHL 445 PROGRAM PLANNING IN HEALTH
F 3 cr. LEC 2 RCT 1
PREREQUISITE: HDLC 371, HDHL 210, HDPE 425 and senior standing in community health major or consent of instructor.
- Senior capstone course. Health program planning and evaluation with emphasis on applications in Montana communities.

HDHL 451 HEALTH AND HEALING
On demand 3 cr. LEC 3
PREREQUISITE: HDHL 310.
- A comparative study of different systems of health and healing. Systems include Allopathic (Western), Ayurvedic (East Indian), Chinese, and Native American. This course includes in and out of class practice components (e.g. Qi Gong, Yoga, Meditation).

HDHL 452 HEALTH DISPARITIES
S 3 cr. LEC 3
PREREQUISITE: HDLC 371, HDHL 210 and HDHL 440.
- Examines what contributes to health disparities, which are inequalities in death, disease, disability, and well-being. Focuses on the epidemiologic evidence, theories of why health disparities exist, and current strategies for ameliorating health disparities.

HDHL 455 THE ETHIC OF CARE
F, S, Su on demand 3 cr. LEC 3
PREREQUISITE: PSYX 100 or SOCI 101 or HDCL 150 and junior standing.
- This course, intended for students interested in working in human service professions (education, health, social work, counseling, human relations and resources) will focus on understanding and applying the theory of the ethic of care in real world situations. Theoretical support for the ethic of care found in diverse areas of philosophy, social justice, education, feminism, parenting, nursing, theology, and medicine will be explored. Utilizing a service learning approach, students will be engaged in understanding theories related to the ethic of care through both in-class lecture and discussion and outreach in the community.

HDHL 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. RCT May be repeated; Maximum 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

HDHL 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HDHL 492 INDEPENDENT STUDY
F, S, Su 1 - 6 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

HDHL 498 INTERNSHIP
F, S, Su 1 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: Consent of instructor.
- An individualized assignment with a professional agency to provide a guided field experience. All students must receive department permission prior to registration.

HDHL 502 THEORIES AND MODELS IN FAMILY AND COMMUNITY HEALTH
S 5 cr. LEC 5
PREREQUISITE: Graduate standing or permission of instructor.
- Understanding and application of theory and models in the family and community health fields. The course will focus on applications at the individual, family, community, and environmental levels.

HDHL 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been agreed upon by the student and his or her major advisor and graduate committee.

HDHL 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; Maximum 5 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, and consent of instructor.
- Courses offered on a one-time basis to fulfill professional development needs of in service educators. A specific focus is given to each course which is appropriately subtitled.
COURSE DESCRIPTIONS: HDHL, HDPE

HDHL 589 GRADUATE CONSULTATION
F, S, Su 1 - 3 cr. IND. May be repeated; Maximum 5 cr.
PREREQUISITE: Graduate standing in health major and approval of committee chair.
- This course may be used only by students who have completed all of their course work (and thesis if on a thesis plan) but who need additional faculty or staff time or help.

HDHL 590 MASTER'S THESIS
F, S, Su 1 - 10 cr. IND
PREREQUISITE: Master's standing.
- Directed graduate research/creative activity.

HDHL 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.

HDHL 592 INDEPENDENT STUDY
F, S, Su 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

HDHL 594 SEMINAR
On Demand 1 cr. SEM Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

HDHL 598 INTERNSHIP
F, S, Su 1 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: Graduate standing and consent of instructor.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

HDPE Human Development - Physical Education

HDPE 102 PARAPROFESSIONAL EXPERIENCE I
S 1 cr. LAB 1
COREQUISITE: HDPE 224
- Observation of teaching and data collection in elementary, middle, and high school physical education/health enhancement classes. Placement of students to assist in youth coaching or intramural programs. This course is specifically for future teachers in the public schools.

HDPE 105 LIFE SKILLS FOR STUDENT ATHLETES
F, S 2 cr. LEC 2
- This course is designed to introduce student athletes to psychological and educational theories and models associated with learning, self-management, personal and career development, and stress, coping and health. Through this course, student athletes will identify and address issues that pertain to learning and development among college students and issues that are unique to you as a student athlete.

HDPE 184 VARSITY ATHLETICS
F, S 1 cr. LAB 1 Maximum repeat 2 cr.
- The participation in an intercollegiate sport which requires a minimum of two to three hours of meeting/participation per week per athletic season.

HDPE 201 EXERCISE PROGRAMMING FOR OLDER ADULTS
S 3 cr. LEC 2 LAB 1
- Students will examine the special exercise-related needs of older adults and learn how to safely and effectively meet those needs. The lab will provide practical experience working with older adults in exercise program for seniors.

HDPE 221 HEALTH ANATOMY AND PHYSIOLOGY
F 3 cr. LEC 3
- This course will focus on the key elements of anatomy and physiology necessary for students in allied health professions, specifically those who will work in the areas of community health, health enhancement education, health promotion, and kinesiology. The aim of this course is for students to demonstrate working knowledge of the muscular, skeletal, nervous, cardiovascular, and respiratory, endocrine, and digestive systems, as well as body metabolism.

HDPE 222 FOUNDA TIONS OF EXERCISE SCIENCE
F, S 3 cr. LEC 3
- The aim of this course is to integrate the subdisciplines of exercise science (nutrition, biomechanics, exercise physiology, motor control, and exercise psychology) from the perspectives of definitions, basic science with application to health, fitness, and athletic performance.

HDPE 224 TEACHING MOVEMENT CONTENT
S 3 cr. 2 LEC 1 LAB
COREQUISITE: HDPE 102
- Practice skills in music fundamentals; teaching and learning folk, square, social, and various types of rhythmic activities and movement exploration. This course is specifically for future teachers in the public schools.

HDPE 251 TEACHING FITNESS AND PHYSICAL ACTIVITY CONCEPTS
F 3 cr. LEC 3
- Teaching practices for physical activity and fitness concepts appropriate for children and adolescents in school and recreational programs. Content includes pedagogical methods, strategies, styles, and techniques that encourage individuals to participate in and adhere to physical activity programs.

HDPE 254 COREQUISITE: HDPE 102
- Introductory coaching course which will cover basic information from the beginning level in the American Coach Effectiveness Program.

HDPE 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

HDPE 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HDPE 292 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

HDPE 304 TECHNOLOGY APPLICATIONS IN HEALTH ENHANCEMENT
S 3 cr. LEC 3
- Skills, knowledge, and applications necessary for integrating technology into developmentally appropriate teaching practices in Health Enhancement. Identifies theories, principles, and strategies for the integration of technology into physical education, physical activity, and health settings.

HDPE 305 LEADERSHIP FOR STUDENT ATHLETES
S 2 cr. LEC 2
PREREQUISITE: HDPE 105 and junior standing
- Intended for student athletes and will focus on understanding and applying principles of leadership to performance. This course will enhance the student’s ability to understand fundamental principles of leadership and apply those principles to their academic, athletic, and professional career. Specific attention will be paid to understanding individual strengths of student personality and translating those strengths into leadership positions.

HDPE 314 HEALTH ENHANCEMENT FOR ATYPICAL POPULATIONS
S 3 cr. LEC 3
PREREQUISITE: HDPE 221
- Health enhancement (physical education and health) issues for school-aged populations who have physical, mental, and/or emotional disabilities. This course is specifically for future teachers in the public schools.

HDPE 316 FOOTBALL COACHING THEORY
S 1 cr. LEC 1
PREREQUISITE: HDPE 267.
- Basic fundamentals and techniques used in coaching football.

HDPE 317 BASKETBALL COACHING THEORY
F 1 cr. LEC 1
PREREQUISITE: HDPE 267.
- This course is set up to provide the student a working knowledge of basketball coaching techniques and philosophies. The course should assist the student in developing his/her own basketball coaching philosophy.

HDPE 318 SOCCER COACHING THEORY
F 1 cr. LEC 1
PREREQUISITE: HDPE 267.
- A working knowledge of soccer coaching tactics and techniques.

HDPE 319 VOLLEYBALL COACHING THEORY
S 1 cr. LEC 1
PREREQUISITE: HDPE 267.
- A working knowledge of volleyball coaching tactics and techniques.

HDPE 320 ANATOMICAL KINESIOLOGY
F, S 4 cr. LEC 3 LAB 1
PREREQUISITE: BIOH 201 or HDPE 221, and M core or permission of instructor.
- Emphasizes the effects of joint structures and muscles on movement of the upper extremity, lower extremity, and spine while providing an introduction to the principles of biomechanics.
HDPE 322 EXERCISE PHYSIOLOGY
F, S 4 cr. LEC 3 LAB 1
PREREQUISITE: Grade of “C” or better in BIOH 201 or HDPE 221, or permission of instructor.
- Topics include factors and mechanisms involved with causing changes and adaptations in the physiological responses to training and participating in strength and endurance sports and activities. Lectures and labs emphasize explaining common observations and practices from the physiological viewpoint.

HDPE 323R BIOMECHANICS
S 4 cr. LEC 3 LAB 1
PREREQUISITE: M 151 or M 161, BIOH 201, PHSX 205 and HDPE 320.
COREQUISITE: HDCF 371 and STAT 217.
- This course emphasizes the effects of structure, motion, forces, and their effects on and within the human body using both qualitative and quantitative analyses. Additional emphasis will be placed on the development of critical thinking skills associated with biomechanics-related research and interpretation.

HDPE 362 TRACK & FIELD THEORY
F 2 cr. LEC 2
PREREQUISITE: HDPE 267.
- The technique of all track and field events. Emphasis on teaching progressions in all events. Classroom sessions include development of training schedules, tactics, strategy, philosophy, meet organization, and officiating.

HDPE 367 COACHING APPLICATION
F S 1 cr. RCT 1 Maximum 3 cr.
PREREQUISITE: HDPE 267.
- Assignment of prospective coaches to specific sports. Discussion and feedback on planning and implementation in practical setting.

HDPE 415 MGMT IN HLTH FITNESS
S
PREREQUISITE: Junior standing.
- Management of sports, fitness, and physical education programs, including budget and finance, supplies and equipment, marketing and public relations, facilities, legal liability, stress and time management, and functions of sport management.

HDPE 425 HEALTH PSYCHOLOGY
F S 3 cr. SEM 3
PREREQUISITE: PSYX 100 or SOCI 101 and junior standing.
- The study and application of theoretical models of exercise and health with emphasis on behavior change in the individual and group levels.

HDPE 430 INSTRUCTIONAL DESIGN IN HEALTH ENHANCEMENT
F 3 cr. LEC 3
PREREQUISITE: HDHI 230, HDHI 240, HDPE 221, HDPE 251, EDU 397 and upper division standing and acceptance into the professional teacher education program.
- A conceptual and practical approach to the design, implementation, and maintenance of various curricula for future teachers.

HDPE 436 PRINCIPLES OF STRENGTH AND CONDITIONING
F S 3 cr. LEC 3
PREREQUISITE: HDPE 322.
- Emphasizes the use of critical thinking skills for exercise development and progressions based on fundamental principles from kinesiology, biomechanics, exercise physiology, motor control, and motor learning. Practical application of this material to the areas of personal training, physical therapy, health enhancement teaching, and exercise physiology is emphasized.

HDPE 445R APPLIED SPORT PSYCHOLOGY
S 3 cr. LEC 3
PREREQUISITE: HDPE 267 and HDCF 371 or consent of instructor
- The application of basic principles of sport psychology for teachers and coaches, with specific emphasis on motivation, anxiety, arousal, and selected groups of athletes.

HDPE 465 EXERCISE TESTING AND PRESCRIPTION
S 4 cr. LEC 3 LAB 1
PREREQUISITE: HDPE 322, STAT 216, with grade “C” or better in each course, or permission of instructor.
- Senior capstone course. Students are familiarized with the hands-on training and theoretical background needed to competently assess levels of health/fitness in a “low-risk” healthy adult population.

HDPE 467 ADVANCED CONCEPTS IN COACHING
F S 3 cr. LEC 3
PREREQUISITE: HDPE 267; HDPE 367 or coaching experience.
- The primary goal of this course is to implement the content of an advanced coach certification curriculum in cooperation with the Montana High School Assoc. (MHSA). The class is intended for experienced coaches who wish to examine current issues in coaching such as the female athlete, sportsmanship, or coach/parent relationships in detail.

HDPE 475 SENIOR SEMINAR - PROFESSIONAL ISSUES
F S, Su 1 cr. LEC 1
COREQUISITE: HDPE 498.
- Senior capstone course for majors in exercise, wellness, and athletic training. Establishing a professional identity and transitioning to a career in the field of human services.

HDPE 490R UNDERGRADUATE RESEARCH
F S, Su 1 - 6 cr. RCT May be repeated. Maximum 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

HDPE 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HDPE 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

HDPE 498 INTERNSHIP
F, S Su 1-12 cr. IND.
PREREQUISITE: Consent of instructor.
- An individualized assignment with a professional agency to provide a guided field experience.

HDPE 501 THEORIES/ MODELS IN HEALTH
S
PREREQUISITE: HDPE 425 or graduate standing.
- Understanding and application of theory and models in the promotion of health. The course will focus on applications at the individual, organizational, community, and environmental levels.

HDPE 506 EXERCISE AND CHRONIC DISEASE
S alternate years, offered odd years 3 cr. LEC 3
PREREQUISITE: HDPE 514, graduate standing.
- Theory and practice in the effects of exercise on various diseases, disabilities, and atypical conditions.

HDPE 515 EXERCISE PERFORMANCE AND NUTRITION
F alternate years, offered odd years 3 cr. LEC 3
PREREQUISITE: Knowledge in areas of anatomy and physiology, upper division courses in one or combination of: exercise physiology, biochemistry, or nutrition.
- This class covers selected topics in exercise physiology, nutrition, and metabolism related to physiological function and performance. The use of nutritional supplements during exercise and the environmental influences on physiological function and metabolism will be addressed.

HDPE 520 CURRICULUM DESIGN
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
- This course provides an overview of the curricular design process necessary to create traditional and nontraditional curricular models currently popular in health enhancement, health promotion, and community health.

HDPE 545 GRADUATE EXERCISE PHYSIOLOGY
F alternate years, offered even years 3 cr. LEC 3
PREREQUISITE: Graduate standing; undergraduate exercise physiology.
- This course defines and explains a conceptual mechanistic-driven model that explains the basis for maximizing human performance. The instructor relies heavily on readings from the current research literature and student participation to understand the plethora of topics covered.

HDPE 567 PROFESSIONAL ISSUES IN COACHING
S Su 3 cr. LEC 5
PREREQUISITE: HDPE 367, HDPE 376 or three years of successful coaching in public schools.
- In depth examination of at least one sub-topic from the Montana High School Coach Certification curriculum that is, prevention, care and rehabilitation of injuries, risk management in sport; sociological and psychological aspects of coaching; coaching the female athlete.
COURSE DESCRIPTIONS: HDPE, HHD, HIST

HDPE 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1 - 6 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major adviser and graduate committee.

HDPE 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; maximum 3 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, and consent of instructor and Dean of the Graduate School.
- Courses offered on a one-time basis to fulfill professional development needs of in-service educators. A specific focus is given to each course which is appropriately subtitled.

HDPE 589 GRADUATE CONSULTATION
F, S, Su 1-3 cr. TUT 1-3 cr.
PREREQUISITE: Master's standing and approval of committee chair.
- This course may be used only by students who have completed all of their course work (and thesis if on a thesis plan) but who need additional faculty or staff time or help.

HDPE 590 MASTER'S THESIS
F, S, Su 1 - 10 cr. IND May be repeated.
- Directed graduate research/creative activity.

HDPE 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HDPE 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

HDPE 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level that are not covered in regular courses. Students participate in preparing and presenting discussion material.

HDPE 598 INTERNSHIP
On Demand 2 - 12 cr. IND Maximum credits unlimited
PREREQUISITE: Graduate standing, and consent of instructor.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

HHD Health & Human Development

HHD 100 SPECIAL ACTIVITY
On Demand 1 cr. LAB 1 May be repeated
- Special Activity classes offered as needed using the unique skills of the instructional faculty in any given semester.

HHD 110 POCKET BILLIARDS
On Demand 1 cr. LAB 1
- Pocket billiard fundamentals, most popular games, and appropriate rules will be stressed. Fee required.

HHD 117 BOWLING FUNDAMENTALS
On Demand 1 cr. LAB 1
- Bowling fundamentals will be stressed along with bowling etiquette and equipment. Fee required.

HHD 161 SKIING, SNOWBOARDING, AND TELEMARKING
S 1 cr. LAB 1
- Instruction at all levels of skill from beginner to advanced. Fee required. Transportation, tickets, and equipment not included.

HHD 261 SKIING, CROSS COUNTRY
S 1 cr. LAB 1 Maximum 4 cr.
- The course provides instruction in preparation and execution of the various skills involved in cross country skiing from the beginner through advanced depending on the student's ability and skill level. Fee required.

HHD 551 SPORT NUTRITION
F 5 cr. LEC 5 (OFFERED ONLINE)
PREREQUISITE: Graduate standing in HHD.
- Course will provide an overview of macronutrient and micronutrient metabolism and function, popular ergogenic aids and sports performance, nutritional quackery, nutritional recommendations for improved physical performance, fluid and electrolyte needs, thermoregulation, and nutritional analyses and consultation techniques.

HHD 552 SPORT PSYCHOLOGY
Su 5 cr. IND 5 (OFFERED ONLINE)
PREREQUISITE: A Bachelor's degree; prior undergraduate course (s) in the exercise, sport or health sciences, psychology, or equivalent; experience with computers/software.
- An overview of basic concepts, behavioral principles, and history; anxiety, arousal, and motivation; leadership, cohesion, and audience effects; aggression and violence; populations including ethnicity, gender, high risk, injured, youth, and elite; coaching psychology; and personality assessment techniques.

HIST History - Graduate Level

HIST 502 PUBLIC HISTORY
F On Demand 3 cr. SEM 3
PREREQUISITE: May be repeated. Maximum 6 cr.
- Advanced readings and discussion in the practice of public history; including oral history, historic preservation, and museum studies.

HIST 503 HISTORY OF AMERICA BEFORE 1860
F 3 cr. SEM 3 May be repeated, not to exceed 6 credits.
PREREQUISITE: HSTA 311 or HSTA 410.
- Topics in the social, cultural, economic, and political history of Early America in the Atlantic world.

HIST 504 TOPICS IN ENVIRONMENTAL HISTORY
On Demand 3 cr. SEM 3 May be repeated. Maximum 6 cr.
- Advanced readings and discussions in environmental history.

HIST 505 U.S. HISTORY 1860 TO PRESENT
S 3 cr. SEM 3 May be repeated. Maximum 6 cr.
PREREQUISITE: Graduate Standing
- Graduate research and analysis of important issues in recent American history.

HIST 506 TOPICS IN HISTORY OF SCIENCE, TECHNOLOGY, & SOCIETY
On Demand 3 cr. SEM 3
- Advanced readings and discussion in the history of science, technology, and society.

HIST 507 HISTORICAL WRITING
On Demand 3 cr. SEM 3
PREREQUISITE: HIST 540 or equivalent.
- Advanced seminar in the practice of writing history.

HIST 512 TOPICS IN WORLD HISTORY
F 3 cr. SEM 3
PREREQUISITE: Graduate standing. May be repeated. Maximum 6 cr.
- Examination of topics of current scholarly concern in history other than United States.

HDPE 551 RESEARCH OR
PROFESSIONAL PAPER/PROJECT
F, S, Su 1 - 6 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major adviser and graduate committee.

On Demand 2 - 12 cr. IND Maximum credits unlimited
PREREQUISITE: Graduate standing, and consent of instructor.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

HHD Health & Human Development

HHD 100 SPECIAL ACTIVITY
On Demand 1 cr. LAB 1 May be repeated
- Special Activity classes offered as needed using the unique skills of the instructional faculty in any given semester.

HHD 110 POCKET BILLIARDS
On Demand 1 cr. LAB 1
- Pocket billiard fundamentals, most popular games, and appropriate rules will be stressed. Fee required.

HHD 117 BOWLING FUNDAMENTALS
On Demand 1 cr. LAB 1
- Bowling fundamentals will be stressed along with bowling etiquette and equipment. Fee required.

HHD 161 SKIING, SNOWBOARDING, AND TELEMARKING
S 1 cr. LAB 1
- Instruction at all levels of skill from beginner to advanced. Fee required. Transportation, tickets, and equipment not included.

HHD 261 SKIING, CROSS COUNTRY
S 1 cr. LAB 1 Maximum 4 cr.
- The course provides instruction in preparation and execution of the various skills involved in cross country skiing from the beginner through advanced depending on the student’s ability and skill level. Fee required.

HHD 551 SPORT NUTRITION
F 5 cr. LEC 5 (OFFERED ONLINE)
PREREQUISITE: Graduate standing in HHD.
- Course will provide an overview of macronutrient and micronutrient metabolism and function, popular ergogenic aids and sports performance, nutritional quackery, nutritional recommendations for improved physical performance, fluid and electrolyte needs, thermoregulation, and nutritional analyses and consultation techniques.

HHD 552 SPORT PSYCHOLOGY
Su 5 cr. IND 5 (OFFERED ONLINE)
PREREQUISITE: A Bachelor’s degree; prior undergraduate course (s) in the exercise, sport or health sciences, psychology, or equivalent; experience with computers/software.
- An overview of basic concepts, behavioral principles, and history; anxiety, arousal, and motivation; leadership, cohesion, and audience effects; aggression and violence; populations including ethnicity, gender, high risk, injured, youth, and elite; coaching psychology; and personality assessment techniques.

HIST History - Graduate Level

HIST 502 PUBLIC HISTORY
F On Demand 3 cr. SEM 3
PREREQUISITE: May be repeated. Maximum 6 cr.
- Advanced readings and discussion in the practice of public history; including oral history, historic preservation, and museum studies.

HIST 503 HISTORY OF AMERICA BEFORE 1860
F 3 cr. SEM 3 May be repeated, not to exceed 6 credits.
PREREQUISITE: HSTA 311 or HSTA 410.
- Topics in the social, cultural, economic, and political history of Early America in the Atlantic world.

HIST 504 TOPICS IN ENVIRONMENTAL HISTORY
On Demand 3 cr. SEM 3 May be repeated. Maximum 6 cr.
- Advanced readings and discussions in environmental history.

HIST 505 U.S. HISTORY 1860 TO PRESENT
S 3 cr. SEM 3 May be repeated. Maximum 6 cr.
PREREQUISITE: Graduate Standing
- Graduate research and analysis of important issues in recent American history.

HIST 506 TOPICS IN HISTORY OF SCIENCE, TECHNOLOGY, & SOCIETY
On Demand 3 cr. SEM 3
- Advanced readings and discussion in the history of science, technology, and society.

HIST 507 HISTORICAL WRITING
On Demand 3 cr. SEM 3
PREREQUISITE: HIST 540 or equivalent.
- Advanced seminar in the practice of writing history.

HIST 512 TOPICS IN WORLD HISTORY
F 3 cr. SEM 3
PREREQUISITE: Graduate standing. May be repeated. Maximum 6 cr.
- Examination of topics of current scholarly concern in history other than United States.
HIST 513 TOPICS IN SOCIAL AND CULTURAL HISTORY
S 3 cr. SEM 3
PREREQUISITE: Graduate standing. May be repeated. Maximum 6 cr.
- Examination of topics in social and cultural history of current scholarly concern.

HIST 515 THE AMERICAN WEST
S 3 cr. LEC 5
PREREQUISITE: HISTA 464 or equivalent. May be repeated. Maximum 6 cr.
- Directed readings and analysis of major problems in the history of the American West.

HIST 540 HISTORICAL METHODS
F 3 cr. LEC 5 May be repeated. Maximum 6 cr.
- Consideration of historical thinking, the uses of evidence and historical methodology.

HIST 575 PROFESSIONAL PAPER
F S Su 1-4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

HIST 588 PROFESSIONAL DEVELOPMENT
On Demand 1-3 cr. May be repeated; maximum 3 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies.
- This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

HIST 589 GRADUATE CONSULTATION
F S Su 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

HIST 590 MASTER’S THESIS
F S Su 1-10 cr. IND May be repeated.
PREREQUISITE: Master’s standing.

HIST 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HIST 592 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head, and Dean of Graduate Studies.
- Directed research and study on an individual basis.

HIST 594 SEMINAR
On Demand (No credits, pass/fail), SEM 1.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

HIST 598 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

HIST 601 DISSERTATION WORKSHOP
F
- Presentation and discussion of dissertation research and writing.

HIST 689 DOCTORAL READING AND RESEARCH
On Demand 3-5 cr. IND May be repeated; maximum 15 cr.
- Presentation and discussion of dissertation research and writing.

HIST 690 DOCTORAL THESIS
On Demand 1-10 cr. IND May be repeated.
- Back to Subject Areas

HORT

HORT 105 MIRACLE GROWING
S 3 cr. LEC 3
- Science in the context of horticulture. Learn environmental factors affecting horticulture and current measurement technology. Projects explore global and regional issues, careers, and tools necessary to be a successful horticulturist. Culminates in a presentation at the Horticulture Open House.

HORT 131 LANDSCAPE DESIGN/HISTORY/THEORY
S 3 cr. LEC 3
- Introduction to the history of landscape design from ancient civilizations to the present. The evolution of design theory as it relates to visual arts, material palettes, climate, ecology, cultural, and social issues. Current trends in landscape industry and the work of major designers will be studied.

HORT 225 LANDSCAPE GRAPHICS I
F 3 cr. LEC 1 LAB 2
PREREQUISITE: EGEN 116 or TE 230 or AutoCAD experience.
- Landscape graphic communication including review of graphic enhancing techniques, rendering and computer presentation drawing applications of site analysis, site planning, landscape and planting design.

HORT 226 LANDSCAPE GRAPHICS II
S 3 cr. LAB 3
PREREQUISITE: EGEN 116 or TE 230 and HORT 225.
- Understanding of the opportunities offered by computer-based modeling technologies; exploring software common to the profession of landscape architecture including desktop publishing, image manipulation, modeling and drafting; utilizing computer-aided methods at different phases of a design project.

HORT 231 WOODY ORNAMENTALS
F 3 cr. LEC 1 LAB 2
PREREQUISITE: BIOW 170IN (may be used as a corequisite).
- Identification, culture and uses of deciduous and evergreen trees, shrubs and vines commonly used as ornamentals in Montana, and some species utilized outside of Montana. Lab includes extensive plant walks.

HORT 232 HERBACEOUS ORNAMENTALS
S 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOW 170IN (may be used as a corequisite).
- Identification, characteristics, cultural requirements and ornamental uses of indoor tropical foliage and flowering plants, herbaceous landscape annuals and perennials and flowering bulbs. This is a hybrid course requiring student participation in one lab each week, with all other course information and participation via the web.

HORT 245 PLANT PROPAGATION
S 3 cr. LEC 2 LAB 1
PREREQUISITE: CHMY 121IN or CHMY 141 and BIOW 170IN.
- Traditional sexual and asexual reproduction of plants including seed germination, stem and leaf cuttings, grafting, and layering. Includes discussion of the biology and physiology of propagation methods. Lab includes experimentation with the various propagation methods using native plants as model systems.

HORT 298 INTERNSHIP
On Demand 2 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience within the field.

HORT 310 TURFGRASS MANAGEMENT
F 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOW 170IN, Quantitative Reasoning Core, and HORT 105.
- Turfgrass propagation, fertilization, establishment, and maintenance. Recognition and adaptabilities of Northern and Southern turfgrasses used for landscape and sports use. Includes irrigation principles and basic hydraulics, establishment and fertilizer calculations, and pest management. Lab includes experimentation with establishment techniques, equipment calibration, soil testing, and turfgrass maintenance.

HORT 331 PLANTING DESIGN
F 3 cr. LEC 1 STU 2
PREREQUISITE: HORT 231 (may be taken as a corequisite).
- Graphic communication skills; landscape trends and styles; landscape design principles; and planting design for engineering, architectural, climate control, and aesthetic uses. Emphasis on residential landscape planning. Specification writing and cost estimating for landscape installation.

HORT 335 SITE ENGINEERING
S 4 cr. LEC 3 LAB 1
PREREQUISITE: M 145Q, HORT 331.
- Site analysis, site survey, structure siting, roadway and parking lot planning, grading and earthwork modifications, site drainage, pedestrian circulation design. Lab includes practical assistance with problem solving and field measurement for: site analysis, boundary survey, leveling and topographic survey.
HORT 336 LANDSCAPE CONSTRUCTION
S 4 cr. LEC 2 LAB 2
PREREQUISITE: HORT 331, HORT 335 (may be taken as a corequisite).
- Understanding of construction materials used to create the built landscape. Design and production of working drawings for walks, patios, steps, ramps, retaining walls, decks, fences, irrigation systems, and other landscape features. Production of landscape construction portfolio which details a complete site development project including cost estimating and bidding for construction.

HORT 357 VEGETABLE PRODUCTION
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: BIOL 110CS or BIOO 230.
- Modern production practices for all major temperate-zone vegetable crops, including crop management, development, storage, and post-harvest physiology. The class will include production of transplants and detailed discussion of several major vegetable crop families, including Solanaceae, Curcurbitaceae, Brassicaceae, Liliaceae, and the Fabaceae.

HORT 343 COMMERCIAL PLANT PRODUCTION
S 3 cr. LEC 3
PREREQUISITE: HORT 245.
- Focus is on greenhouse and nursery design and operation, including environmental control, growing media, irrigation, and fertilization of field and container grown ornamental crops. Retail and wholesale marketing strategies will be explored. Sustainable practices will be emphasized.

HORT 345 ORGANIC MARKET GARDENING
Su 5 cr. LEC 3
PREREQUISITE: BIOL 110CS, ENSC 245N and Junior standing.
- Focus is on the production of quality vegetable, herb and flower products for sale through local, regional or non-traditional marketing avenues. Special attention is made to present and analyze sustainable food crop production systems.

HORT 431 TOUGH PLANTS IN TOUGH PLACES
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: BIOL 170, BIOL 110, (HORT 231 and HORT 232) or BIOO 230.
- Delve into the physiological adaptation for both native and non-native plants to survive in urban and highly disturbed landscapes of the intermountain west. Explore the roles and interactions of turfgrasses, trees, shrubs, perennials and annuals in the ecology of the developed landscape. Learn about the interaction of the built landscape with natural systems.

HORT 447 ADVANCED PLANT PROPAGATION
F 3 cr. LEC 1 LAB 2
PREREQUISITE: HORT 245.
- Students will learn specialized sexual and asexual propagation techniques, with an emphasis on the physiological and environmental manipulation of plants associated with in vitro, seed and grafting production. Students will receive extensive tissue culture experience.

HORT 485 HORTICULTURE CAPSTONE I
F 1 cr. IND 1
PREREQUISITE: Senior standing, for majors only.
- First semester of a two-semester project for seniors majoring in Environmental Horticulture Science. This capstone course allows students to pursue a contemporary issue or problem in horticulture within a team research project.

HORT 486R HORTICULTURE CAPSTONE II
S 2 cr. IND 1 RCT 1
PREREQUISITE: Senior standing, for majors only.
- Second semester of a two-semester project for seniors majoring in Environmental Horticulture Science. This capstone course allows students to pursue a contemporary issue or problem in horticulture within a team research project.

HORT 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 4 cr. IND.
PREREQUISITE: Junior or Senior standing and approval of instructor.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

HORT 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

HORT 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

HORT 498 INTERNSHIP
F, S, Su 2 - 12 cr. IND.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

HORT 160D INTRODUCTION TO THE AMERICAN WEST
4 cr. LEC 3 RCT 1
- The American West examines the conquest settlement and development of territory west of the Mississippi River.

HORT 290R UNDERGRADUATE RESEARCH
F 1.5 cr. IND may be repeated
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project.

HSTA 291 SPECIAL TOPICS
1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Course not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HSTA 298 AMERICAN HISTORY INTERNSHIP
On Demand 1 - 12 cr. Maximum 12 cr.
PREREQUISITE: Consent of instructor, and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

HISTA 311 EARLY AMERICA
3 cr. LEC 3
- The development of the British American colonies and the establishment of the U.S. before 1800. Topics include pre-Columbian Native Americans, the European invasion and settlement of America, the social, economic and political evolution of the colonies, the American Revolution, and the establishment of the new nation.

HISTA 316 AMERICAN CIVIL WAR ERA
3 cr. LEC 3
PREREQUISITE: HSTR 101 or HSTR 102.
- Political, economic, and social developments leading to sectional division. Breakdown of political accommodation, Civil War, and Reconstruction.

HISTA 318 GILDED AGE TO 1940
PREREQUISITE: HSTR 101 or HSTR 102.
- This course explores the social, economic, and political development of the U.S. from 1877 to 1940, including the rise of big business, urbanization, progressive reform, the Great Depression, and the New Deal.

HISTA 322 AMERICAN HISTORY: WWI TO PRESENT
3 cr. LEC 3
PREREQUISITE: HSTA 102.
- Political, cultural, and economic history of the U.S. since the end of World War II.

HISTA 406 McCarthyism/Ike/Truman
S 3 cr. SEM 3
PREREQUISITE: HSTA 101 or HSTA 102.
- An analysis of the ways the Truman and Eisenhower administrations dealt with anti-communism, with a focus on McCarthyism.

HISTA 407 GENDER IN THE US & CANADIAN WEST
3 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- An examination of the experiences of women in the western U.S. and Canada. Focus on topics of race and ethnicity, families and intimacy, politics and the law, paid and unpaid work, art and culture.
COURSE DESCRIPTIONS: HSTA, HSTR

HSTA 408 GENDER IN AMERICA
5 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- History of women in America from colonial times to the present. Analysis of gender relations, the family, the struggle by women to achieve civil rights and social reform, the problems of working women, and the rise of feminism.

HSTA 409 FOOD IN AMERICA
S. alternate years, to be offered even years. 5 cr.
LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- This course examines the history of the production, consumption, and cultural meaning of food in America. In this class food functions as the gateway to examine issues of labor, gender, race, and class in America from the colonial period to the present.

HSTA 412 AMERICAN THOUGHT/CULTURE
5 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- The fundamental purpose of this course is to show the interconnectedness of science, philosophy, literature, and religion in shaping the American intellectual tradition from the Puritan founding to the present.

HSTA 416 RACE & CLASS IN AMERICA
S 3 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- Race in the history of the United States from early European and Native American contact until the present. Considers issues of racism, race relations, slavery, African-American culture, jazz, the modern Civil Rights movement, and current policy and racial questions.

HSTA 450 HISTORY OF AMERICAN INDIAN
(Now listed as NASX 450)
5 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- Indian affairs in America from 1600-1970. Emphasis on white reaction to the American Indians and the effect of the European invasion on Indian culture.

HSTA 460 MONTANA AND THE WEST
5 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- A survey of Montana history which will cover the development of the territory and state, and will examine the social, economic, cultural, and political patterns that connect Montana with the rest of the American West.

HSTA 464 TRANS-MISSISSIPPI WEST
5 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- Exploration of major themes in the development of the American West, such as conquest and settlement, economic development, racial and ethnic diversity, urbanization, and popular culture.

HSTA 468 HISTORY OF YELLOWSTONE
3 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- Historical analysis of changing perceptions of nature on development of Yellowstone and of the Park’s place in the context of a modernizing American nation.

HSTA 470 AMERICAN ENVIRONMENTAL HISTORY
3 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- Survey of changing perceptions and uses of the natural world from the colonial era to the present.

HSTA 482 HISTORY OF AMERICAN TECHNOLOGY
5 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- This course investigates fundamental questions about the role of technological change in U.S. history, focusing on issues such as the environment, concepts of progress, consumerism, power, work, and freedom.

HSTA 490R UNDERGRADUATE RESEARCH
F, S, Su 1-6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Course will address responsible conduct of research. Directed research on an individual basis.

HSTA 491 SPECIAL TOPICS
1-4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HSTA 492 INDEPENDENT STUDY
On Demand 1-4 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

HSTA 498 INTERNSHIP
On Demand 1-12 cr. IND
PREREQUISITE: Consent of instructor, consent of internship supervisor, and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

HSTA 499R SEMINAR CAPSTONE:
HISTORICAL METHODOLOGY
F, S 3 cr. SEM 3
PREREQUISITE: Senior standing, HSTR 160, HSTR 101 or HSTR 102 and HSTA 101 or HSTA 102.
- Senior capstone course. History majors practice sound research and writing methods, using appropriate bibliographical tools and in light of contemporary historiography.

HSTA 591 SPECIAL TOPICS
1-4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HSTR 101IH WESTERN CIVILIZATION I
F, S 4 cr. LEC 3 RCT 1
- This course explores the political, social, and cultural transformation of Europe from the absolute monarchies of the 1600s through the birth of the European Union. Possible topics include overseas trade, revolutions, cityscapes, class and gender identities, environmental transformations, and/or the memory of war. Introduces students to historical methods for analyzing primary sources such as architectural plans, maps, paintings, photographs, music, diaries, political treatises, and propaganda films.

HSTR 130D LATIN AMERICAN HISTORY
S 4 cr. LEC 3 RCT 1
- The history of Latin America from the Pre-Columbian period to the present day, focused primarily on the period since Independence in the 1820s. The course examines the origins and legacies of economic and political inequalities both within Latin America and the “first world”, with attention to questions of class, race, ethnicity, and gender.

HSTR 135D THE MODERN MIDDLE EAST
F 4 cr. LEC 3 RCT 1
- This introductory course examines the Middle East from the early twentieth century until the present day. Beginning with the Ottoman and Safavid empires, this course explores a variety of themes relating to the region and its place in the world.

HSTR 140D MODERN ASIA
S 4 cr. LEC 3 RCT 1
- Explores the legacies of imperialism, war, and revolution in the rise of modern East Asia, primarily Japan and China.

HSTR 145D REINVENTING JAPAN:
FROM ANCIENT TIMES TO PRESENT
F, S 4 cr. LEC 3 RCT 1
- Explores the political and cultural development of Japan from earliest time to the present. Special attention will be given to Japanese relations with Asia and the West.

HSTR 160D MODERN WORLD HISTORY
F 4 cr. LEC 3 RCT 1
- Introduction to themes important for understanding the world in the 20th century through an examination of commodities from 1900 - present: world systems, global interconnections, identity and difference, the rise of mass society, technology, and the environment.

HSTR 295CS SCIENCE, TECHNOLOGY, AND RISK
3 cr. LEC 3
- Examines the history, science, and ethics of risk, focusing on the complex relationship of science, technology, and risk in modern age. Includes exploration of knowledge production in science and technology; case studies such as industrial health and safety, the atomic age, “natural” disasters, and global warming to understand how risk has been defined, perceived, and remedied; and team research projects on such topics as automobile safety, earthquakes, and maladies.

HSTR History - World
formerly HIST

HSTR 101IH WESTERN CIVILIZATION I
F, S 4 cr. LEC 3 RCT 1
- Survey of the ancient Near East, Greece, Rome, and the European world through 1600. Emphasis on social, economic, and cultural history.
HISTR 207CS SCIENCE & TECHNOLOGY IN WORLD HISTORY
5 cr. LEC 3
- Surveys the role of science and technology in relation to social, political, and economic change in global history. Special attention is given to the historical development of scientific and technological knowledge, the ways different societies have linked ideas of progress and science, and how history can provide valuable perspective to contemporary debates over potentially revolutionary scientific and technological practices.

HISTR 208RH SCIENCE, ENVIRONMENT, TECHNOLOGY, SOCIETY: COMMON EXPERIENCE
5 cr. SEM
- Science and technology have become pervasive instigators of social change. This course aims to understand the nature, causes, and consequences of the growth of science and technology from a humanistic perspective, including recent advances in stem-cell research, the human genome, atomic energy and weapons, and space technology. We will explore the immense social, cultural, political, and economic consequences of these advances and how they have affected our relationship to the natural world.

HISTR 209H RELIGION IN LATIN AMERICA
5 cr.
- This course examines the history of religion in Latin America from pre-conquest times to the present.

HISTR 212CS DARWINIAN REVOLUTION
5 cr. LEC 3
- Covers the history, philosophy, and our current understanding of the biological sciences, focusing especially on the theory of evolution. Explores Darwin's ideas, the manner in which he came to them, his argument's explanatory power, and the diverse ramifications of evolutionary theory, including the modern debates in science and religion, stem cell research, cloning, sociobiology, and other tricky contemporary issues.

HISTR 215R UNDERGRADUATE RESEARCH F, S 1-4 cr. IND may be repeated
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

HISTR 216S SPECIAL TOPICS F-S 1-4 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Course not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HISTR 218W WORLD HISTORY INTERNSHIP
On Demand
PREREQUISITE: Consent of instructor, and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

HISTR 292H ANCIENT GREECE
5 cr. LEC 3
PREREQUISITE: HISTR 101 or HISTR 102.
- Origins to Alexander the Great, with special attention to life in classical Athens. Emphasis on reading ancient sources in translation.

HISTR 301H ANCIENT ROME
5 cr. LEC 3
PREREQUISITE: HISTR 101 or HISTR 102.
- From the foundations of the city to the fall of the empire, with special attention to social and military history. Emphasis on reading ancient sources in translation.

HISTR 322 19TH CENTURY EUROPE
5 cr. LEC 3
PREREQUISITE: HISTR 101 or HISTR 102.
- A comparative and transnational approach to the history of modern Europe from the French Revolution to the First World War.

HISTR 324 20TH CENTURY EUROPE
5 cr. LEC 3
PREREQUISITE: HISTR 101 or HISTR 102.
- Events and forces in 20th century Europe from World War I to the present. The rise of fascism, communism, and the interwar crisis along with post-World War II developments.

HISTR 330 HISTORY OF MEXICO
5 cr. LEC 3.
PREREQUISITE: Take one of the following: HISTA 101, HISTA 102, or HISTR 130D.
- This course examines the historical processes that resulted in the creation of modern Mexico.

HISTR 340 AGE OF THE SHOGUNS
5 cr. LEC 3
PREREQUISITE: HISTR 140D or HISTR 145D.
- Explores the political, cultural, and diplomatic issues involved in the development of the Tokugawa state and the emergence of modern Japanese identity.

HISTR 342 JAPAN'S LONG 19TH CENTURY
5 cr. LEC 3
PREREQUISITE: HISTR 140D or HISTR 145D.
- Investigates the revolutionary changes that Japan underwent between the 1770s and 1910 and the emergence of modern Japanese nationalism.

HISTR 345 MODERN CHINA
5 cr. LEC 3
PREREQUISITE: HISTR 160, HISTR 102 or HISTR 140.
- Social, political, and economic history of the People's Republic of China.

HISTR 346 MODERN INDIA
5 cr. LEC 3
PREREQUISITE: HISTR 160, HISTR 102 or HISTR 140.
- Social, economic, political, and intellectual history of India during the 19th and 20th centuries.

HISTR 353 MODERN FRANCE
5 cr. LEC 3
PREREQUISITE: HISTR 160, HISTR 101H or HISTR 192.
- A survey of French history from 1750 to the present, focusing on revolutions, the emergence of modern French culture, dynamics between Paris and provincial France, and the experience of war.

HISTR 355 MODERN FRANCE
5 cr. LEC 3
PREREQUISITE: HISTR 160, HISTR 101H or HISTR 192.
- From the foundations of the city to the fall of the empire, with special attention to social and military history. Emphasis on reading ancient sources in translation.

HISTR 358 MODERN GERMANY
5 cr. LEC 3
PREREQUISITE: HISTR 160, HISTR 101H or HISTR 192.
- Provides a comparative and thematic approach to the critical issues involved in the development of the German nation from its re-unification and the fall of the Berlin Wall to the present. Course will address responsible conduct of research.

HISTR 362 MODERN GERMANY
5 cr. LEC 3
PREREQUISITE: HISTR 101H or HISTR 192.
- An in-depth look at the economic, social, and political developments of modern Germany.

HISTR 366 MIDDLE EAST/20TH CENTURY
On Demand 3 cr. LEC 3
PREREQUISITE: One of the following: HISTR 101H, HISTR 102, HISTR 135D or PSCI 230.
- Investigates major diplomatic, economic, cultural and religious themes from the Middle East in the 20th century. Students will choose topics and countries of interest for specific, instructor-guided research.

HISTR 372 THE WORLD AT WAR
F, alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: HISTR 101H, or HISTR 102, or HISTA 101, or HISTA 102, or HSTA 160.
- The First World War examined through political, military, technological, and social history, in the contexts of the early decades of the 20th century and consequences up to the present.

HISTR 375 EURASIAN BORDERLANDS
F, alternate years, to be offered every even years 3 cr. LEC 3
PREREQUISITE: HISTR 101H, or HISTR 102, or HISTR 155.
- Provides a comparative and thematic approach to a series of issues related to the theme of cross-cultural contact. Draws on scholarly literature pertaining to the Balkans, the Middle East, and the former Soviet Union to examine imperialism, nationalism and religious identity, human mobility, and genocide.

HISTR 376 TWENTIETH CENTURY WAR
F, alternate years, to be offered every even years 3 cr. LEC 3
PREREQUISITE: HISTR 101H, or HISTR 102, or HISTR 155.
- This course examines the history of U.S. military activity in the Pacific Rim from the Philippine War to Vietnam, investigating the geopolitical, economic, social, and cultural factors that culminated in the nation's longest war: Vietnam.

HISTR 377 WORLD AT WAR
F, alternate years, to be offered every even years 3 cr. LEC 3
PREREQUISITE: HISTR 101H, or HISTR 102, or HISTR 155.
- This course examines the history of U.S. military activity in the Pacific Rim from the Philippine War to Vietnam, investigating the geopolitical, economic, social, and cultural factors that culminated in the nation's longest war: Vietnam.

HISTR 386 GENDER AND TECHNOLOGY
3 cr. LEC 3
PREREQUISITE: HISTR 102 or HISTA 102 or consent of instructor.
- This course explores the relationship between gender and technology in comparative cultural, social, and historical perspective.
HSTR 417 MODERN EARLY SCIENCE
5 cr. LEC 3
PREREQUISITE: HSTA 101, HSTR 101H, HSTR 102, HSTR or 282.
- The Scientific Revolution in Europe. Topics of study include the relationships between religion and science, science and gender, and technological change and the structure of society.

HSTR 419 MODERN SCIENCE
5 cr. LEC 3
PREREQUISITE: HSTR 102, or HSTA 101.
- The emergence of modern science in Europe and America from the Scientific Revolution to the Atomic Age. Special emphasis will be given to the cultural, political, and economic rise of science and technology within society.

HSTR 423 EUROPEAN INTELLECTUAL HISTORY
5 cr. LEC 3
PREREQUISITE: HSTR 101H or HSTR 102.
- The ideologies and major thinkers who have influenced European history from the French Revolution to the present day.

HSTR 430 LATIN AMER SOC HISTORY
5 cr. SEM 3
PREREQUISITE: HSTR 130, HSTA 101 or HSTA 102.
- Social history of Latin America from colonial times to the present.

HSTR 431 RACE IN LATIN AMERICA
5 cr. SEM 3
PREREQUISITE: HSTR 130, HSTA 101 or HSTA 102.
- This course explores the history of race relations in Latin America, focusing on the traditional links between “race” and power. Topics may include examinations of Indigenous, African, and European cultures/ethnicities, from the Conquest to the present day.

HSTR 432 COLONIAL LATIN AMERICA
5 cr. SEM 3
PREREQUISITE: HSTR 130 or consent of the instructor.
- This seminar-style course examines the colonial period in Latin America. Important themes include cross-cultural contact and conflict, the development of a colonial economy, religious and cultural change, institutional and political history, and the organization of colonial society.

HSTR 433 LATIN AMERICAN PERSPECTIVES
5 cr. LEC 3
PREREQUISITE: HSTR 160, HSTR 102, HSTR 130 or consent of the instructor.
- This course approaches historical developments, literature, and construction of identity in twentieth-century Latin America. Taught in English with Spanish reading/writing option. Focus will vary by instructor.

HSTR 434 GENDER IN LATIN AMERICA
5 cr. LEC 3
PREREQUISITE: Background in Latin American and/or Women’s Studies.
- An exploration of the ways in which transformations in the historical construction of gender and sexuality shaped and were shaped by broader processes of socioeconomic, political, and cultural change in Latin American history.

HSTR 443 GENDER IN ASIA
5 cr. LEC 3
PREREQUISITE: HSTR 160, HSTR 101H, HSTR 102, HSTR 140, or HSTR 145.
- Analysis of gender relations, the family, the struggle by women in Asia to achieve civil rights and social reform, the problems of working women and various alternatives to western feminism.

HSTR 444 GENDER IN JAPAN
5 cr. SEM 3
PREREQUISITE: HSTR 140 or HSTR 145.
- Investigates the role of gender in Japanese history from ancient times to the present.

HSTR 445 ENVIRONMENT, HEALTH, AND SCIENCE IN JAPAN
5 cr. LEC 3
PREREQUISITE: HSTR 140 or HSTR 145.
- Investigates the complex relationship between the Japanese and the natural world, including the history of disease and medicine.

HSTR 446 SCIENCE & MEDICINE IN CHINA
5 cr. LEC 3
PREREQUISITE: HSTR 140 or consent of instructor.
- An exploration of the transformations of medicine, technology, and natural knowledge in imperial and modern China.

HSTR 448 THE MAKING OF MODERN TURKEY
5 cr. alternate years 3 cr. LEC 3
PREREQUISITE: Lower division HSTR (non-US history) course or junior standing or consent of the instructor.
- This course focuses upon the major political, cultural, social, and economic developments taking place in the history of Turkey from its establishment in 1923 up to the present day. Of particular importance to the course is the question of what the study of Turkey’s modern history can teach us about the modern era more generally.

HSTR 482 ANIMAL HISTORIES
5 cr. LEC 3
PREREQUISITE: Consent of instructor.
- An intensive and creative research experience, this course allows students to explore the multidisciplinary side of history by investigating the interrelationship of human and nonhuman animals in a historical setting.

HSTR 490 UNDERGRADUATE RESEARCH
On Demand 1-4 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Consent of instructor and consent of department head.
- This course will address responsible conduct of research. Directed research on an individual basis.

HISTORICAL METHODOLOGY
F, S 3 cr. SEM 3
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

HISTORICAL METHODOLOGY
F, S 3 cr. SEM 3
PREREQUISITE: Senior standing and consent of instructor. Must register in History Department Office.
- Senior capstone course. History majors practice sound research and writing methods, using appropriate bibliographical tools and in light of contemporary historiography.

HUMANITIES

HUM 204 GENDER & SEXUALITY
On Demand 3 cr. 5 LEC
- The role of gender in human culture - in social organizations, views of nature, perception of self and arts, and technologies. Sexuality as paradigmatic image.

HUM 291 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

HUM 291 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.
COURSE DESCRIPTIONS: ICS, IDSN

ICS 490R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND May be repeated.
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

ICS 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ICS 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Independent study on topics related to intercultural and/or global issues.

ICS 404 INTERCULTURAL EXPERIENCE
On Demand 1 - 3 cr.LEC RCT
- Students must spend a minimum of three weeks in a non-US cultural setting, and must be accompanied by one or more MSU faculty members. Number of credits to be awarded will be determined by the Director of International Programs.

ICS 490R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

ICS 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ICS 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis of intercultural and/or global issues.

IDSN 101 INTRODUCTION TO DESIGN
F, S 3 cr.
- This course introduces design as it relates to interior design, architecture and related professions, through the study of the elements and principles of design and the ways in which humans interact with designed environments and elements.

IDSN 110 HISTORY OF INTERIOR DESIGN I: ANCIENT - 1900
F 3 cr.
- This course offers exposure to stylistic variations found in interior design of the ancient world and traditional Europe. Students will become aware of how these styles have been the impetus for pre-1900 architecture and decorative arts in America.

IDSN 111 HISTORY OF INTERIOR DESIGN II: 1900 - CONTEMPORARY
S 3 cr.
- This course is a continuation of the study of the development of the interior environment from the 19th century to the present. The difference in the basic philosophy between 19th and 21st century design is emphasized.

IDSN 122 TEXTILES AND INTERIOR FINISHES
S 3 cr.
- This course includes the study of textiles and interior finishes used by interior designers. Students will gain familiarity with a wide range of textile products used in both residential and commercial interiors including fiber content and yarn type, application and labeling, performance and maintenance. Students will also study the range and application of wall, ceiling and floor finish materials commonly used in interior design.

IDSN 130 INTERIOR DESIGN GRAPHICS
F 3 cr.
- This course introduces design as it relates to interior design, architecture and related professions, through the study of the elements and principles of design and the ways in which humans interact with designed environments and elements.

IDSN 131 PRESENTATION DRAWING
S 3 cr.
PREREQUISITE: IDSN 130 or equivalent - Interior Design Graphics provides interior design students with a basic knowledge of building structures, construction techniques and building materials. It introduces the technical skills needed to read and produce drawings used in the practice of interior design, including floor plans, interior elevations, reflected ceiling plans and detail drawings.

IDSN 135 FUNDAMENTALS OF SPACE PLANNING
S 3 cr.
- This course explores the physical and psychological concepts pertaining to interior spaces. Students work with commercial design programs, schematic planning tools, commercial furniture, and universal design concepts to create functional space plans that meet program criteria. Students will explore space planning in relationship to plumbing and mechanical systems and apply NKBA kitchen and bath space planning guidelines. The basic space planning skills and terminology learned are applicable to the NCIDQ exam.

IDSN 225 LIGHT, COLOR, AND LIGHTING SYSTEMS
S 3 cr.
PREREQUISITE: IDSN 101, IDSN 130.
- This course is a continuation of previous experience in color and lighting systems. Students will explore color theory, human response to color, and the properties of light and color. Students will also gain knowledge in lighting systems and specification of lamps and fixtures. The student will learn practical methods for applying these elements of design and demonstrate competency in color usage and lighting systems by designing projects including reflected ceiling plans, lighting and color specification.

IDSN 230 INTERIOR ARCHITECTURAL CAD
S 4 cr.
PREREQUISITE: Completion of all 100-level technical courses.
- The interior design student will learn basic commands in AutoCAD, and then apply these applications to the creation of residential and commercial construction drawings, furniture plans and 3D rendering using AutoCAD. Topics covered include drawing set-up, creation, 2D and 3D color rendering, and plotting.

IDSN 240 STUDIO I: RESIDENTIAL
F 4 cr.
PREREQUISITE: Completion of all 100-level technical courses.
- This course is a laboratory experience with real-life & hypothetical design projects. The focus of Studio I is primarily residential. Students will develop 2 or 3 complete presentations including but not limited to floor plans, interior elevations, interior perspectives, color board, room finish schedule, and a budget. Students will make oral presentations using the presentation boards to illustrate their design solutions.

IDSN 250 STUDIO II: COMMERCIAL
S 4 cr.
PREREQUISITE: Completion of all DE courses, IDSN 225 and DE 267/DE 250.
- Studio II is an advanced laboratory class which focuses on commercial design projects, some for actual clients. Advanced space planning, utilization of appropriate codes and specification writing will be covered. Students will develop 2-3 complete presentations including but not limited to floor plans, interior elevations, interior perspectives, color boards, and specification schedules. Students will make oral presentations using the presentation boards and CAD drawings to illustrate their design solutions.

IDSN 266 KITCHEN AND BATH I
F 3 cr.
PREREQUISITE: Completion of all 100-level technical courses.
- Using the National Kitchen and Bath Association guidelines, students will learn the fundamentals of kitchen and bath design, using NKBA’s drawing and presentation standards. Analysis of client needs, specifying products, creating design solutions, residential plumbing and mechanical systems, project drawing and documentation will also be covered.

IDSN 267 KITCHEN AND BATH II
S 3 cr.
PREREQUISITE: IDSN 266.
- This studio course is a continuation of Kitchen and Bath I, with a special emphasis on baths. There will be further exploration into products, and more advanced design solutions.

IDSN 275 PROFESSIONAL PRACTICES
S 3 cr.
PREREQUISITE: Completion of all 100-level technical courses, IDSN 240.
- This course is an introduction to business principles and practices related to the interior design profession. Topics include business procedures, methods of charging, and steps involved in business formation. Use of contracts and specifications to achieve desired objectives is covered, as is marketing of professional services and promotion of the firm. A portfolio, resume and cover letter will be completed during this class.
**IMID**

**Immunology & Infectious Diseases**

*formerly VTMB*

**IMID 298 INTERNSHIP**
Su 5 cr.
- This course is a variable credit class which gives the student 90 or 160 hours of experience in the daily operation of an interior design firm or a related business. It provides monitored experience in dealing with clients, customers and other business persons. The student will encounter opportunities to utilize skills and knowledge acquired in previous interior design courses. The discussion and reporting component of this class will be managed online. Students will be expected to give a brief presentation describing their experience when they return to school fall semester.

**IMID 498R BIOTECHNOLOGY INTERNSHIP**
ON DEMAND 4 cr.
- Junior standing, consent of instructor, and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

**IMID 522 LABORATORY ROTATION II**
S 2 cr.
- Must be a first year IMID Graduate Student. The IMID laboratory in which IMID 522 is performed must be different from the laboratories in which IMID 521 and IMID 522 were performed.
- An independent scientific project within a IMID research laboratory. Student should identify a question, master the necessary methods, collect and analyze data, and interpret how the data addresses the question. Final results are presented in a 15-minute departmental seminar.

**IMID 523 LABORATORY ROTATION III**
S 2 cr.
- Must be a first year IMID Graduate Student. The IMID laboratory in which IMID 523 is performed must be different from the laboratories in which IMID 521 and IMID 522 were performed.
- An independent scientific project within a IMID research laboratory. Student should identify a question, master the necessary methods, collect and analyze data, and interpret how the data addresses the question. Final results are presented in a 15-minute departmental seminar. An independent scientific project with a IMID research laboratory.

**IMID 525 MICROBIAL PATHOGENESIS**
S alternate years, 4 cr. LEC 4
- Bi 410, BCH 441/442 and Bio 425.
- Mechanisms by which organisms of significant medical interest interact with host cells, resulting in tissue or systems pathology will be explored. Pathogenesis is considered from the perspective of biology of the organism and the response of the host that contribute to disease progression.

**IMID 589 GRADUATE CONSULTATION**
S, Su 5 cr. TUT 3 Maximum credits unlimited.
- May be repeated. Max 12 cr.
- Directed research and/or study on an individual basis.

**IMID 590 MASTER'S THESIS**
S, Su 1 - 10 cr. IND Maximum credits unlimited.
- Prerequisite: Master's standing.

**IMID 591 SPECIAL TOPICS**
On Demand 1 - 4 cr. Maximum 6 cr.
- Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

**IMID 592 INDEPENDENT STUDY**
On Demand 1 - 3 cr. IND Maximum 6 cr.
- Directed research and/or study on an individual basis.
COURSE DESCRIPTIONS: ITS, JPNS, LAC

ITS
Information Technology Systems

ITS 280 COMPUTER REPAIR MAINTENANCE
F 4 cr. LEC 3

JPNS
Japanese
formerly MLJ

JPNS 101 ELEMENTARY JAPANESE I
F 4 cr. RCT 4
- Elementary course designed to help students acquire basic language skills in Japanese: reading, writing, listening, speaking. Introduction to Japanese writing systems (hiragana, katakana, kanji). Emphasis on establishing correct pronunciation and grasp of grammar. Cultural perspectives such as greetings, simple dialogues.
- PREREQUISITE: JPNS 101 (or equivalent), or placement interview with instructor.
- Continuation of JPNS 101. Expansion of cultural knowledge.

JPNS 102D ELEMENTARY JAPANESE II
S 4 cr. RCT 4
PREREQUISITE: JPNS 101 or equivalent, or placement interview with instructor.
- Review and further development of grammar and vocabulary skills necessary for improved reading proficiency in Japanese. Topics for study address Japanese culture and society through manga/cartoons, newspapers, magazines, correspondence, and short essays, with some translation and comparison with English.

JPNS 104D INTERMEDIATE JAPANESE I
F 4 cr. RCT 4
PREREQUISITE: JPNS 102 or equivalent, or placement interview with instructor.
- Review of skills acquired in elementary Japanese, followed by additional study of grammatical patterns and vocabulary acquisition. Emphasis on gaining basic conversational skills and improving reading. Expansion of cultural knowledge.

JPNS 102D INTERMEDIATE JAPANESE II
S 4 cr. RCT 4
PREREQUISITE: JPNS 201 or equivalent, or placement interview with instructor.
- Continuation of JPNS 201. Students who successfully complete this course will have "survival" skills for daily life in Japan, and will be ready for more advanced course work using authentic materials. Expansion of cultural knowledge.

JPNS 105 JAPANESE: ADVANCED CONVERSATION
S 3 cr. RCT 3
PREREQUISITE: JPNS 202 or placement interview with instructor.
- Review and further development of communication skills with an emphasis on both speaking and writing for various occasions. Cultural and social topics are explored through authentic materials to enhance knowledge of Japan and its people.

JPNS 201 CLASSICAL JAPANESE LITERATURE
On Demand 3 cr. RCT 3
PREREQUISITE: WRIT 101W or consent of instructor.
- Study of poetry, drama, and narrative from earliest times to mid-nineteenth century. All readings and discussions in English. No knowledge of Japanese necessary.

JPNS 202 MODERN JAPANESE LITERATURE
On Demand 3 cr. RCT 3
PREREQUISITE: WRIT 101W or consent of instructor.
- Study of novels, short stories, and poems written by Japanese authors from the mid-nineteenth century onward. Covers Japan's initial encounter with the West and the establishment of individual identity. All readings and discussions in English. No knowledge of Japanese necessary.

JPNS 325 OTHERS IN JAPANESE LIT & CULT
F alternate years, to be offered even years 3 cr. RCT 3
PREREQUISITE: WRIT 101W or consent of instructor.

JPNS 340 JAPANESE: ADV READING & GRAMMAR
F 5 cr. RCT 3
PREREQUISITE: JPNS 202 or placement interview with instructor.
- Review and further development of grammar and vocabulary skills necessary for improved reading proficiency in Japanese. Topics for study address Japanese culture and society through manga/cartoons, newspapers, magazines, correspondence, and short essays, with some translation and comparison with English.

JPNS 341 JAPANESE TEXT & CINEMA
On Demand 3 cr. RCT 3
PREREQUISITE: WRIT 101W or consent of instructor.
- Study of several fine Japanese films and the literary works upon which they were based. Emphasis is on the transformation of written text into image. All readings and discussions in English. No knowledge of Japanese necessary.

JPNS 401 MODERNITY AND MODERNISM IN JAPAN
On Demand 3 cr. LEC 3
PREREQUISITE: HISTR 145 or JPNS 150 and WRIT 101 or consent of instructor.
- This course concerns the challenges to representational practices in literature and film posed by Japan's modernization process. Topics covered vary; e.g., "Representations of Tokyo", "Detecting Modernity", "Caste and Class", "The Sixties in Japan", etc. May be repeated for credit.

JPNS 450R SEM: JAPANESE LITERATURE & CULTURE
On Demand 3 cr. SEM
PREREQUISITE: JPNS 315 or JPNS 350.
- Senior capstone course. Topics offered at the upper division level which are not covered in regular courses. Students conduct individual research projects while also preparing and presenting discussion materials.

JPNS 320 MODERN JAPANESE LITERATURE
On Demand 3 cr. RCT 3
PREREQUISITE: WRIT 101W or consent of instructor.
- Study of novels, short stories, and poems written by Japanese authors from the mid-nineteenth century onward. Covers Japan's initial encounter with the West and the establishment of individual identity. All readings and discussions in English. No knowledge of Japanese necessary.

JPNS 202 MODERN JAPANESE LITERATURE
On Demand 3 cr. RCT 3
PREREQUISITE: WRIT 101W or consent of instructor.
- Study of novels, short stories, and poems written by Japanese authors from the mid-nineteenth century onward. Covers Japan's initial encounter with the West and the establishment of individual identity. All readings and discussions in English. No knowledge of Japanese necessary.

LAC
Licensed Alcohol and Drug Counselor

LAC 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

LAC 501 CHEMICAL DEPENDENCY COUNSELING
Su 5 cr. LEC 3 (OFFERED ONLINE).
- This course will provide an introduction to the assessment and treatment of alcoholism and other chemical dependencies, with emphasis on the application of specific clinical strategies to this specialized problem area. Since substance abuse may underlie or coexist with a variety of other problems, including family violence, mental illness, health issues, etc., the mental health professional trained in the assessment and treatment of chemical dependency will be better able to assess and intervene appropriately.

LAC 502 PSYCHOPHARMACOLOGY
Su 5 cr. LEC 3 (OFFERED ONLINE).
- Examination of medications that are commonly prescribed for psychiatric disabilities; descriptions of medication effects, interaction, and side effects.

LAC 503 ASSESSMENT, TREATMENT, PLANNING AND ETHICS OF ADDICTION COUNSELING
F 3 cr. LEC 3 (OFFERED ONLINE).
- This course covers chemical dependency assessment and patient placement, including American Society of Addiction Medicine Patient Placement Criteria. Treatment planning and documentation, as well as ethics and ethical practice specific to the addiction field will be covered.

LAC 504 ALCOHOL AND DRUG STUDIES
F 3 cr. LEC 3 (OFFERED ONLINE).
- This course is designed to cover in-depth exploration of alcohol and drug studies. Students will integrate overview information with cutting edge research within the field of addictions as it pertains to a particular population or topic specific to addiction counseling.

LAC 506 GROUP COUNSELING IN ADDICTION SETTINGS I
F 3 cr. LEC 3 (OFFERED ONLINE).
- This course is designed for students who have already obtained an undergraduate degree in psychology or sociology and wish to obtain additional certification in the addiction counseling field.

LAC 507 GROUP COUNSELING IN ADDICTION SETTINGS II
S 3 cr. LEC 3 (OFFERED ONLINE).
- This course will build upon material presented in LAC 506 with greater emphasis on group work in an addictions setting. Topics will include motivational interviewing and cognitive behavioral techniques in group work.

LAC 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

LAC 501 CHEMICAL DEPENDENCY COUNSELING
Su 5 cr. LEC 3 (OFFERED ONLINE).
- This course will provide an introduction to the assessment and treatment of alcoholism and other chemical dependencies, with emphasis on the application of specific clinical strategies to this specialized problem area. Since substance abuse may underlie or coexist with a variety of other problems, including family violence, mental illness, health issues, etc., the mental health professional trained in the assessment and treatment of chemical dependency will be better able to assess and intervene appropriately.

LAC 502 PSYCHOPHARMACOLOGY
Su 5 cr. LEC 3 (OFFERED ONLINE).
- Examination of medications that are commonly prescribed for psychiatric disabilities; descriptions of medication effects, interaction, and side effects.

LAC 503 ASSESSMENT, TREATMENT, PLANNING AND ETHICS OF ADDICTION COUNSELING
F 3 cr. LEC 3 (OFFERED ONLINE).
- This course covers chemical dependency assessment and patient placement, including American Society of Addiction Medicine Patient Placement Criteria. Treatment planning and documentation, as well as ethics and ethical practice specific to the addiction field will be covered.

LAC 504 ALCOHOL AND DRUG STUDIES
F 3 cr. LEC 3 (OFFERED ONLINE).
- This course is designed to cover in-depth exploration of alcohol and drug studies. Students will integrate overview information with cutting edge research within the field of addictions as it pertains to a particular population or topic specific to addiction counseling.

LAC 506 GROUP COUNSELING IN ADDICTION SETTINGS I
F 3 cr. LEC 3 (OFFERED ONLINE).
- This course is designed for students who have already obtained an undergraduate degree in psychology or sociology and wish to obtain additional certification in the addiction counseling field.

LAC 507 GROUP COUNSELING IN ADDICTION SETTINGS II
S 3 cr. LEC 3 (OFFERED ONLINE).
- This course will build upon material presented in LAC 506 with greater emphasis on group work in an addictions setting. Topics will include motivational interviewing and cognitive behavioral techniques in group work.
LIBR 121 LIBRARY RESEARCH SKILLS
F, S 2 cr. RCT 2
- Library Research Skills is a course focusing on both the concepts and skills needed to conduct library research with an emphasis on electronic information sources. The purpose of the course is to provide individuals with a basic understanding of the library research process and the skills by which they can successfully find information for research, presentations, and other class assignments. This course may be taught solely online or as hybrid course that contains both classroom and online components.

LIBR 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

LIBR 316 BUSINESS INFORMATION RESEARCH SKILLS
F 3 cr. LEC 3
PREREQUISITE: Junior standing or consent of instructor.
- Focuses on both the concepts and skills needed to conduct research in various areas of business. Provides individuals with an understanding of the research process and the skills by which they can successfully find business related information for research, presentations, class assignments and personal use.

LIBR 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

LIBR 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: HIST 156
- Internship for archival arrangement and description.

LIBR 498 INTERNSHIP
On Demand 1 - 12 cr. IND.
PREREQUISITE: Junior standing, consent of instructor, and approval of Department Head
- An individual assignment arranged with an agency, business or other organization to provide guided experience in the field.

LIBR 592 INDEPENDENT STUDY
F, S, Su 1 - 4 cr. IND Maximum 8 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of Associate Dean of Libraries, and Dean of Graduate Education.
- An individual assignment arranged with an agency, business, school, or other organization to provide guided experience in the field.

LIBR 598 INTERNSHIP
F, S, Su 1 - 4 cr. IND Maximum 8 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of Associate Dean of Libraries, and Dean of Graduate Education.
- Directed research and study on an individual basis.

LIT 110H INTRO TO LIT
F, S 3 cr. RCT 3
- This writing-intensive introduction to the English major will prepare students for advanced study in literature by providing them with the foundational skills of literary analysis, literary theory, disciplinary methodologies, and close readings of literary texts.

LIT 201 INTRODUCTION TO LITERARY STUDIES
F, S 3 cr. SEM 3
- Introduction to basic concepts including but not limited to: plot, character, theme, symbol, and the primary literary modes of poetry, fiction, and drama. Students will be introduced to terms through a standard handbook which should accommodate all future English courses.

LIT 214D REGIONAL LIT
F, S 3 cr. RCT 3
- Examination of American literary regions in the context of critical multiculturalism. Analyzes topics such as the development of local color writing, borderlands/transnational studies, and the concept of the frontier as contact zone. May focus on a specific regional literature or adopt a comparative approach.

LIT 235 CLASSICAL ENDNNS OF LIT
S 3 cr. LEC 3
- Study of the literature of Classical Greece and Rome and how this tradition has influenced subsequent literature.

LIT 240 BIBLE AS LIT
F 3 cr. LEC 3
- Study of the Bible and related texts and how this tradition has influenced subsequent literature.

LIT 285D MYTHOLOGIES
F, S alternate years, to be offered even years 3 cr. RCT 3
- A study of the relationship between women and literature, with some attention to feminist approaches to critical interpretation.

LIT 300 LITERARY CRITICISM
F, S 3 cr. RCT 3
PREREQUISITE: LIT 201.
- Historical survey of principles, problems, and strategies of literary criticism.

LIT 325 REST/18TH CTRY BRIT LIT
F, S 3 cr. RCT 3
PREREQUISITE: LIT 201.
- An introduction to the literature of 18th-century Britain with attention to cultural contexts.

LIT 355 WOMEN & LIT
F, S alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: LIT 201.
- A study of the relationship between gender and literature, with some attention to feminist approaches to critical interpretation.

LIT 360 MULTICULTURAL LIT
F, S, Su 3 cr. RCT 3
PREREQUISITE: LIT 201.
- Designed specifically for English Education students. Focuses on literature by American minorities, women, and ethnic subcultures. Includes young adult literature, popular literature, and the work of one or more Montana Native American writers.

LIT 372 CONTEMP BRIT/AMER LIT
F, S alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: LIT 201.
- An examination of oral poetic/story traditions with emphasis on theory and primary materials. Students will be expected to make oral presentations based on class research.

LIT 377 20TH CTRY BRIT/AMER LIT
F, S alternate years, to be offered even years 3 cr. RCT 3
PREREQUISITE: LIT 201.
- A study of the relationship between gender and literature, with some attention to feminist approaches to critical interpretation.

LIT 378 ORAL TRADITIONS
S, S alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: LIT 201.
- An examination of oral poetic/story traditions with emphasis on theory and primary materials. Students will be expected to make oral presentations based on class research.

LIT 399 INDEPENDENT STUDY
S 3 cr. RCT 3
PREREQUISITE: LIT 201.
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

LIT 405 RESEARCH SKILLS
Fall 1 - 3 cr. IND.
PREREQUISITE: LIT 201.
- Internship for archival arrangement and description.

LIT 498 INTERNSHIP
On Demand 1 - 12 cr. IND.
PREREQUISITE: Junior standing, consent of instructor, and approval of Department Head.
- An individual assignment arranged with an agency, business or other organization to provide guided experience in the field.

LIT 499 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND.
PREREQUISITE: LIT 201.
- Internship for archival arrangement and description.

LIT 500 LITERARY CRITICISM
F, S 3 cr. RCT 3
PREREQUISITE: LIT 201.
- Historical survey of principles, problems, and strategies of literary criticism.

LIT 500 LITERARY CRITICISM
F, S 3 cr. RCT 3
PREREQUISITE: LIT 201.
- Historical survey of principles, problems, and strategies of literary criticism.

LIT 508 MULTICULTURAL LIT
S 3 cr. RCT 3
PREREQUISITE: LIT 201.
- Designed specifically for English Education students. Focuses on literature by American minorities, women, and ethnic subcultures. Includes young adult literature, popular literature, and the work of one or more Montana Native American writers.

LIT 510 AMERICAN LIT
F, S, Su 3 cr. RCT 3
PREREQUISITE: LIT 201.
- An introduction to the literature of 18th-century Britain with attention to cultural contexts and current literary trends and issues.

LIT 525 REST/18TH CTRY BRIT LIT
F, S alternate years, to be offered even years 3 cr. RCT 3
PREREQUISITE: LIT 201.
- An introduction to the literature of 18th-century Britain with attention to cultural contexts and current literary trends and issues.

LIT 535 WOMEN & LIT
F, S alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: LIT 201.
- A study of the relationship between gender and literature, with some attention to feminist approaches to critical interpretation.

LIT 571 20TH CTRY BRIT/AMER LIT
F, S alternate years, to be offered even years 3 cr. RCT 3
PREREQUISITE: LIT 201.
- An introduction to the literature of 18th-century Britain with attention to cultural contexts and current literary trends and issues.

LIT 575 ORAL TRADITIONS
S 3 cr. RCT 3
PREREQUISITE: LIT 201.
- An introduction to the literature of 18th-century Britain with attention to cultural contexts and current literary trends and issues.

LIT 575 ORAL TRADITIONS
S 3 cr. RCT 3
PREREQUISITE: LIT 201.
- A study of the relationship between gender and literature, with some attention to feminist approaches to critical interpretation.

LIT 577 20TH CTRY BRIT/AMER LIT
F, S alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: LIT 201.
- A study of the relationship between gender and literature, with some attention to feminist approaches to critical interpretation.

LIT 577 20TH CTRY BRIT/AMER LIT
F, S alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: LIT 201.
- A study of the relationship between gender and literature, with some attention to feminist approaches to critical interpretation.
LIT 382 LIT FOR CHILDREN/ADOLESCENTS
F alternate years, to be offered even years 3 cr.
RCT 3
PREREQUISITE: LIT 201.
- Studies in selected literary works for children and young adults. The course may focus on genres, authors, themes, and/or critical approaches.

LIT 431R STUDIES IN MAJOR AUTHOR/S
F 3 cr. LEC 3 Maximum 6 cr.
PREREQUISITE: LIT 201 and at least one other literature course.
- Intensive study in the works, biography, and criticism of a particular author.

LIT 437 STUDIES IN GENRES
F alternate years, to be offered even years 3 cr. RCT 3 Maximum 6 cr.
PREREQUISITE: LIT 201 and at least one other literature course.
- Intensive study of a single genre, such as the epic, novel, poem, dream vision, hypertext, or the idea of "genre" itself. Selection and approach will vary with each offering.

LIT 438 STUDIES IN LITERARY TOPICS
F 3 cr. LEC 3 Maximum 12 cr.
PREREQUISITE: LIT 201 and at least one other literature course.
- Provides an in-depth, rigorous analysis of current trends in literary scholarship. Organized around a specific theme, this course will expose students to new groups of literary works that cut across traditional historical, national, or generic boundaries.

LIT 440 STUDIES IN WORLD LIT
S 3 cr. LEC 3
PREREQUISITE: LIT 201 and at least one other literature course.
- Selected literary works in translation from non-English cultures and/or from English speaking cultures outside the United States and Britain.

LIT 473R STUDIES IN SHAKESPEARE
S 3 cr. RCT 3
PREREQUISITE: LIT 201 and at least one other literature course.
- Studies in selected Shakespearean works, drawn from tragedies, comedies, histories, romances, and poetry. Development of Shakespeare’s philosophy, poetics, and dramaturgy in the context of the Renaissance.

LIT 490 UNDERGRADUATE RESEARCH
F, S, Su 1-6 cr. IND May be repeated, Max. 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

LIT 492 INDEPENDENT STUDY
On demand 1-5 cr. IND Max. 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department chair.
- Directed research and study on an individual basis. May not be used in lieu of another required course in the English curriculum.

LIT 494R SEMINAR: RESEARCH ISSUES
F, S 3 cr. RCT 3
PREREQUISITE: Senior standing. Consent of instructor.
- Senior capstone course for literature majors. Integration and assessment of students’ cumulative experiences as English literature majors through specific seminar-styled research issues which vary with each offering. Restricted entry.

LIT 507 ENVIRONMENTAL RISK ASSESSMENT
F alternate years, to be offered odd years 5 cr. LEC 3
PREREQUISITE: BIOL 170, BIOL 370, STAT 401.
- Principles of risk analysis, including risk assessment, perception, communication, and management. Emphasis on human toxicology, ecotoxicology, dose-response relationships, exposure analysis, environmental fate, and deterministic and probabilistic risk assessment. Case studies will include examples from pesticides, biotechnology, and invasive species.

LIT 510 BIODIVERSITY SURVEY AND MODELING METHODS
F 3 cr. LEC 2 LAB 1
- Biodiversity survey and monitoring designs, sampling methods, and data evaluation techniques are introduced. Emphasis is on plants but other taxa are addressed for agricultural, rehabilitation and wildland systems. One week of fieldwork required prior to semester; course completion early October.

LIT 511 ENVIRONMENTAL DATA MANAGEMENT
S alternate years, to be offered even years 2 cr. LEC 2
PREREQUISITE: Graduate standing.
- Introduces graduate students in the natural sciences to concepts of designing data models and creation of associated databases. Database development project during the course is intended to facilitate proper management of data for each student’s graduate research project.

LIT 515 MICROBIAL ECOLOGY
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: BIOM 415.
- Critical review of literature on the distribution and activity of microorganisms in natural microbial communities based on microbial adaption and physical, chemical and biological features of the microenvironment. A critical discussion of literature and approaches.

LIT 525 APPLIED REMOTE SENSING
S 3 cr. LEC 2 LAB 1
PREREQUISITE: GPHY 426 or consent of instructor.
- Applications of remote sensing for graduate students, including advanced studies of multispectral and hyperspectral sensors and image processing algorithms. Emphasis is on using remote sensing technologies for solving applied land resource issues.

LRES 507 ENVIRONMENTAL RISK ASSESSMENT
F alternate years, to be offered odd years 1 cr.
PREREQUISITE: Any graduate student or undergraduate student with approval from the instructor.
- The course goal is to elevate agricultural students’ awareness of peer-reviewed literature that demonstrates application of principles to address issues of sustainability in cropping systems. The course will use a student-led discussion format to highlight issues and principles in a series of papers that the class will read. The course will emphasize the practical interaction among agronomy, ecology, economics, and sociology to create an awareness of the interdisciplinary issues associated with sustainability in agriculture.

LRES 529 SUSTAINABLE CROPPING SYSTEMS
S alternate years, to be offered odd years 5 cr. LEC 3
PREREQUISITE: ENSC 245 and either AGSC 341 or AGSC 342; graduate standing or consent of instructor.
- The course goal is to elevate agricultural students’ awareness of peer-reviewed literature that demonstrates application of principles to address issues of sustainability in agriculture. The course will use a student-led discussion format to highlight issues and principles in review of a series of papers that the class will read. The course will focus on the interaction among agronomy, ecology, economics, and sociology to create an awareness of the interdisciplinary issues associated with sustainability in agriculture. Topical issues associated with climate change impacts, system resilience and thresholds and ways to understand complex interactions will be considered for discussion.

LRES 530 NATURAL RESOURCE LAW
S 3 cr. LEC 3
- The course examines major natural resource laws, emphasizing the federal model. A modified case study approach is used to review legislation and related court cases governing natural resources, including water, minerals, timber, range, wildlife, recreation, and wilderness.

LRES 535 TECHNIQUES OF SPATIAL ANALYSIS
F alternate years, to be offered even years 5 cr. LEC 2 LAB 1
PREREQUISITE: STAT 410 or consent of instructor.
- Exploration and understanding of analytical techniques needed to deal with spatially correlated data. Emphasis is placed on practical applications within geographic information systems and image processing.

LRES 543 AGROECOLOGY/ APPLIED PLANT ECOLOGY
S alternate years, to be offered even years 3 cr.
LEC 2 LAB 1
PREREQUISITE: BIOL 370, M 171, ENSC 443, STAT 216.
- Focus on the principles and theories of population and community ecology as they relate to invasive plant species in natural and agroecosystems. Measuring plant interference and assessing population interactions and dynamics through empirical and theoretical models. Review theory and methodology concerning plant population demographics, dispersal, and natural trait selection. Examine the role of biodiversity and evolution in determining sustainable management of ecosystems.

LRES 528 BRIDGING PRINCIPLES AND PRACTICES OF SUSTAINABLE CROPPING SYSTEMS
F alternate years, to be offered odd years 1 cr.
LEC 1
PREREQUISITE: Any graduate student or undergraduate student with approval from the instructor.
- The course goal is to elevate agricultural students’ awareness of peer-reviewed literature that demonstrates application of principles to address issues of sustainability in cropping systems. The course will use a student-led discussion format to highlight issues and principles in a series of papers that the class will read. The course will emphasize the practical interaction among agronomy, ecology, economics, and sociology to create an awareness of the interdisciplinary issues associated with sustainability in agriculture.
LRES 545 WATERSHED ANALYSIS
5 cr. LEC 2 LAB 1
PREREQUISITE: ENSC 444 and STAT 216 or BIOB 314
- Conceptual and quantitative analysis of watershed processes with an emphasis on modeling surface water hydrology and water resources management. watershed modeling concepts including analysis of time series, spatially variable data, model calibration, and uncertainty analysis will be studied and demonstrated. The course will emphasize critical analysis of current hydrologic computational methods and hands-on use of watershed models.

LRES 546 QUANTITATIVE METHODS FOR ENVIRONMENTAL MODELING
5 alternate years, to be offered odd years 5 cr. LEC 3
PREREQUISITE: STAT 410 and ENSC 444
- Introduction and application of numerical skills desirable for watershed and environmental modelers, including applied time series analysis, applied spatial statistics, probabilistic approaches to data analysis, uncertainty analysis and introductory programming skills. The course will focus on the use of real life and relevant environmental/watershed case studies and examples to illustrate theory.

LRES 552 ADVANCED SOIL & ENVIRONMENTAL MICROBIOLOGY
5 alternate years, to be offered even years 5 cr. LAB 3
PREREQUISITE: Graduate standing or consent of instructor
- Advanced laboratory course. Microorganisms are targeted for isolation and characterization, emphasizing those not normally encountered in general microbiology laboratory. Biogeochemical cycling, contaminant biodegradation, extremophiles, and plant-microbe interactions are typical topics investigated. Students employ classic and novel cultivation approaches, identifying microbes based morphology, physiology, and phylogeny. Cross-listed with MB 552.

LRES 554 SOIL-LANDSCAPE MODELING
5 alternate years, to be offered odd years 5 cr. LEC 2 LAB 1
PREREQUISITE: ENSC 454 and STAT 410
- Quantitative soil-landscape modeling with an emphasis on multivariate spatial statistics, digital terrain modeling, and underlying landscape processes. The course is built around “hands-on” projects and discussions of peer-reviewed literature.

LRES 555 AQUEOUS GEOCHEMISTRY
5 alternate years, to be offered odd years 5 cr. LEC 2 LAB 1
PREREQUISITE: CHEM 211, CHEM 228, ENSC 245 or equivalent
- Advanced coverage of aqueous geochemistry in terrestrial and aquatic systems including chemical processes such as complexation, precipitation-dissolution, sorption-desorption, partitioning, oxidation-reduction and gas-water equilibria. Applications of these principles will be demonstrated in subject areas including biogeochemical cycling, bioremediation, contaminant fate and transport, salt-affected soils and wetland processes. Recitation will focus on current literature, applied problems, and case studies.

LRES 557 THERMAL BIOLOGY IN YELLOWSTONE NATIONAL PARK
Su 2 cr. LEC 1 RCT/DIS 1
PREREQUISITE: B.S. Science/Science Education; Enrollment limited to M.S. Science Education Graduate Program
- A survey of the ecology of important organisms common in thermal habitats of Yellowstone National Park, including a review of different life forms (prokaryotes and eukaryotes) and their modes of metabolism, and the physical, and chemical habitats that define their environment. Course includes lecture, laboratory, and field components. Students will be asked to design curricula for K-12 audiences.

LRES 558 ISOPTOLE BIOGEOCHEMISTRY
5 alternate years, to be offered even years 2 cr. LEC 1 RCT/DIS 1
PREREQUISITE: Consent of instructor
- Fundamentals and applications of isotope systems useful in the environmental sciences, including light elements such as carbon, mid-mass elements such as iron, and heavy elements such as uranium. Measurement techniques will be discussed, and application to student inspired questions explored.

LRES 561 BELOWGROUND PLANT ECOLOGY
5 alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: STAT 401 or equivalent; BIOE 370 or equivalent; BIOE 433 or equivalent
- Application of basic ecological principles to belowground interactions of plant communities. Topics include plant competition, belowground herbivory, plant-microbe interactions including mycorrhizae, and diversity/productivity links in soil systems. Case studies will include invasive species, restoration scenarios, sustainable agriculture, and wildland communities.

LRES 565 ENVIRONMENTAL BIOPHYSICS
5 alternate years, to be offered even years 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOL 170 or equivalent and PHYS 265
- The study of physical relationships between organisms, ecosystems, and their environment. Basic principles of Micrometeorology, Biometry, Ecological Climatology, and Biophysical Ecology as applied to contemporary ecological challenges. Laboratory sessions will focus on computer exercises using ecosystem models and field observations.

LRES 568 ECO SYSTEM BIOGEOCHEMISTRY AND GLOBAL CHANGE
5 cr. LEC 3
PREREQUISITE: CHMY 143, GPHY 111, ENSC 110 and ENSC 245 (or equivalent understanding)
- Introduction to the study of biogeochemistry and ecosystem dynamics from an Earth-systems perspective. Discussion will emphasize factors governing the “grand elemental cycles” of carbon, nitrogen, and phosphorus of Earth’s major ecosystems and how modern human activities are affecting these cycles.

LRES 569 ECOLOGY OF INVASIVE PLANTS IN THE GYE
5 cr. LEC 1 RCT/DIS 1
PREREQUISITE: Consent of instructor
- Current theories on what makes species invasive and what ecosystem conditions invite or resist non-indigenous plant species will be considered. Direct involvement in field research associated with testing methodology for monitoring the invasive potential of several exotic species in the otherwise pristine mountain environments.

LRES 575 PROFESSIONAL RESEARCH PAPER
On Demand 1-4 cr. Maximum 6 cr.
PREREQUISITE: Graduate standing
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student, the major advisor, and graduate committee.

LRES 589 GRADUATE CONSULTATION
F, S, Su 3 cr. TUT
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their coursework (and thesis, if on a thesis plan), but who need additional faculty or staff time or help.

LRES 590 MASTER’S THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.

LRES 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need or given on a trial basis to determine acceptability and demand before requesting a regular course number.

LRES 592 INDEPENDENT STUDY
On demand 1 - 10 cr. Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head, and Dean of Graduate Studies.
- Directed research and study on an individual basis.

LRES 594 SEMINAR
F, S, Su 1 cr. SEM Maximum 6 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering. Students prepare, present, and critique scientific presentations.

LRES 598 INTERNSHIP
On demand 2 - 4 IND Maximum 12 cr.
PREREQUISITE: Graduate standing, consent of instructor and approval of department head, and Dean of Graduate Studies.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in a field of study.

LRES 690 DOCTORAL THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

LS
Liberal Studies

LS 101 US WAYS OF KNOWING
F 3 cr. SEM 3
- Introduction to the processes of academic inquiry through examination of topics in disciplines encompassed by the Fine Arts, Humanities, Natural Sciences, and Social Sciences.
LS 102 INTRO TO LIBERAL STUDIES
S 1 cr. SEM 1
PREREQUISITE: University Seminar (US Course) or consent of instructor.
- An introduction to the history and philosophy of liberal education and a review of the Fine Arts, Humanities, Social and Natural Science disciplines. The LS degree components and options will be explained, as will career opportunities.

LS 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

LS 301 INTEGRATIVE SEMINAR
F, S 1 cr. SEM 1 Maximum 3 cr.
PREREQUISITE: University Seminar and sophomore standing.
- The integration of knowledge, theories, and concepts across different disciplines in the Fine Arts, Humanities, Natural Sciences, and Social Sciences.

LS 401 SENIOR PROJECT
F, S 4 cr. SEM 4
PREREQUISITE: CLS 101 or LS 101 and LS 301.
- Senior capstone course. Opportunity for Liberal Studies majors to apply knowledge and experiences acquired throughout the program in researching and designing solutions to contemporary public policy issues.

LS 460 TEACHING INTERNSHIP
F
PREREQUISITE: US core and consent of instructor.
- As co-facilitators of a section of LS 101-US, students will acquire and have the opportunity to practice classroom teaching strategies and mentoring skills.

LS 490R UNDERGRADUATE RESEARCH
F, S 4 cr. IND 4
PREREQUISITE: LS 101 or LS 101 and LS 301.
- Senior capstone course. Opportunity for Liberal Studies majors to apply knowledge and experiences acquired throughout the program in researching and designing solutions to contemporary public policy issues.

LS 491 SPECIAL TOPICS
On Demand 1 - 4 cr. SEM Maximum 12 cr.
PREREQUISITE: Course prerequisites are dependent on the offering.
- Courses not required in any curriculum for which there is a particular one-time need or given on a trial basis to determine acceptability and demand before requesting a regular course number.

LS 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
- Directed research and study on an individual basis.

M Mathematics
formerly MATH

M 065 PREALGEBRA
(Gallatin College Programs)
F, S 4 cr. LEC 4
PREREQUISITE: ACT 23, SAT 540, MPLEX Level 3 (or M121).
- The study of number and operations for prospective elementary and middle school teachers, including whole numbers, decimals, fractions, percents, integers, operations, numeration systems, and problem solving.

M 066 PREALGEBRA LAB & STUDY
(Gallatin College Programs)
F 1 cr. RCT 1
- Students enrolled in M 065 co-enroll in this course for additional instruction and practice with M 065 curriculum and Math study skills. This course will help students understand Math concepts, practice course material, and prepare for Math tests. Offered by Gallatin College Programs. Course is offered pass/fail.

M 096 SURVEY OF ALGEBRA
(Gallatin College Programs)
F, S 4 cr. LEC 4
PREREQUISITE: M 065 or M 085 or Math Placement Test within the past 12 months.
- This instructor-taught course initiates development in students’ ability to organize thought processes and systematically solve problems while preparing students for studies in other courses. Topics include linear equations and inequalities and their graphs, systems of linear equations, exponents, polynomials, factoring, rational expressions, and square roots. Offered by Gallatin College Programs. Course is equivalent to M 097.

M 097 SURVEY OF ALGEBRA
(Master Learning)
F, S 3 cr. IND 3
PREREQUISITE: M 065 or Math Placement Test within the past 12 months.
- A flexible paced course designed for a wide range of students needing anything from extensive practice to a quick review of algebraic concepts and problem solving. Students have access to a variety of resources as well as a personalized course webpage to keep track of their progress. Topics include linear equations and inequalities and their graphs, systems of linear equations and inequalities, exponents, polynomials, factoring, rational expressions, and square roots.

M 108 BUSINESS MATHEMATICS
(Gallatin College Programs)
F 4 cr.
- Students in this course will examine the mathematics of business ownership and will demonstrate an understanding of business decisions. Concepts include marketing, payroll, cash flow, simple and compound interest, credit, promissory notes, insurance, financial statements, ratio analysis, depreciation, annuities, and inventory valuation. Offered by Gallatin College Programs.

M 116 MATHEMATICS FOR HEALTH CAREERS
(Gallatin College Programs)
S 5 cr. LEC 5
- Inductive reasoning; logic; mathematical number systems; linear, quadratic, exponential, and logarithmic functions; graphing; probability; English, Apothecary and Metric systems and conversions; dosage calculations; and dimensional

M 121Q COLLEGE ALGEBRA
F, S, Su 3 cr. LEC 3
PREREQUISITE: M 097 or Math Placement Test within the past 12 months.
- Further development of algebraic skills through the study of linear, quadratic, polynomial, exponential, and logarithmic functions.

M 122Q COLLEGE ALGEBRA
F, S, Su 3 cr. LEC 3
PREREQUISITE: M 121 or Math Placement Test within the past 12 months.
- Functions, graphs, and the use symbols for expressing mathematical thoughts. Polynomials, rational, exponential, logarithmic, and trigonometric functions.

M 132 NUMBERS & OPERATIONS FOR K-8 TEACHERS
F, S 3 cr. LEC 3
PREREQUISITE: ACT 23, SAT 540, MPLEX Level 3 (or M121).
- The study of number and operations for prospective elementary and middle school teachers, including whole numbers, decimals, fractions, percents, integers, operations, numeration systems, and problem solving.

M 133Q GEOMETRY & GEOMETRIC MEASUREMENT FOR K-8 TEACHERS
F, S 3 cr. LEC 3
PREREQUISITE: M 132.
- The study of geometry and geometric measurement for prospective elementary and middle school teachers, including synthetic, transformational, and coordinate geometry, constructions, congruence and similarity, 2-dimensional and 3-dimensional measurement, and problem solving.

M 135 MATHEMATICS FOR K-8 TEACHERS I
F, S on demand 4 cr. LEC 4
PREREQUISITE: M 097 or Math Placement Test within the past 12 months.
- An introduction to problem solving, sets, rational and irrational numbers, operations functions, number systems, and statistics for prospective elementary school teachers.

M 136Q MATHEMATICS FOR K-8 TEACHERS II
F, S on demand 4 cr. LEC 4
PREREQUISITE: M 135.
- An introduction to problem solving, sets, rational and irrational numbers, operations functions, number systems, and statistics for prospective elementary school teachers.

M 145Q MATHEMATICS FOR THE LIBERAL ARTS
F, S, Su 3 cr. LEC 3
PREREQUISITE: M 097 or Math Placement Test within the past 12 months.
- Basic skills in applicable mathematics including linear, quadratic, and exponential models, financial mathematics, trigonometry and some elementary statistics.

M 147Q LANGUAGE OF MATHEMATICS
S 3 cr. LEC 3
PREREQUISITE: M 097 or Math Placement Test within the past 12 months.
- Reading comprehension and writing skills in the language of mathematics; vocabulary, grammar, syntax and logic; emphasis on understanding, expressing, proving, and thinking mathematical thoughts.

M 149Q SECRETS OF THE INFINITE
F, S 3 cr. LEC 3
PREREQUISITE: M 097 or Math Placement Test within the past 12 months.
- Intriguing problems, puzzles, and paradoxes studied from an historical perspective. Hands-on thought experiments follow mathematical ideas as they evolved from ancient beginnings into their modern contexts. Topics vary by semester.

M 151Q PRECALCULUS
F, S, Su 3 cr. LEC 4
PREREQUISITE: M 121 or Math Placement Test within the past 12 months.
- Functions, graphs, and the use symbols for expressing mathematical thoughts. Polynomials, rational, exponential, logarithmic, and trigonometric functions.
COURSE DESCRIPTIONS: M

M 16Q SURVEY OF CALCULUS
F, S, Su 4 cr. LEC 4
PREREQUISITE: M 121 or Math Placement Test within the past 12 months.
– A survey of basic calculus including limits, differentiation, and integration with applications to business, biology, and social science problems.

M 165Q CALCULUS FOR TECHNOLOGY I
F, S 3 cr. LEC 3
PREREQUISITE: M 151 or Math Placement Test within the past 12 months.
– Calculus with emphasis on problems of interest to engineering technologists. Includes analytic geometry, differentiation, and introduction to integration.

M 166Q CALCULUS FOR TECHNOLOGY II
F, S 3 cr. LEC 3
PREREQUISITE: M 165.
– Calculus with emphasis on problems of interest to engineering technologists. Includes integration, differentiation, and introduction to integration.

M 171Q CALCULUS I
F, S, Su 4 cr. LEC 4
PREREQUISITE: M 151 or Math Placement Test within the past 12 months.
– Calculus with emphasis on problems of interest to engineering technologists. Includes integration, differentiation, and introduction to integration.

M 172Q CALCULUS II
F, S 4 cr. LEC 4
PREREQUISITE: M 171.
– Methods of integration, applications of the integral, Taylor’s theorem, infinite sequences and series, polar coordinates.

M 181Q HONORS CALCULUS I
F 4 cr. LEC 4
PREREQUISITE: M 151 with an “A” grade, 700 on the SAT Math exam, 31 on the ACT Math exam, 4 on an AP Calculus exam, or consent of the instructor.
– Honors section of M 171. Topic coverage parallels M 171 but with a greater emphasis on theory and more difficult problems.

M 182Q HONORS CALCULUS II
S 4 cr. LEC 4
PREREQUISITE: M 171 with an “A” grade or M 181 with a “B” grade.
– Honors section of M 172. Topic coverage parallels M 172 but with a greater emphasis on theory and more difficult problems.

M 221 INTRODUCTION TO LINEAR ALGEBRA
F, S, Su 3 cr. LEC 3
PREREQUISITE: M 166 or M 172.
– Matrix algebra, systems of linear equations, determinants, vector algebra and geometry in Euclidean 5-space, eigenvalues, eigenvectors.

M 234 ADVANCED TOPICS IN MATHEMATICS FOR K-8 TEACHERS
F, S 3 cr. LEC 3
PREREQUISITE: M 132 and M 133Q.
– The study of algebra, number theory, probability and statistics for prospective elementary and middle school teachers, including proportional reasoning, functions, elementary number theory, statistical modeling and inference, and elementary probability theory.

M 242 METHODS OF PROOF
F, S 3 cr. LEC 3
PREREQUISITE: M 172.
– Reasoning and communication in mathematics, including logic, generalization, existence, definition, proof, and the language of mathematics. Topics include functions, relations, set theory, recursion, algebra, number theory, and other areas of mathematics.

M 273Q MULTIVARIABLE CALCULUS
F, S, Su 4 cr. LEC 4
PREREQUISITE: M 172.
– Topics in two and three dimensional geometry. Manipulation and application of vectors. Functions of several variables, contour maps, graphs, partial derivatives, gradients, double and triple integrals, vector fields, line integrals, surface integrals, Green’s Theorem, Stokes’ Theorem, the Divergence Theorem.

M 274 INTRODUCTION TO DIFFERENTIAL EQUATIONS
F, S, Su 4 cr. LEC 4
PREREQUISITE: M 172.
– An introduction to qualitative, quantitative, and numerical methods for ordinary differential equations. Topics include modeling via differential equations, linear and nonlinear first order differential equations and systems, elementary phase plane analysis, forced oscillations, and Laplace transform techniques.

M 283Q HONORS MULTIVARIABLE CALCULUS
F 4 cr. LEC 4
PREREQUISITE: M 182 with a ‘B’ grade, M 172 with an ‘A’ grade, AP Calculus BC exam with a 5, or consent of the instructor.
– Honors section of M 271. Topic coverage parallels M 271 but with a greater emphasis on theory and more difficult problem solving.

M 284HONORS INTRODUCTION TO DIFFERENTIAL EQUATIONS
S 4 cr. LEC 4
PREREQUISITE: M 283 with a ‘B’ grade, M 273 with an ‘A’ grade, or consent of the instructor.
– Honors section of M 274. Topic coverage parallels M 274 but with a greater emphasis on theory and more difficult problem solving.

M 290R UNDERGRADUATE RESEARCH
F, S, Su 1 - 8 cr. IND
PREREQUISITE: Consent of the department head.
– Directed undergraduate research. Course will address responsible conduct of research.

M 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

M 328 HIGHER MATHEMATICS FOR SECONDARY TEACHERS
F 3 cr. LEC 3
PREREQUISITE: M 242.
– Concepts, processes, and proof relevant to school mathematics, including number theory, abstract algebra, combinatorics and probability; NCTM Standards and a focus on content for teachers in secondary schools.

M 329 MODERN GEOMETRY
S 3 cr. LEC 3
PREREQUISITE: M 242.
– A study of Euclidean and non-Euclidean geometries, chosen from, hyperbolic, spherical, projective, finite, transformational, and fractal geometries; computer tools for geometry; NCTM Standards and a focus on content for teachers in secondary schools.

M 330 HISTORY OF MATHEMATICS
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: M 273 and M 274 or consent of instructor.
– Topics will be selected from the entire span of history from Egyptian, Babylonian, and Greek times through the 20th century. The course may focus on milestones that lead to the development of modern mathematics as well as the contributions of great mathematicians from ancient times until today. Some ideas will require mathematical sophistication at the upper division level.

M 333 LINEAR ALGEBRA
F 3 cr. LEC 3
PREREQUISITE: M 273 and M 274.
– An introduction to advanced analytical techniques frequently used by scientists and engineers to study ordinary differential equations and two-point boundary value problems. Topics include series solution techniques, method of Frobenius, Laplace transforms, Fourier series, and boundary value problems.

M 348 TECHNIQUES OF APPLIED MATHEMATICS I
F 3 cr. LEC 3
PREREQUISITE: M 273 and M 274.
– Science and engineering majors often encounter partial differential equations in the study of heat flow, vibrations, electric circuits, and similar areas. Topics include Sturm-Liouville theory, partial differential equations boundary value problems, and Laplace Transform methods.

M 383 INTRODUCTION TO ANALYSIS I
F 3 cr. LEC 3.
PREREQUISITE: M 273 and either M 242, M 333, or consent of instructor.
– A rigorous development of calculus with formal proofs. Functions, sequences, limits, continuity, differentiation, and integration.

M 384 INTRODUCTION TO ANALYSIS II
S 3 cr. LEC 3.
PREREQUISITE: M 381.
– A rigorous development of multivariate calculus. Differentiable functions, inversion theorem, multiple integrals, line and surface integrals, infinite series.
M 360R SOFTWARE APPLICATIONS IN MATHEMATICS
S 5 cr. LEC 3.
PREREQUISITE: M 221, M 273, and M 274.
- An introduction to modern mathematical and scientific computing. Software such as MAPLE and MATLAB will be used to explore, solve, and visualize solutions of standard mathematical problems as well as simple models of various physical and/or biological systems.

M 420 GEOMETRY, MEASUREMENT, AND DATA IN THE MIDDLE GRADES
F alternate years, to be offered even years
5 cr. LEC 3
PREREQUISITE: M 242 or M 254 and 3 credits from elementary math option.
- Develop content knowledge necessary to teach standards-based middle school mathematics. Investigate the underlying conceptual structure of topics in geometry, measurement and data analysis appropriate to middle school. Explore the use of manipulative materials and technology, and discuss related pedagogical issues and national standards.

M 424 ALGEBRAIC THINKING AND NUMBER SENSE IN THE MIDDLE GRADES
F alternate odd years, Sa alternate even years
3 cr. LEC 3
PREREQUISITE: M 242 or M 254 and 3 credits from elementary math option.
- Develop algebraic knowledge necessary to teach standards-based middle school mathematics. Investigate the underlying conceptual structure of topics in algebra and number appropriate to middle school. Explore the use of manipulative materials and technology, and discuss related pedagogical issues and national standards.

M 428 MATHEMATICAL MODELING FOR TEACHERS
F 3 cr. LEC 3
PREREQUISITE: Junior or senior standing in mathematics education, or consent of instructor.
- Senior capstone course. Overview of the modeling process including simulation, review of relevant technology, relevant mathematics including difference equations and recursion, strategies to initiate modeling, activities, modeling in the secondary curricula, and the classroom assessment of modeling activities. Emphasis on technology and authentic applications using pre-college mathematics.

M 430 MATHEMATICAL BIOLOGY
S 3 cr. LEC 3
PREREQUISITE: M 273 and M 274 or consent of the instructor.
- Mathematical modeling of basic biological processes in ecology, physiology, neuroscience, epidemiology and molecular biology using difference equations, differential equations, and partial differential equations.

M 431 ABSTRACT ALGEBRA I
S 3 cr. LEC 3
PREREQUISITE: M 333.
- Senior capstone course. The integers, integers modulo, the Euclidean algorithm. Groups, subgroups, normal subgroups, quotient groups, homomorphism and isomorphism theorems, and abelian groups. Rings, ideals, homomorphism and isomorphism theorems. Integral domains, fields, and fields of quotients.

M 441 NUMERICAL LINEAR ALGEBRA & OPTIMIZATION
F 3 cr. LEC 3
PREREQUISITE: M 221 and M 273.

M 442 NUMERICAL SOLUTION OF DIFFERENTIAL EQUATIONS
S 3 cr. LEC 3
PREREQUISITE: M 221 and M 274.

M 450 APPLIED MATHEMATICS I
F alternate years, to be offered odd years
3 cr. LEC 3
PREREQUISITE: M 273 and M 274.
- An introduction to modern methods in applied mathematics. Topics include introductions to dimensional analysis and scaling, perturbation and WKB methods, boundary layers, calculus of variations, stability, and bifurcation analysis.

M 451 APPLIED MATHEMATICS II
S alternate years, to be offered even years
3 cr. LEC 3
PREREQUISITE: M 450.
- This is the second semester of a course that introduces modern methods in applied mathematics. Topics involve methods for linear and nonlinear partial differential equations, including introductions to Green’s functions, Fourier analysis, shock waves, conservation laws, maximum and minimum principles, and integral equations.

M 454 INTRODUCTION TO DYNAMICAL SYSTEMS I
F alternate years, to be offered even years
3 cr. LEC 3
PREREQUISITE: M 273 and M 274.

M 455 INTRODUCTION TO DYNAMICAL SYSTEMS II
S alternate years, to be offered odd years
3 cr. LEC 3
PREREQUISITE: M 454.
- Gradient systems, Poincare-Bendixson theory, Poincare maps, structural stability and chaotic systems.

M 472 INTRODUCTION TO COMPLEX ANALYSIS
S alternate years, to be offered even years
3 cr. LEC 3
PREREQUISITE: M 273 and M 274.
- An introduction to the techniques of complex analysis that are frequently used by scientists and engineers. Topics include complex numbers, analytic functions, Taylor and Laurent expansions, Cauchy’s theorem, and evaluation of integrals by residues.

M 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Junior standing in mathematics and consent of department head.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

M 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

M 492 INDEPENDENT STUDY
F, S, Su 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

M 494 SEMINAR
On Demand 1 cr. EM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting material.

M 497 EDUCATIONAL METHODS: TEACHING FELLOWSHIP
F, S 1 - 2 cr. IND.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- As co-teachers of a Mathematics or Statistics course, students will learn and have the opportunity to practice classroom teaching strategies as well as mentoring skills.

M 498 INTERNSHIP
F, S, Su 2 - 12 cr. IND.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

M 501 INTERMEDIATE PROBABILITY & STATISTICS
F 3 cr. LEC 3
PREREQUISITE: STAT 422 or M 382.

M 502 INTERMEDIATE MATHEMATICAL STATISTICS
S 3 cr. LEC 3
PREREQUISITE: STAT 501 or M 501.
- Mathematical foundation and theory of point estimation, particularly maximum likelihood estimation, interval estimation, and hypothesis testing. Cross-listed with STAT 502.

M 503 ADVANCED LINEAR ALGEBRA
S 3 cr. LEC 3
PREREQUISITE: M 335 or consent of instructor.
- Topics include abstract vector spaces, diagonalization, Schur’s Lemma, Jordan canonical form and spectral theory for finite dimensional operators.

M 504 ABSTRACT ALGEBRA
S 3 cr. LEC 3
PREREQUISITE: M 431 or consent of instructor.
- The theory of groups, rings and fields with particular emphasis on finite groups, polynomial rings and fields of characteristic zero.
COURSE DESCRIPTIONS: M

M 505 PRINCIPLES OF MATHEMATICAL ANALYSIS
F 3 cr. LEC 3
PREREQUISITE: M 385 or consent of instructor.
• Principles of analysis in Euclidean spaces and metric spaces.

M 509 STOCHASTIC PROCESSES
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: STAT 421.
• Conditional probability theory, discrete and continuous time markov chains including birth and death processes and long run behavior; Poisson processes; queueing systems; system reliability. Cross-listed with STAT 509.

M 511 GENERAL TOPOLOGY
F 3 cr. LEC 3
PREREQUISITE: M 384 or consent of instructor.
• Definition of a topology; relative topology; metric topology; quotient topology; and the product topology. Connectedness, local connectedness, components and path components. Compactness and local compactness; countability and separation axioms; the Urysohn Lemma, metrization and compactification.

M 512 GEOMETRIC & ALGEBRAIC TOPOLOGY
S 3 cr. LEC 3
PREREQUISITE: M 511 or consent of instructor.
• Topics in continua theory; topics in dimension theory; covering spaces and the fundamental group; simplicial complexes; topics in homology and cohomology theory.

M 516 LANGUAGE OF MATHEMATICS FOR TEACHERS
Su alternate years, to be offered odd years 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Features of the language of mathematics, particularly as they apply to high school and middle school curricula. Examination of written and oral mathematical proofs; current research on language use in mathematics; analysis of school students’ use of language. Focus on NCTM’s Communication and Reasoning and Proof standards in relation to mathematical language.

M 517 ADVANCED MATHEMATICAL MODELING FOR TEACHERS
Su alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Focus on the use of modeling to solve real-world problems. Topics include the modeling process, an overview of relevant technology, strategies to initiate modeling in the secondary classroom, and classroom assessment of modeling activities. Extensive use of mathematics to explore application areas, leading to the construction of original models.

M 518 STATISTICS FOR TEACHERS
Su 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics or science education, teaching endorsement in mathematics or science, or consent of instructor.
• Stochastic concepts including probabilistic underpinnings of statistics, measures of central tendency, variability, correlation, distributions, sampling, and simulation. Exploratory data analysis including experiments, surveys, measures of association and inferential statistics. Discussion of methods for teaching statistics in secondary mathematics and science.

M 520 STANDARDS-BASED MATHEMATICS FOR TEACHERS
S alternate years, to be offered odd years 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Study of key content themes and connections in algebra, geometry, probability/data analysis, number, and measurement with a focus on the NCTM process standards. Exploring, extending, designing, and teaching standards-based classroom activities for middle/high school students and reflecting on student outcomes.

M 521 LEARNING THEORIES IN MATHEMATICS FOR TEACHERS
F alternate years, to be offered even years 3 cr. LEC 3 Distance format
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Examine theories of learning as they apply to the mathematics classroom. The course focuses on theories of and research about learning, human development, personality and motivation. The theories and research are used (a) to understand mathematics learning amongst all cultural, linguistic, and socioeconomic backgrounds, and (b) to formulate effective teaching and learning strategies.

M 522 ASSESSMENT OF MATHEMATICS FOR TEACHERS
On demand 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Focuses on the design, implementation, and evaluation of curricula in mathematics. Includes historical changes and trends in mathematics curriculum and an examination of current research.

M 523 NUMBER STRUCTURE FOR TEACHERS
Su alternate years, to be offered even years 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Focuses on the history of mathematics as a context for classroom instruction. Includes the changing nature of mathematics, classical problems, proofs and mathematical processes, and the development of teaching units that incorporate the history of mathematics.

M 524 ALGEBRA FOR TEACHERS
Su 3 cr. LEC 3
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Focus on the history of mathematics as a context for classroom instruction. Includes the changing nature of mathematics, classical problems, proofs and mathematical processes, and the development of teaching units that incorporate the history of mathematics.

M 525 ANALYSIS FOR TEACHERS
Distance format 3 cr. LEC 3
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• A study of calculus concepts and processes from graphical, numerical and algebraic perspectives. Extensive use of activities and projects. Modeling and technology are incorporated throughout the course.

M 526 DISCRETE MATHEMATICS FOR TEACHERS
Su alternate years, to be offered even years 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• A study of classical topics in discrete mathematics, chosen from combinatorics, probability, graph theory, and other areas relevant to secondary mathematics. Emphasis on problem solving and justification.

M 527 GEOMETRY FOR TEACHERS
S 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Focuses on the design, implementation, and evaluation of curricula in mathematics. Includes historical changes and trends in mathematics curriculum and an examination of current research.

M 528 CURRICULUM DESIGN
S alternate years, to be offered even years 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Focuses on the design, implementation, and evaluation of curricula in mathematics. Includes historical changes and trends in mathematics curriculum and an examination of current research.

M 529 ASSESSMENT MODELS AND ISSUES
S alternate years, to be offered even years 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Focuses on the design, implementation, and evaluation of curricula in mathematics. Includes historical changes and trends in mathematics curriculum and an examination of current research.

M 530 RESEARCH IN MATHEMATICS EDUCATION
On demand 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Focuses on the design, implementation, and evaluation of curricula in mathematics. Includes historical changes and trends in mathematics curriculum and an examination of current research.

M 531 HISTORY OF MATHEMATICS FOR TEACHERS
On demand 3 cr. LEC 3 Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.
• Focus on the history of mathematics as a context for classroom instruction. Includes the changing nature of mathematics, classical problems, proofs and mathematical processes, and the development of teaching units that incorporate the history of mathematics.

M 534 RESEARCH IN MATHEMATICS EDUCATION
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: EDCI 506.
• Examination of quantitative and qualitative research findings and methodology in mathematics education. Review of current trends and literature. Writing for publication and proposals.
M 535 TECHNOLOGY AND MATHEMATICS FOR TEACHERS
On demand 3 cr. LEC 3.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.

M 540 INTRODUCTION TO CALCULUS ON MANIFOLDS
F alternate years, to be offered odd years 3 cr. LEC 3.
PREREQUISITE: M 384 and M 451, or consent of instructor.
- An introduction to: manifolds and their atlases, fiber bundles, vector fields, tensor fields and differential forms, the exterior and Lie derivatives, Stokes Theorem, and de Rham cohomology.

M 544 PARTIAL DIFFERENTIAL EQUATIONS I
F alternate years, to be offered odd years 3 cr. LEC 3.
PREREQUISITE: M 384 and M 451, or consent of instructor.
- An extended survey of the origins of a large number of scientific and mathematical partial differential equations and an overview of the theoretical techniques which are available to solve them.

M 545 PARTIAL DIFFERENTIAL EQUATIONS II
S alternate years, to be offered even years 3 cr. LEC 3.
PREREQUISITE: M 544 and M 547.
- Linear partial differential equations and the function spaces and functional analysis which one uses to study them. Topics include: Holder and Sobolev functions, Sobolev and Poincare inequalities, embedding density; semigroup theory for evolution equations.

M 547 MEASURE THEORY
F 3 cr. LEC 3.
PREREQUISITE: M 384 or M 505.

M 551 COMPLEX ANALYSIS
S 3 cr. LEC 3.
PREREQUISITE: M 505.
- Analytic functions and conformal maps, contour integrals, Cauchy’s theorem, Cauchy’s integral formula, the maximum modulus theorem, harmonic functions, Taylor’s theorem and Laurent series. Classification of singularities, the residue theorem and evaluation of definite integrals, Rouche’s theorem and the argument principle.

M 560 METHODS OF APPLIED MATHEMATICS I
F alternate years, to be offered even years 5 cr. LEC 3.
PREREQUISITE: M 451.

M 561 METHODS OF APPLIED MATHEMATICS II
S alternate years, to be offered odd years 3 cr. LEC 3.
PREREQUISITE: M 560.
- Calculus of variations, Hamilton’s principle, asymptotic and perturbation methods, transform techniques and scattering theory. Partial differential equations, Green’s functions, separation of variables and transform methods.

M 570 INDEPENDENT STUDY
F, S, Su 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor; approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

M 571 ACTION RESEARCH IN MATHEMATICS EDUCATION
On demand 2 cr. LEC 2.
PREREQUISITE: Graduate standing in mathematics education and consent of instructor.
- Preparing mathematics teachers to study a mathematics education problem within their classroom, school or district with supervision by a faculty member. Course topics include how to interpret educational research and literature; design and implement reliable and valid action research; identify worthwhile problems; and formulate questions that can be addressed through action research.

M 572 IMPROVING MATHEMATICS EDUCATION: CAPSTONE PROPOSAL
On demand 2 cr. LEC 2 Distance format.
PREREQUISITE: M 571, graduate standing in mathematics education and consent of instructor.
- With guidance from faculty, students pursue a problem in the context of their classroom, school or district which impinges on student achievement in mathematics. Students work with a faculty advisor to characterize the problem, complete a review of relevant literature, and create an action research proposal to address the problem and evaluate outcomes of the proposed intervention.

M 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 2 - 12 cr. IND Maximum credits unlimited.
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

M 576 INTERNSHIP
F, S, Su 2 - 12 cr. IND Maximum credits unlimited.
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

M 577 IMPROVING MATHEMATICS EDUCATION: CAPSTONE PROJECTS
On demand 3 cr. LEC 3.
PREREQUISITE: M 571/572 sequence, graduate standing in mathematics education, teaching endorsement in mathematics and consent of instructor.
- With guidance from faculty, students conduct action research addressing a problem in the context of their classroom, school or district which impinges on student achievement in mathematics. Students work with a faculty advisor to implement an intervention, collect and analyze data resulting from the intervention, and summarize results. Findings are presented orally to peers and faculty.

M 580 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

M 581 NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS I
F 3 cr. LEC 3.
PREREQUISITE: M 442.
- Finite difference and finite element solution techniques for elliptic, parabolic, and hyperbolic partial differential equations, numerical linear algebra.

M 582 NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS II
S 3 cr. LEC 3.
PREREQUISITE: M 581.
- A continuation of topics from M 581.

M 584 FUNCTIONAL ANALYSIS I
F alternate years, to be offered even years 3 cr. LEC 3.
PREREQUISITE: M 547.
- Banach spaces, fixed point theorems, Hilbert spaces, the Dirichlet principle, generalized Fourier series, and spectral theory.

M 585 FUNCTIONAL ANALYSIS II
S alternate years, to be offered odd years 3 cr. LEC 3.
PREREQUISITE: M 584.
- The Hahn Banach theorem, variational principles, weak convergence, uniform boundedness theorem, the open mapping theorem and the implicit function theorem.

M 586 PROBABILITY THEORY
S alternate years, to be offered odd years 3 cr. LEC 3.
PREREQUISITE: M 547.

M 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; maximum 5 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies.
- Courses offered on a one time basis to fulfill professional development needs of inservice educators. A specific focus is given to each course which is appropriately subtitled.

M 589 GRADUATE CONSULTATION
F, S, Su 3 cr. IND 3.
PREREQUISITE: Master’s standing.
- This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time.

M 590 MASTER’S THESIS
F, S, Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.
M 591 TOPICS IN APPLIED MATHEMATICS I
F 3 cr. LEC 3
PREREQUISITE: Graduate standing and consent of instructor.
- Topics may include numerical solution of linear and nonlinear problems, eigenvalue problems, continuation methods, numerical optimization, computational mechanics, spectral methods, bifurcation theory, invariant manifold theory, index theory, nonlinear analysis, reaction-diffusion equations, nonlinear oscillations, asymptotic methods and perturbation methods.

M 592 TOPICS IN APPLIED MATHEMATICS II
S 3 cr. LEC 3
PREREQUISITE: Graduate standing and consent of instructor.
- Topics may include numerical solution of linear and nonlinear problems, eigenvalue problems, continuation methods, numerical optimization, computational mechanics, spectral methods, bifurcation theory, invariant manifold theory, index theory, nonlinear analysis, reaction-diffusion equations, nonlinear oscillations, asymptotic methods and perturbation methods.

M 594 SEMINAR
F, S, Su 1 cr. SEM 1 Maximum 6 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presentation discussion material.

M 595 DYNAMICAL SYSTEMS I
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: M 503.
- Topics in differential equations including existence and uniqueness, continuous dependence on parameters, extendability, the existence and stability of equilibria and limit cycles and the Poincare-Bendixon theorem.

M 596 DYNAMICAL SYSTEMS II
S alternate years, to be offered every even years 3 cr. LEC 3
PREREQUISITE: M 505.
- Topics include Hartman’s theorem, invariant manifold theory, Smale-Birkhoff theorem, horseshoe chaos, and the Melnikov method. Topics in discrete dynamical systems may also be covered.

M 597 TOPICS IN MATHEMATICS I
F 3 cr. LEC 3
PREREQUISITE: Graduate standing and consent of instructor.
- Topics selected from: differential topology, differential geometry and complex dynamics.

M 598 TOPICS IN MATHEMATICS II
S 3 cr. LEC 3
PREREQUISITE: Graduate standing and consent of instructor.
- Topics selected from: continuum theory, symbolic dynamics, ergodic theory and low dimensional topology.

M 689 DOCTORAL READING & RESEARCH
F, S, Su 3 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: Doctoral standing.
- This course may be used by doctoral students who are reading research publications in the field in preparation for doctoral thesis research.

M 690 DOCTORAL THESIS
F, S, Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.
MAS 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

MAS 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of the director.
- Directed research and study on an individual basis.

MAS 309 FIELD TRAINING, 4 WEEK

MAS 310 AIR FORCE LEADERSHIP AND MANAGEMENT I
F 3 cr. LEC 3
COREQUISITE: MAS 315
- Study of leadership and quality management fundamentals, professional knowledge and leadership ethics, with emphasis in communication skills.

MAS 311 AIR FORCE LEADERSHIP AND MANAGEMENT II
S 3 cr. LEC 3
COREQUISITE: MAS 310
- Continuation of the study of leadership and quality management fundamentals, professional knowledge and leadership ethics, with emphasis in communication skills.

MAS 315 LEADERSHIP LABORATORY 315
F 9 cr. LAB 0
PREREQUISITE: Consent of instructor and approval of department head.
COREQUISITE: MAS 310.
- Laboratory includes advanced group leadership problems, planning and orchestrating cadet corps activities.

MAS 316 LEADERSHIP LABORATORY 316
S 0 cr. LAB 0.
PREREQUISITE: Consent of instructor and approval of department head.
COREQUISITE: MAS 311.
- Laboratory includes advanced group leadership problems, planning and orchestrating cadet corps activities.

MAS 410 NATIONAL SECURITY AFFAIRS/ PREPARATION FOR ACTIVE DUTY I
F 3 cr. LEC 3
PREREQUISITE: Approval of department head (for students not pursuing a commission in the U.S. Air Force)
COREQUISITE: MAS 415.
- Examination of national security process, analyzes U.S. defense policy, strategy, and joint doctrine; explores the global environment, terrorism, cultural awareness and conflict resolution within military Areas of Responsibility. Also focus on the military as a profession, officer/his, military justice system, and current issues affecting military professionalism. Communication skills are emphasized.

MAS 411 NATIONAL SECURITY AFFAIRS/ PREPARATION FOR ACTIVE DUTY II
S 3 cr. LEC 3
PREREQUISITE: MAS 410, approval of department head (for students not pursuing a commission in the U.S. Air Force)
COREQUISITE: MAS 416.
- Continuation of MAS 410.

MAS 415 LEADERSHIP LABORATORY 415
F 0 cr. LAB 0
PREREQUISITE: Consent of instructor and approval of department head.
COREQUISITE: MAS 410.
- Laboratory includes advanced group leadership problems and commanding and supervising all cadet corps activities.

MAS 416 LEADERSHIP LABORATORY 416
S 0 cr. LAB 0
PREREQUISITE: Consent of instructor and approval of department head.
COREQUISITE: MAS 411.
- Laboratory includes advanced group leadership problems and commanding and supervising all cadet corps activities.

MAS 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

MAS 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

MB Microbiology
graduate level only; see BIOM for undergraduate

MB 501 PRINCIPLES & TECHNIQUES OF ANIMAL EXPERIMENTATION
F 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOM 560.
- Ethical, humane, anatomical, physiological, environmental and legal considerations involved in the use of laboratory animals will be discussed and information on non-animal alternatives provided. Bio-methodological procedures, including anesthetic and surgical techniques will be demonstrated and/or practiced in the laboratory.

MB 515 ADVANCED MICRORIAL ECOLOGY
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: BIOM 415.
- Critical review of literature on the distribution and activity of microorganisms in natural microbial communities based on microbial adaptation and physical, chemical and biological features of the microenvironment. A critical discussion of literature and approaches. Cross-listed with LRES 515.

MB 520 MICRORIAL PHYSIOLOGY
F 3 cr. LEC 3
PREREQUISITE: BIOM 360 and BCH 380.
- An in-depth examination of microbial cell structure and function, bioenergetics, and intermediary metabolism and control. Students will also be expected to consider biochemical function within the context of genomic sequences, and be able to formulate predictions for carbon and energy flow.

MB 525 ADVANCED IMMUNOLOGY
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: BIOL 410 or equivalent.
- Recent advances in immunochemistry, immunogenetics, immunopathology, molecular and cellular immunology. Cross-listed with IMM 501.

MB 528 ADVANCED GENETICS
S alternate years, to be offered odd years 5 cr. LEC 3
PREREQUISITE: BIOM 450 or equivalent.
- Recent advances in microbial genetics with an emphasis on molecular genetics and eukaryotic gene expression.

MB 530 VIROLOGY
F 3 cr. LEC 3
PREREQUISITE: BIOL 425 or BCH 441/442 and graduate status.
- Fundamentals of virology with emphasis on animal viruses of medical importance. Molecular aspects of structure, replication transmission hand host response to viral infection will be covered.

MB 535 GENOMIC ANALYSIS
F 4 cr. LEC 3 LAB 1
PREREQUISITE: Permission of instructor needed.
- The quantity of sequence information deposited into databases necessitates that scientists train in both discovery and hypothesis-based research that utilizes these resources. This class will cover experimental design, database searching and management, sequence alignment, molecular pattern recognition, and phylogenetics.

MB 536 EXPLORING MICROBIOLOGY
Su 3 cr. ONLINE 3
PREREQUISITE: BS in Biology or equivalent degree
COREQUISITE: Graduate standing or petition approval from the Vice Provost of Graduate Education.
- Explore microscopy, prokaryotes, microbial eukaryotes, viruses, acellular agents, microbial evolution, diversity, by focusing on an experimental microcosm. Ideal for middle/high school lower level college teachers and others in education and outreach roles, e.g., museums, zoos, National Parks, nature preserves, environmental health.

MB 537 ADVANCES IN MOLECULAR EVOLUTION
F 3 cr. LEC 3
PREREQUISITE: BIOM 410 or 450 or 455 or 528 or 538 or BIOL 402 or BCH 380 or BCH 441 or BIOL 475.
- The educational objectives of this course are to provide graduate students with a basic introduction to molecular evolution. The study of molecular evolution encompasses the origin and evolution of life on earth at the molecular level.

MB 538 CELL AND MOLECULAR BIOLOGY
Su 2 cr. LAB 2
PREREQUISITE: BIOM 360, BCH 380 or BIOL 402, MB 536, or the equivalent.
COREQUISITE: Graduate standing or petition approval from the Vice Provost of Graduate Education.
- An inquiry-based laboratory in prokaryotic and eukaryotic C&M provides training in microbiological techniques: recombinant DNA, phylogenetic analyses, growth, cell cycle regulation, gene expression, protein purification, and immunosays. Current literature and laboratory discussions cover molecular approaches for investigating complex cellular mechanisms.
**MB 539 INFECTION AND IMMUNITY**
Su alternate years, to be offered even years
3 cr. IND 3
PREREQUISITE: BIOB 410 or BIOM 435 or BIOM 431.
COREQUISITE: Graduate standing or petition approval from the Vice Provost of Graduate Education.
- An inquiry-based study of recent advances in understanding the etiology, pathogenesis, chemotherapy and prevention of infectious disease which includes analysis of current literature, case histories, and online sources of information. This course is intended for practicing teachers and those in the MSSE program.

**MB 540 APPLIED MICROBIOLOGY**
F, S cr. IND 3
PREREQUISITE: MB 536 and MB 541 or equivalent course.
COREQUISITE: BS in biology or equivalent; Graduate standing or petition approval from the Vice Provost of Graduate Education.
- Biotechnology, industrial microbiology, antimicrobial chemotherapy, public health, epidemiology, climate change, food water, wastewater, extreme environments, space travel, biodegradation, bioremediation and bioaugmentation. Ideal for middle/high school/college teachers, and others in education/outreach, e.g., museums, zoos, National Parks, nature preserves, environmental health.

**MB 541 MICROBIAL GENETICS**
Su alternate years, to be offered odd years 3 cr.
LEC 3
- Prokaryotes provide much of the understanding of fundamental genetics for all organisms, especially through in vivo and in vitro genetic tools. Transcription, translation, mutation and recombination are considered, so that science teachers understand of fundamentals of genetics. This course is intended for practicing teachers and those in the MSSE program.

**MB 542 MICROBIAL ECOLOGY**
S 3 cr. LEC 3
PREREQUISITE: MB 536 or equivalent course or BS in Biology.
COREQUISITE: BS in biology or equivalent; Graduate standing or petition approval from the Vice Provost of Graduate Education.
- Ecology of microorganisms, their nutrition, growth, control, metabolism, biogeochemical cycling, natural environments, habitats and interactions. Centered on an experiment, this discovery-based course is ideal for middle/high school/lower level college teachers, and others in education/outreach roles, e.g., nature facilities, environmental health.

**MB 544 ADVANCED BIOINFORMATIC**
S 4 cr. LEC 3 Lab 1
PREREQUISITE: MB 535. This requirement can be waived at instructor’s discretion.
- This course will cover advanced topics in Bioinformatics, including genome assemblies and functional annotations of proteins. This training will enable students to make confident predictions from biological sequences and to develop testable hypotheses that will guide their experimental work.

**MB 552 ADVANCED SOIL & ENVIRONMENTAL MICROBIOLOGY**
Su alternate years, to be offered even years
3 cr. LAB 3
PREREQUISITE: BIOM 452 or consent of instructor.
- Advanced laboratory course. Microorganisms are targeted for isolation and characterization, emphasizing those not normally encountered in general microbiology laboratory. Biochemical cycling, contaminant biodegradation, extremophiles, and plant-microbe interactions are typical topics is investigated. Students employ classic and novel cultivation approaches, identifying microbes based morphologically, physiologically and phylogenetically. Cross-listed with LRES 552.

**MB 557 PROFESSIONAL PAPER**
F, S 1-4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing and committee approval.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major adviser and graduate committee.

**MB 589 GRADUATE CONSULTATION**
F, S 3 cr.
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

**MB 590 MASTER’S THESIS**
F, S 1-10 cr. IND Maximum 20 crs.
PREREQUISITE: Master’s standing.

**MB 591 SPECIAL TOPICS**
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

**MB 592 INDEPENDENT STUDY**
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

**MB 594 SEMINAR**
F 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material. There are separate sections for departmental seminar, general/environmental and biomedical microbiology journal clubs and graduate reading; consult the Department of Microbiology Graduate Student Handbook for specific requirements.

**MB 598 INTERNSHIP**
On Demand 2 - 12 cr. IND Maximum credits unlimited
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

**MB 690 DOCTORAL THESIS**
S 1-10 cr. IND Maximum 30 crs.
PREREQUISITE: Doctoral standing.

**MBEH**
Microbiology Environmental Health

**MBEH 475 FIELD PROJECT**
F, S, Su 1 - 4 cr. IND Maximum 4 cr.
PREREQUISITE: Consent of instructor and department head.
- Research and field experience in some aspect of environmental health science.

**MBEH 498 UNDERGRADUATE RESEARCH**
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

**MBEH 499 INDEPENDENT STUDY**
On Demand 1 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- An individual assignment arranged with an agency, business, or other organization to provide guided experience in the field.

**MBSP**
Molecular Biosciences Program

**MBSP 561 MOLECULAR BIOSCIENCES PROGRAM LAB ROTATION I**
F, S 1 cr. LAB 1
- Each Molecular Biosciences Program graduate student will complete three laboratory rotations during their first year of graduate study. Each Laboratory Rotation will provide students with a six-week period of active research experimentation time. Each Laboratory Rotation is a mini-research project and is designed to allow the student to explore a potential avenue of research for their thesis/dissertation research project in Years 2 and beyond. Students should become familiar with the relevant literature, concepts, methods, reagents, and instruments that will be needed to conduct their experiments and achieve the goals of their research projects. Extensive bench research time will be required to obtain meaningful results.

**MBSP 592 INDEPENDENT STUDY**
F, S 1 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and department head.
- Research and field experience in some aspect of environmental health science.

**MBSP 593 UNDERGRADUATE RESEARCH**
F, S 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

**MBSP 594 SEMINAR**
F 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material. There are separate sections for departmental seminar, general/environmental and biomedical microbiology journal clubs and graduate reading; consult the Department of Microbiology Graduate Student Handbook for specific requirements.

**MBSP 598 INTERNSHIP**
S 1-10 cr. IND Maximum 30 crs.
PREREQUISITE: Graduate standing.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

**MBSP 690 DOCTORAL THESIS**
S 1-10 cr. IND Maximum 30 crs.
PREREQUISITE: Doctoral standing.
MBSP 562 MOLECULAR BIOSCIENCES PROGRAM LAB ROTATION II
F, S 1 cr. LAB 1
- Each Molecular Biosciences Program graduate student will complete three laboratory rotations during their first year of graduate study. Each Laboratory Rotation provides students with a six-week period of active research experimentation time. Each Laboratory Rotation is a mini-research project and is designed to allow the student to explore a potential avenue of research for their thesis/dissertation research project in Years 2 and beyond. Students should become familiar with the relevant literature, concepts, methods, reagents, and instruments that will be needed to conduct their experiments and achieve the goals of their research project. Extensive bench research time will be required to obtain meaningful results.

MBSP 563 MOLECULAR BIOSCIENCES PROGRAM LAB ROTATION III
F, S 1 cr. LAB 1
- Each Molecular Biosciences Program graduate student will complete three laboratory rotations during their first year of graduate study. Each Laboratory Rotation is a mini-research project and is designed to allow the student to explore a potential avenue of research for their thesis/dissertation research project in Years 2 and beyond. Students should become familiar with the relevant literature, concepts, methods, reagents, and instruments that will be needed to conduct their experiments and achieve the goals of their research project. Extensive bench research time will be required to obtain meaningful results.

MBSP 594 MOLECULAR BIOSCIENCES PROGRAM SEMINAR
F, S 1 cr. SEM 1
- This course will fulfill the seminar requirement of the first year Molecular Biosciences Program (MBSP) doctoral fellows. The fellows (students) will attend three seminars sponsored by the MBSP focused on molecular biosciences research. Students will also attend twelve additional departmental or research center-based seminars from the participating MBSP centers and departments. Each student will write a summary of the fifteen attended seminars and turn it into the instructor by the last day.

MBSP 513 SPECIAL TOPICS
On Demand 1 - 4 cr. Max 12 cr
PREREQUISITE: Upper division courses and others as determined for each offering.
- This course focuses on the impact of basic science on medicine and medical practice. Basic science, clinical research, and investigative medicine will be integrated across five major topics: inflammation, vascular disease, obesity, cancer, and therapeutics.

MEDI 500 SEMINAR
On Demand 1 - 4 cr. Max 4 cr
PREREQUISITE: WWAMI medical student or consent of the WWAMI Medical Program and Dean of the Division of Graduate Education.
- This course will assist students in exploring various medical problems at MSU and choosing a major that best fits their passions, career goals, and educational interests. This course will also provide an opportunity to explore the breadth of health care professions.

MEDS 105 INTRODUCTION TO MEDICINE AND HEALTH PROFESSIONS
S 1 cr. LEC 1 cr
- This course will assist students in exploring various departments at MSU and choosing a major that best fits their passions, career goals, and educational interests. This course will also provide an opportunity to explore the breadth of health care professions.

MEDS 200 UNDERGRADUATE CLINICAL OBSERVATION
F 1 cr. LAB 1 cr
PREREQUISITE: GPA greater than 3.0, consent of instructor.
- This course will provide fundamentals in health care professionalism through discussions of professionalism, HIPAA, medical ethics, and case studies. Following successful completion of the didactic component of the course, students will participate in a series of clinical observation rotations.

MEDS 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Max 12 cr
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

MEDS 292 SPANISH FOR HEALTHCARE PROFESSIONALS
S 1 cr. LEC 1 cr
PREREQUISITE: WWAMI medical student.
- A mixed-level course for beginning to advanced learners of the Spanish language with a focus to communicate in a medical setting. Objectives include learning the essential skills to converse with Spanish-speaking patients, understand important cultural considerations, conduct patient interviews in Spanish focusing on different medical problems, and set a foundation for further learning of Spanish in the healthcare context.

MEDS 310 MICROSCOPIC ANATOMY (HISTOLOGY)
F 3 cr. LEC 2 LAB 1 cr
PREREQUISITE: WWAMI medical student or consent of the Director of the WWAMI Medical Program.
- A course on microscopic organization of cells, tissues and organs.
MEDS 511 ANATOMY & EMBRYOLOGY
F S 4 cr. LEC 2 LAB 2
PREREQUISITE: WWAMI medical student.
- Dissection course on the anatomy and embryology of the human thorax, abdomen, pelvis and perineum for first year medical students. Emphasis is on correlations of structure, radiology, function, and dysfunction related to medical applications.

MEDS 512 MECHANISMS IN CELL PHYSIOLOGY
F 4 cr. LEC 4
PREREQUISITE: WWAMI medical student or consent of the Director of the WWAMI Medical Program.
- Physiological basis of excitable tissues. This includes nerve and muscle; also includes sensory perception and epithelial transport. Students give presentations on diseases associated with course-related dysfunction related to medical applications.

MEDS 513 INTRODUCTION TO CLINICAL MEDICINE I
F 2 cr. LEC 1 LAB 1
PREREQUISITE: WWAMI medical student.
- Communication skills and interview techniques to form the basis for the doctor-patient relationship and for the skill of communicating with patients.

MEDS 514 BIOCHEMISTRY AND MOLECULAR BIOLOGY
F 5 cr. LEC 4 RCT 1
PREREQUISITE: WWAMI medical student.
- Coordinated course covering protein and nucleic acid structure/function, molecular biology and genetics, signal transduction, bioenergetics and metabolism. Emphasizes material important to understanding disturbances in disease states.

MEDS 516 CLINICAL PRECEPTORSHIP
F 1 cr. LAB 1
PREREQUISITE: WWAMI medical student.
- Opportunity to gain personal experience with primary care medical practice by observation of selected physicians in the Bozeman area.

MEDS 521 INFECTIOUS DISEASES AND MICROBIOLOGY
S 6 cr. LEC 3 RCT 1 LAB 1
PREREQUISITE: WWAMI medical student.
- Pathogenesis, susceptibility and resistance to infection. Microbiology, epidemiology, clinical manifestations and control of representative bacterial, fungal, parasitic and viral infectious diseases. Principles of chemotherapy, sterilization, principles of asepsis, nosocomial and iatrogenic infections and their prevention.

MEDS 522 INTRODUCTION TO CLINICAL MEDICINE II
S 2 cr. LEC 1 LAB 1
PREREQUISITE: WWAMI medical student.
- This course continues with patient interviewing techniques, patient medical history, and the screening physical examination. Additional emphasis will be placed on the importance of continuity of care.

MEDS 523 IMMUNOLOGY & HUMAN DISEASE
S 2 cr. LEC 1 LAB 1
PREREQUISITE: WWAMI medical student or consent of the instructor and Director of the WWAMI Medical Program.
- Concepts that are covered include: Mechanisms of humoral and cell mediated immunity. Immunological mechanisms of cell and tissue injury; and immune mechanisms in human resistance to disease and in immunological diseases. This course is designed with the major goal to allow the student to integrate immunological systems into a growing view of the entire patient, and to understand the role of the immune system in the analyses of patient pathology involving many physiologic systems.

MEDS 531 HEAD & NECK ANATOMY
S 4 cr. LEC 2 LAB 1
PREREQUISITE: WWAMI medical student.
- An anatomical dissection course covering the head and neck for first year medical students. Emphasis is on correlations of structure, radiology, function and dysfunction related to medical applications.

MEDS 532 NERVOUS SYSTEM
S 5 cr. LEC 4 LAB 1
PREREQUISITE: WWAMI medical student.
- Integrated approach to the normal structure and function of the human nervous system, basic neuropathological concepts and an introduction to the clinical evaluation of typical neurological lesions. Laboratory includes dissection of human brain and histologic study of brain stem cross sectional anatomy.

MEDS 533 SYSTEMS OF HUMAN BEHAVIOR
F 3 cr. LEC 3
PREREQUISITE: WWAMI medical student.
- Overview of conceptual systems and models of behavior, normality and abnormality, environment and social learning, conditioning, learning in the autonomic nervous system, illness behavior, feelings, emotion and cognition, physician-patient interaction and disease and techniques of behavior change.

MEDS 540 CLINICAL PRACTICUM
F S 1 cr. LAB 1
PREREQUISITE: Graduate level standing and acceptance into Post-Bacc Pre-Med or M.S. in Health Sciences program.
- A practical course for students going into the medical field to observe and learn about the services provided by different health care professionals at various stages of patient care.

MEDS 551 MEDICAL MUSCULOSKELETAL ANATOMY
S 3 cr. LEC 2 LAB 1
PREREQUISITE: WWAMI medical student.
- Anatomical dissection course on the extremities and back emphasizing correlation of structure, function, radiology, and disorders of the musculoskeletal system.

MEDS 560 RURAL HEALTH CARE DELIVERY
F 1 cr. LEC 1
PREREQUISITE: WWAMI medical student.
- Provide historical and current information about the health care industry, health care delivery systems and economics of health care and health care policy; with emphasis on rural health care. The purpose is to encourage WWAMI students to consider practicing in rural communities and/or providing health care to undeserved populations. The infrastructure of the Montana health Care Delivery system will be presented in detail.

MEDS 562 US HEALTHCARE SYSTEMS
F 3 cr. LEC 3
- A detailed overview of the US healthcare systems, providing students with an understanding of the history and current status regarding the US healthcare systems, industry, economics and healthcare policy. Factors playing a role in the escalating cost of healthcare will be identified, as well the performance indicators of health outcomes, with comparisons between the US and other countries.

MEDS 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
On Demand 1-4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- Mechanism for M.S. students to complete scholarly project.

MEDS 580 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

MEDS 591 MEDICAL INFORMATION & DECISION MAKING
F 1 cr. LEC 1
PREREQUISITE: WWAMI medical student.
- This course is designed to provide an introduction to medical information. Evidence-Based Medicine and use of medical information in patient care. This will include an introduction to methods for identifying and retrieving high quality, relevant evidence electronically, using the Internet and other resources. The course will also describe the challenges of applying medical information to decision making. The course will utilize lectures, discussion sessions and computer lab sessions.

MEDS 592 INDEPENDENT STUDY
On Demand 1-3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor and approval of the Director of the WWAMI Medical Program.
- Directed research and study on an individual basis.

MEDS 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: WWAMI medical student (section 1) or graduate level standing and acceptance into Post Bacc or MS in Health Sciences program (section 2).
- Topics offered at the graduate level which are not covered in regular courses.

ML
Modern Languages
ML 100H INTRODUCTION TO WORLD CULTURES
S 3 cr. RCT 3 cr.
- Introduces students to a range of issues in world cultures through an interdisciplinary approach. Through lectures, discussion, and project-based learning, students gain knowledge of cultural, historical, and economic concepts in a global context. Students develop an understanding of linguistic, national, regional, and area studies models for learning about the world.
ML 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

ML 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ML 344 INSTRUCTIONAL PERSPECTIVES
F, S, Su On Demand 1 cr. RCT 1 Maximum 3 cr.
PREREQUISITE: FCH 323 or FCH 324; GRMN 330 or GRMN 331; SPNS 321 or SPNS 324.
- Students learn how various pedagogical approaches are realized through class discussion, observation, and practice under the direction of the faculty mentor.

ML 490 UNDERGRADUATE RESEARCH
F, S, Su 1 - 8 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

ML 491 SPECIAL TOPICS
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ML 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

ML 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; maximum 5 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies.
- Courses offered on a one-time basis to fulfill professional development needs of in-service educators. A specific focus is given to each course which is appropriately subtitled.

ML 591 SPECIAL TOPICS
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ML 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

MOR
Museum of the Rockies
MOR 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

MOR 301 INTRODUCTION TO MUSEUM PRACTICES
F 3 cr. LEC 3
PREREQUISITE: Junior standing or permission of instructor
- Team-taught by Museum of the Rockies staff, the course will introduce students to the museum profession with emphasis on collections and exhibitions. Topics covered include museum missions, object-based learning, collecting theory, curatorial research, managing collections, and developing exhibitions.

MOR 490 UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

MOR 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

MSG
Military Science - Army
MSG 101 INTRODUCTION TO MILITARY LIFESTYLES
F 2 cr. LEC 1 LAB 1
- An introduction to issues and competencies that are central to a commissioned officer’s responsibilities. These initial lessons establish a framework for understanding officership, leadership and Army values. The class also addresses “life skills” including fitness and time management. Laboratory component is required.

MSG 103 PROBLEM SOLVING AND LEADERSHIP MANAGEMENT SKILLS
S 2 cr. LEC 1 LAB 1
PREREQUISITE: Recommended MSG 101.
- Building on problem solving, communications and leadership. “Life skills” include problem solving, goal setting, interpersonal communication skills and assertiveness skills. Further information about life in the Army. Laboratory component is required.

MSG 106 ARMY PHYSICAL FITNESS
F, S 1 cr. LAB 1 Maximum 6 cr.
- MSG 106 is designed to provide students a framework of fitness skills, planning and testing for a life-time of health. The course consists of three Physical Training sessions per/week that include running, swimming, upper body and core development, sports, and team building exercises. This course may be repeated for credit.

MSG 290 LEADERSHIP MANAGEMENT AND LIFE SKILLS
F 2 cr. LEC 1 LAB 1
- Leadership studies. An understanding of how to build teams, influence, communicate, decision making, creative problem solving, planning and organizing. Laboratory component is required which includes physical fitness training, and other outdoor skills.

MSG 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

MSG 292 INDEPENDENT STUDY
On Demand 1-3 cr. Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

MSG 301 SMALL UNIT TACTICS AND METHODS OF INSTRUCTION
F 3 cr. LEC 2 LAB 1
PREREQUISITE: MSG 101, MSG 103, MSG 201, MSG 200, or MSG 204.
- The study, practice and evaluation of adaptive leadership skills. Small unit tactical operations are used to develop self-awareness and critical thinking. Preparation for Leader Development and Assessment Course. A lab component including a field training exercise is required.

MSG 302 PREPARATION FOR LEADER DEVELOPMENT AND ASSESSMENT COURSE
S 3 cr. LEC 2 LAB 1
PREREQUISITE: MSG 301.
- Situational leadership challenges are used to build awareness and skills in leading small units. Skills in decision-making, persuading and motivating team members are explored, evaluated and developed. Preparation for Leader Development and Assessment Course. A lab component including a field training exercise is required.
MSG 305 MILITARY SCIENCE
LEADER DEVELOPMENT AND COURSE
F 3 cr. LAB 3
PREREQUISITE: MSG 302. Enrollment restricted to successful completion of MSG 301 and MSG 302 and the Professor of Military Science’s approval.
- Practical exercise in tactical, technical, and administrative duties common to all branches of the Army. Development of leadership and the ability to function effectively in small unit operations.

MSG 401 SENIOR SEMINAR I
F 3 cr. LEC 2 LAB 1
PREREQUISITE: MSG 302, approval of instructor.
- Develops proficiency in planning, executing and assessing complex operations, function as a member of a staff and providing leadership performance feedback to subordinates. A lab component is required.

MSG 402 SENIOR SEMINAR II
S 3 cr. LEC 2 LAB 1
PREREQUISITE: MSG 401, approval of instructor.
- Study of military justice system and international military law. Study of Army organization and administrations. Exploration of the dynamics of leading in complex situations. Preparation for transition from college student to commissioned officer in the Army. A lab component is required.

MSG 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

MSG 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

MSG 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

MSEM
Master of Science in Engineering and Management
graduate level only
MSEM 501 LEADING & MANAGING
THE HUMAN & FINANCIAL ENTERPRISE
F LEC 9 cr.
PREREQUISITE: Undergraduate Degree.
- Course will develop and enhance your business management skills as they relate to the technical, scientific, or professional enterprise. The course topics will be delivered in an integrated fashion using multiple instructors with expertise in several areas. The course will focus on the following three areas: leading people, leading the financial enterprise, and leading new product development.

MSSE
Master of Science Education
MSSE 589 GRADUATE CONSULTATION
F, S, Su 5 cr. TUT
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used by only students who have completed all of their coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

MSSE 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

MSSE 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Bachelor degree, consent of instructor, and admission to MSSE program.
- Directed research and study on an individual topic.

MTA & THTR
Media & Theatre Arts
THTR 122IA ACTING FOR NON-MAJORS
F 3 cr. LEC 3
- An introduction to the creative process engaged by a performer on a stage. Taught in a workshop format in which the individual student engages in exercises designed to convey stories and emotions through the understanding of human behavior as expressed on a stage.

THTR 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND May be repeated.
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

THTR 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

THTR 304 THEATRE PRODUCTION
F 4 cr. SEM 4
PREREQUISITE: FILM 212, FILM 251, and FILM 254.
- Projects pursued under faculty supervision, emphasizing the theatrical production processes. Specific emphasis may include acting, directing, management, technical theatre and/or theatrical design.

THTR 490R UNDERGRADUATE RESEARCH
F, S, Su 1-6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Senior standing in MPT.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

THTR 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in a curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

THTR 492 INDEPENDENT STUDY
On Demand 1-3 cr. IND, may be repeated, Maximum 6 cr. total for FILM, PHOT & THTR 492 combined.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

THTR 498 CAREER INTERNSHIP
F, S 1-12 cr.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

MUSE
Music - Education
formerly MUED
MUSE 123 TECHNIQUES: VOICE
F 1 cr. LAB 1
PREREQUISITE: Music Major or consent of instructor.
- Introductory vocal training and diction for instrumentalists and beginning singers. Students develop voice production and performance skills for solo and small group singing through a lab setting.

MUSE 130 TECHNIQUES: FLUTE & CLARINET
F 1 cr. LAB 1
- Teaching techniques, materials and basic playing approaches for flute and clarinet. For music education students.

MUSE 131 TECHNIQUES: SAX, OBOE & BASSOON
S 1 cr. LAB 1
- Teaching techniques, materials, and basic playing approaches for saxophone, oboe, and bassoon. For music education students.

MUSE 132 TECHNIQUES: BRASS
S 1 cr. LAB 1
- Teaching techniques, materials, and basic playing approaches for brass instruments. For music education students.

MUSE 134 TECHNIQUES: PERCUSSION
S 1 cr. LAB 1
- Teaching techniques, materials, and basic playing approaches for percussion. For music education students.

MUSE 135 TECHNIQUES: STRINGS
F 1 cr. LAB 1
- Teaching techniques, materials, and basic playing approaches for strings. For music education students.
MUSE 140 LABORATORY
INSTRUMENTAL ENSEMBLE
F 1 cr. LAB 1 May be repeated. Maximum 8 cr.
- Repertoire suitable for beginning and advanced secondary school ensembles (band and/or orchestra) will be reviewed. Students are asked to play their secondary instrument.

MUSE 141 LABORATORY CHORAL ENSEMBLE
S 1 cr. LAB 1 May be repeated. Maximum 8 cr.
- Repertoire suitable for beginning and advanced secondary school vocal ensembles will be reviewed. The ensemble will present a recital at the end of the semester under the direction of student conductors.

MUSE 220 INTRO TO COMP APP MUS ED
F 2 cr. LEC 1 LAB 1
- An introduction to computer applications in music, including music notation, marching band and basic music notation, marching band and basic musicianship software programs, as well as audio recording. This course is particularly geared toward music education majors.

MUSE 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

MUSE 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

MUSE 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

MUSE 294 SEMINAR, WORKSHOP
On Demand 1 cr. SEM Maximum 4 cr.
- Topics offered which are not covered in regular courses. Students participate in preparing and presenting discussion materials.

MUSE 339 CONDUCTING PRACTICUM
F, S 1 cr. LAB 1
COREQUISITES: MUSI 335 (fall) or MUSI 336 (spring).
- Leadership of ensemble, opportunity to apply rehearsal techniques and conducting skills learned in MUSI 335 or MUSI 336. Experience teaching in small ensemble setting.

MUSE 340 MARCHING BAND TECHNIQUES
On Demand 2 cr. LEC 2
PREREQUISITE: MUSI 206.
- Organization, administration, and creative skills necessary for directing a successful public school marching band.

MUSE 383 ASSESSMENT IN MUSIC EDUCATION
F 3 cr. LEC 3
PREREQUISITE: EDU 222 or EDU 223.
- Fundamental concepts of differentiated educational assessment for music teachers including the alignment of assessment to curriculum standards and essential understandings, quality of assessment, principles of item construction, evaluation of student responses, interpretation of results, and improvement of techniques.

MUSE 395 TEACHING PRACTICUM:
GENERAL MUSIC
F 1 cr. Lab 1.
COREQUISITE: MUSE 397.
- Students will be assigned to school classrooms to observe children, teachers, and teaching strategies and to serve as teacher aides. Students will teach lessons in subject areas corresponding to the methods classes in which they are currently enrolled.

MUSE 397 METHODS: GENERAL MUSIC
F 3 cr. LEC 3
PREREQUISITE: MUSI 241, MUSI 206, MUSI 251, MUSE 383, and good standing in Teacher Education Program.
COREQUISITE: MUSE 395.
- Elementary music methods for the music education majors; in-depth study and application of elementary music methods using singing, listening, instrument playing, creating, and movement; materials, management, sequencing, planning, and assessment for K-6 music classes.

MUSE 437 INSTRUMENTAL FIELD EXPERIENCE
S 1 cr. LAB 1
COREQUISITE: MUSE 497.
- A field experience in secondary (grades 5-12) instrumental music situations prior to student teaching. Observations, interviews, and brief teaching experiences with music ensembles at the secondary level.

MUSE 439 CHORAL FIELD EXPERIENCE
F 1 cr. LAB 1
COREQUISITE: MUSE 497.
- A field experience in secondary (grades 5-12) choral music situations prior to student teaching. Observations, interviews, and brief teaching experiences with music ensembles at the secondary level.

MUSE 445 STUDIO TEACHING EXPERIENCE
F, S, Su 1 - 6 cr. IND May be repeated. Maximum 4 cr.
PREREQUISITE: Senior standing and one of the following: MUSI 438, MUSI 442, MUSI 452.
- Supervised teaching in student’s performance area.

MUSE 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

MUSE 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

MUSE 494 SEMINAR, WORKSHOP
F, S, Su On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing; consent of instructor and approval of department head.
- Directed research and study on an individual basis.

MUSE 497 METHODS: INSTRUMENTAL METHODS & LITERATURE 5-12
S 3 cr. LEC 3
PREREQUISITE: MUSI 335, MUSI 206, MUSI 232.
COREQUISITE: MUSE 437.
- Rehearsal techniques, materials, literature, strategies for classroom management and the administration of the instrumental program for the middle school band and orchestra teacher.

MUSE 497 METHODS: CHORAL METHODS & LITERATURE 5-12
F 3 cr. LEC 3
PREREQUISITE: MUSI 336, MUSI 206, MUSI 232.
COREQUISITE: MUSE 439.
- Rehearsal techniques, materials, literature, strategies for classroom management and the administration of the choral program for the middle school and high school choral instructor.

MUSE 530 MUSIC, SOCIETY AND EDUCATION
Su alternate years, to be offered odd years 5 cr.
LECT 5
PREREQUISITE: EDU 495.
- Philosophical, historical, psychological and social foundations of music education. Music in public education, music curricula, aesthetics, and music learning theory.

MUSE 532 MUSIC EDUCATION: RESEARCH AND PRACTICE
F alternate years, to be offered even years 5 cr.
LECT 5
PREREQUISITE: EDU 495.
- Examination and close study of research in music education and its implications for practice.

MUSE 535 TEACHING MUSIC LITERACY
On Demand 2 cr. LEC 2
PREREQUISITE: MUSE 397.
- Analysis of the foundations of music literacy, contemporary trends in music reading and writing instruction and research related to these issues.

MUSE 545 GEN MUSIC PRACTICUM
S alternate years, to be offered even years 3 cr.
RCT 3
- Current issues and developments, teaching-learning systems, materials, media, strategies, and research relevant to K-12 general music education. Practical application of course content to one’s own teaching situation through online readings, research, discussions, and presentations.

MUSE 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. Maximum 5 cr.
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies.
- Courses offered on a one-time basis to fulfill professional development needs of in service educators. A specific focus is given to each course which is appropriately subtitled.

MUSE 590 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

MUSE 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.
MUSE 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of Department Head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

MUSE 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

MUSE 598 INTERNSHIP
On Demand 2 - 12 cr. IND Maximum credits unlimited
PREREQUISITE: Graduate standing, consent of instructor and Department Head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

MUSI
Music - General
formerly part of MUS

MUSI 100 CONCERT ATTENDANCE
F, S 0 cr. IND Maximum credits unlimited
- Required of Music Major students every semester that they are in residence on campus. Each student must attend 7 concerts and 3 approved lectures and sign in or submit proof of attendance. Pass/ Fail course.

MUSI 101A ENJOYMENT OF MUSIC
S 3 cr. LEC 3 cr.
- Introduces students to the rich legacy of Western Art Music, defined as notated musical traditions in Europe and later in the USA from liturgical chant to the present. Explores the historical context that led to the development of important genres and influenced the lives of composers. Facilitates active listening and curious inquiry into the language of music.

MUSI 103A FUNDAMENTALS OF MUSICAL CREATION
F, S 3 cr. LEC 1 RCT 1 LAB 1
- Open to all students. Study of the elements of music and their combination in musical creation. Activities include the acquisition of keyboard skills, exploration of traditional harmonic theory and exercises in music reading, analysis, and composition.

MUSI 105 MUSIC THEORY I
F 3 cr. LEC 3
PREREQUISITE: Music fundamentals pre-test. COREQ: MUSI 140.
- Music fundamentals, diatonic harmony and elementary counterpoint. Successful completion of Music Fundamentals Pre-test (administered during the first class meeting and covering scales, rhythm, meter, clefs, and key signatures) required for enrollment in this course.

MUSI 106 MUSIC THEORY II
S 3 cr. LEC 3
PREREQUISITE: MUSI 105.
COREQ: MUSI 141.
- Continuation of study of materials used in the previous semester: diatonic harmony and analysis in the common practice style, musical notation and language, function and interaction of the elements of music.

MUSI 112 CHOIR I: UNIVERSITY CHORUS
F 1 cr. LAB 1 May be repeated, maximum 8 cr.
PREREQUISITE: Consent of Instructor.
- Intermediate, mixed-voice choir performing a variety of concert music.

MUSI 114 BAND I: UNIVERSITY BAND
F, S 1 cr. LAB 1 May be repeated, maximum 8 cr.
- Study and performance of traditional and contemporary repertoire for wind and percussion in a large ensemble format. Open to all students with high school instrumental music experience.

MUSI 130A HISTORY OF JAZZ
S 3 cr. LEC 3
- Important literature from American jazz, with an emphasis on a detailed study of styles that have developed new directions in music and shaped America’s culture.

MUSI 131 JAZZ ENSEMBLE I: MSU F, S 1 cr. LAB 1 May be repeated, Maximum 8 cr.
PREREQUISITE: Successful audition.
- Ensemble performance experiencing musical styles that include swing, jazz, commercial, and popular music. Open to all students with high school instrumental music experience.

MUSI 135 KEYBOARD SKILLS I
F 1 cr. LAB 1
PREREQUISITE: Placement audition and music major.
- Study of keyboard theory and technique, creative activities, sight reading, and piano repertoire. For music majors.

MUSI 136 KEYBOARD SKILLS II
S 1 cr. LAB 1
PREREQUISITE: MUSI 15 or placement audition and music major.
- Continued study of keyboard theory and technique, creative activities, sight reading, and piano repertoire. For music majors.

MUSI 140 AURAL PERCEPTION I
F 1 cr. LAB 1
PREREQUISITE: Music reading pre-test. COREQ: MUSI 105.
- Studies in ear training and sight-singing to develop aural perception of tonal and temporal relationships. Primarily for students with planned concentration in music. Assumes knowledge of musical notation.

MUSI 141 AURAL PERCEPTION II
S 1 cr. LAB 1
PREREQUISITE: MUSI 140.
COREQ: MUSI 106.
- Continuation of studies in ear training and sight-singing to develop aural perception of tonal and temporal relationships. Primarily for students with planned concentration in music.

MUSI 155 MARCHING BAND:
SPIRIT OF THE WEST
F 1/2 cr. LAB May be repeated.
- Non-auditioned ensemble offering experience in marching techniques and outdoor performances.

MUSI 160 BEGINNING GUITAR
F 1 cr. LAB 1
PREREQUISITE: Placement audition.
- Basic instruction in techniques of chord and classical guitar, music reading, and performance.

MUSI 161 BEGINNING GUITAR II
S 1 cr. LAB 1
PREREQUISITE: MUSI 160 or placement audition.
- Continuation of MUSI 160.

MUSI 195 APPLIED MUSIC I
F, S 1 cr. STU 1 May be repeated, Maximum 3 cr.
PREREQUISITE: Successful audition.
- Techniques of performance and interpretation to develop musical ability, expression, accuracy, and stylistic awareness in student’s performance area.

MUSI 203A AMERICAN POPULAR MUSIC: REFLECTIONS OF POLITICS & SOCIETY
F, S 3 cr. LEC 3
- A study of the way in which American popular music is a product of the social, political, and historical context in which it developed, and in turn how this context was shaped by this music.

MUSI 205 MUSIC THEORY III
F 3 cr. LEC 3
PREREQUISITE: MUSI 106.
- Study and use of harmonic and counterpoint in the common practice period. Analysis of small forms.

MUSI 206 MUSIC THEORY IV
S 3 cr. LEC 3
PREREQUISITE: MUSI 205.
- Analysis and use of homophonic forms and 20th Century techniques.

MUSI 211A MASTERWORKS IN MUSIC
F, S 3 cr. LEC 3
- Presentation of examples of great music literature to develop informed, perceptive listening and musical understanding.

MUSI 219A HONORS MUSIC & SOCIETY
S 3 cr. LEC 3
- An investigation into the relationship between composers, and the cultural, political, and social influences that impacted their creative work. Various composers and significant musical works representing diverse style periods, cultures, and historical backgrounds will be discussed in depth. Students will be required to present a final paper discussing the work of a specific composer of their choice, incorporating the above criteria. Restricted entry. Priority to University Honors students.

MUSI 225 JAZZ THEORY & IMPROVISATION I
F alternate years, to be offered odd years 2 cr. LEC 1 LAB 1
PREREQUISITE: MUSI 105 and MUSI 295 or successful audition.
- Improvisational basis for experienced instrumentalists and vocalists, improvement of aural perception, techniques of teaching improvisation and utilizing it at various levels of technical proficiency, enhancing other approaches to music education.

MUSI 226 JAZZ THEORY & IMPROVISATION II
S alternate years, to be offered even years 2 cr. LEC 1 LAB 1
PREREQUISITE: MUSI 225.
- Application of the techniques learned in Improvisation I, continuation of improvisational and creative experiences.

COURSE DESCRIPTIONS: MUSE, MUSI
MUSI 230 INTERMEDIATE
KEYBOARD SKILLS: REPERTOIRE
F 1 cr. LAB 1
PREREQUISITE: MUSI 136 OR placement audition and music major.
- Continuation of the study of keyboard theory and technique, sight reading, and piano repertoire. For non-keyboard music majors.

MUSI 231 INTERMEDIATE
KEYBOARD SKILLS: ACCOMPANYING
F 1 cr. LAB 1
PREREQUISITE: MUSI 136 or placement audition and music major.
- Continuation of the study of keyboard theory and technique, ensemble playing, sight reading, and piano accompanying. For non-keyboard music majors.

MUSI 232 INTERMEDIATE
KEYBOARD SKILLS: OPEN SCORE READING
S 1 cr. LAB 1
PREREQUISITE: MUSI 136 or placement audition and music major.
- Continuation of the study of keyboard theory and technique, sight reading, and keyboard realization of choral and instrumental ensemble scores. For music majors.

MUSI 240 AURAL PERCEPTION III
F 1 cr. LAB 1
PREREQUISITE: MUSI 141.
- Continued development of aural and vocal skills that deal with tonal and temporal relationships.

MUSI 241 AURAL PERCEPTION IV
S 1 cr. LAB 1
PREREQUISITE: MUSI 240.
- Continued development of aural and vocal skills that deal with tonal and temporal relationships.

MUSI 260 INTERMEDIATE GUITAR
F 1 cr. LAB 1
PREREQUISITE: MUSI 161.
- Continued instruction in techniques of choral and classical guitar, music reading, and performance.

MUSI 281 DICTION: LATIN, ENGLISH ITALIAN
S 2 cr. LEC 2
PREREQUISITE: MUSI 195 in voice or previous singing experience.

MUSI 290R UNDERGRADUATE RESEARCH
F, S 1-4 cr. IND may be repeated
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

MUSI 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

MUSI 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

MUSI 294 SEMINAR/WORKSHOP
On Demand 1 cr. SEM Maximum 4 cr.
- Topics offered which are not covered in regular courses. Students participate in preparing and presenting discussion materials.

MUSI 295 APPLIED MUSIC II
F, S, Su 1 cr. STU 1 May be repeated, maximum 3 cr.
PREREQUISITE: MUSI 295 and successful audition.
- Continued instruction in techniques of performance and interpretation to develop musical ability, expression, accuracy, and stylistic awareness in student’s performance area.

MUSI 301 MUSIC HISTORY I
S 3 cr. LEC 3
PREREQUISITE: MUSI 106.
- Music as it relates to other arts and humanities from an historical and stylistic perspective. From Antiquity through the Baroque era.

MUSI 302 MUSIC HISTORY II
F 3 cr. LEC 3
PREREQUISITE: MUSI 106.
- Music as it relates to other arts and humanities from an historical and stylistic perspective. The Classical and Romantic eras.

MUSI 303 MUSIC HISTORY OF THE 20TH CENTURY
S 3 cr. LEC 3
PREREQUISITE: MUSI 106 and MUSI 301 or MUSI 302.
- Music as it relates to other arts and humanities from an historical and stylistic perspective. 20th Century and Jazz.

MUSI 307A WORLD MUSIC
F, S 3 cr. LEC 3
PREREQUISITE: Junior standing.
- Approaches to, and use of, music in world cultures. Impact of world music on the western art music tradition.

MUSI 308 ORCHESTRA II:
MSU SYMPHONY ORCHESTRA
F S 1 cr. LAB 1 May be repeated, maximum 8 cr.
PREREQUISITE: Successful audition.
- Advanced training in the performance repertoire for orchestra.

MUSI 310 OPERA THEATRE II
F, S 1 cr. LAB 1
PREREQUISITE: Successful audition
- Advanced training in the performance of opera and musical theater repertoire.

MUSI 312 CHOIR III: CHORALE
F, S 1 cr. LAB 1 May be repeated, maximum 8 cr.
PREREQUISITE: Successful audition.
- Advanced choral performance.

MUSI 314 BAND III: WIND SYMPHONY
F, S 1 cr. LAB 1 Maximum 8 cr.
PREREQUISITE: Enrollment by audition.
- Study and performance of advanced, traditional, and contemporary wind band repertoire.

MUSI 322 PERCUSSION ENSEMBLE
F, S 1 cr. LAB 1 May be repeated, maximum 8 cr.
PREREQUISITE: Successful audition
- Advanced ensemble performance experience focusing primarily on music written for percussion during the 20th century.

MUSI 331 JAZZ ENSEMBLE II:
ONE O’CLOCK JAZZ BAND
F, S 1 cr. LAB 1 May be repeated, maximum 8 cr.
PREREQUISITE: Successful audition.
- Advanced performance training in jazz literature from all style periods, guided improvisational experience.

MUSI 335 INSTRUMENTAL CONDUCTING & REHEARSAL TECHNIQUES
F 2 cr. LEC 1 RCT 1
PREREQUISITE: MUSI 241, MUSI 206.
- Basic conducting and instrumental rehearsal techniques, instrumental score study, laboratory experiences.

MUSI 336 CHORAL CONDUCTING & REHEARSAL TECHNIQUES
S 2 cr. LEC 1 RCT 1
PREREQUISITE: MUSI 355.
- Basic conducting and choral rehearsal techniques, choral score study, laboratory experiences.

MUSI 348 ENSEMBLE
F, S, Su 1 cr. LAB 1 May be repeated; Maximum 8 cr.
PREREQUISITE: Successful audition.
- Selected students perform in small, coached instrumental and vocal ensemble performance.

MUSI 351 ACCOMPANYING
F alternate years, to be offered even years 2 cr. RCT 2
PREREQUISITE: MUSI 295.
- Study of repertoire and principles of accompanying in all style periods. Laboratory experiences include accompanying instrumentalists and vocalists.

MUSI 358 PARKENING OBSERVATION
Su 1 cr. IND 1 Maximum 4 cr.
PREREQUISITE: MUSI 195.
- Guided observation and critique of Parkening Master Class.

MUSI 362 CHAMBER ENSEMBLES III: MSU ONE O’CLOCK JAZZ BAND
F, S 1 cr. LAB 1 May be repeated; maximum 8 cr.
COREQUISITE: MUSI 195, MUSI 295, MUSI 395, MUSI 415, or MUED 369; or successful audition.
- Students perform in small, coached instrumental and vocal chamber music ensembles. Students study and perform chamber music repertoire composed between 1650 and the present.

MUSI 382 DICTION: GERMAN AND FRENCH
F alternate years, to be offered odd years 2 cr. LEC 2
PREREQUISITE: MUSI 281
- Correct pronunciation of German and French for singers using the International Phonetic Alphabet. Study of standard art song and operatic repertoire in German and French.
MUSI 395 APPLIED MUSIC III
F, S; Su 1-2 cr. STU 1 May be repeated three times for credit.
PREREQUISITE: MUSI 295 and successful audition.
– Continued study of techniques of performance and interpretation to develop musical ability, expression, accuracy, and stylistic awareness in student’s performance area.

MUSI 407 COUNTERPOINT
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: MUSI 296.
– Study and practice of the techniques of writing two- and three-voice counterpoint, 16th, 18th, and 20th-Century styles.

MUSI 410 ANALYSIS
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: MUSI 296.
– Advanced analysis and in depth study of selected and representative works from specific categories, such as chamber, orchestral, vocal, or choral music.

MUSI 422 MSU CHAMBER ORCHESTRA
F, S 1 cr. LAB 1
PREREQUISITE: Audition or Consent of Instructor.
– A small (20-30 member) auditioned orchestra of strings and a few winds suitable for playing appropriate literature, such as works from the Baroque of Classical era, or more modern works written for smaller forces.

MUSI 426 MONTANANS
F, S 1 cr. LAB 1 Maximum 8 cr.
PREREQUISITE: Successful audition.
– Advanced performance in small vocal ensemble using stylistic variation in programming.

MUSI 428 GAMELAN
F, S 1 cr. LAB 1 May be repeated. Max 8 cr.
PREREQUISITE: MUSI 105 or MUSI 307 and consent of instructor. May be repeated; maximum 8 cr.
– Balinese gamelan orchestra rehearsal and performance using authentic instruments. Both traditional music for the angklung gamelan as well as newer directions in music will be addressed. Traditional role learning and musical notation will be used.

MUSI 430 KEYBOARD STUDY PEDAGOGY
F alternate years, to be offered odd years 2 cr. LEC 2
PREREQUISITE: Junior standing and MUSI 295.
– Study of studio and class piano teaching techniques, beginning piano methods, beginning keyboard literature and materials needed for studio/class piano teaching. Observations and supervised teaching experiences are included.

MUSI 432 KEYBOARD LITERATURE
S alternate years, to be offered even years 2 cr. LEC 1
PREREQUISITE: MUSI 450.
– Study of historical keyboard instruments and literature from the 1600s to the present.

MUSI 438 INSTRUMENTAL STUDIO PEDAGOGY & LITERATURE
F, S and on demand 2 cr. LEC 1 IND 1
PREREQUISITE: Junior standing, MUSI 295.
– Studio teaching techniques and relevant etudes, solo, and ensemble literature in the student’s major applied area. Evaluation of literature and progress of a young player. Required observation of experienced private lesson teachers.

MUSI 440 ORCHESTRACTION
S 2 cr. LEC 1 LAB 1
PREREQUISITE: MUSI 206.
– Training in scoring principles for instrumental ensembles with emphasis on arranging and adapting music for public school programs.

MUSI 442 VOCAL STUDIO PEDAGOGY & LITERATURE
S 2 cr. LEC 1 LAB 1
PREREQUISITE: Junior standing, and one of the following: MUS 156 or MUSI 295 and MUSI 231.
– Vocal pedagogy, teaching techniques, and literature.

MUSI 446 ADVANCED APPLIED CONDUCTING
F, S 1-2 cr. LAB 1-2
PREREQUISITE: Junior standing, and one of the following: MUSI 355 and MUSI 336 and MUSI 231 or MUSI 232.
– Provides BA-Music and BME-Music Education majors with practical experience in conducting, leadership, and management. Students will study advanced conducting and rehearsal techniques, and perhaps have the opportunity to conduct large ensembles as Student Conductors.

MUSI 450 RECITAL
F, S, Su 1 cr. IND 1 May be repeated.
COREQUISITE: MUSI 395 or MUSI 495.
– Selection of appropriate program of works suited to student’s abilities, preparation for performance.

MUSI 460 GUITAR MASTER CLASS
Su and on demand 1 cr. IND 1
PREREQUISITE: MUSI 295 (Guitar).
– Pedagogical and performance techniques in classical guitar.

MUSI 485 ACOUSTIC COMPOSITION
F, S on demand 1-5 cr. TUT 1 IND 1-2 May be repeated; maximum 6 cr.
PREREQUISITE: MUSI 106.
– Individual study of compositional practices for acoustic/orchestral instruments, compositional processes and techniques, standard notation and part-writing, and aesthetic concepts. Students meet minimum weekly progress standards and a total requirement for minutes of music written, adjustable for the complexity of the medium.

MUSI 490R UNDERGRADUATE RESEARCH
F, S, Su 1-6 cr. IND May be repeated. Max 12 cr.
– Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

MUSI 491 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

MUSI 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
– Directed research and study on an individual basis.

MUSI 494 SEMINAR/WORKSHOP
F, S, Su On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
– Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

MUSI 495 APPLIED MUSIC IV
F, S, Su 1-2 cr. STU 1 May be repeated three times for credit.
PREREQUISITE: MUSI 395 and successful audition.
– Continued study of techniques of performance and interpretation to develop musical ability, expressivity, accuracy, and stylistic awareness in student’s performance area.

MUSI 498 INTERNSHIP
On Demand 2-6 cr. IND Max. 12 cr.
PREREQUISITE: Consent of instructor.
– An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

MUSI 499R SENIOR RECITAL/CAPSTONE PJT
F 3 cr. LEC 2 SEM 1
PREREQUISITE: MUSI 296, MUSI 301, MUSI 302.
– Senior capstone course. Synthesis of historical, stylistic, and theoretical concepts and performance. Analysis and study of exemplary compositions. Public performance or other presentation and research paper based on an important work.

MUSI 504 STUDIES IN HISTORY AND ANALYSIS
Su alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: MUSI 296, MUSI 301, MUSI 302.
– Review and study of the history of music, with an emphasis on specific works. Review and practice of analytical and theoretical procedures and concepts in a variety of musical genres and styles.

MUSI 515 CONTEMPORARY DIRECTIONS IN MUSIC
On demand 2 cr. LEC 2
PREREQUISITE: MUSI 302.
– In-depth investigation of musical styles prevalent in western music between 1975-present.

MUSI 519 WORLD MUSIC
On demand 2 cr. LEC 2
PREREQUISITE: MUSI 302.
– Approaches to and use of music in world cultures. The influence of world music on Western music.

MUSI 520 MONTANA CHAMBER MUSIC WORKSHOP
Su 2 cr. LAB 2
PREREQUISITE: MUSI 295, MUSI 295 and consent of instructor.
– Students investigate the wealth of chamber music literature that includes their own instrument in various instrumental combinations, through coached playing assignments and in performance forums.

MUSI 540 ADVANCED CONDUCTING
F, S 3 cr. RCT 1-3 May be repeated for credit.
PREREQUISITE: MUSI 335 or MUSI 336.
– Conducting techniques, score study and rehearsal procedures for direction of instrumental and choral groups in the public schools. Online readings, research, and discussions with on-campus and off-site conducting of ensembles.
MUST 522 GRADUATE VOCAL PEDAGOGY  
F alternate years, to be offered every year  
5 cr., SEM 3  
PREREQUISITE: MUSI 412.  
COREQUISITE: Must be an active music educator.  
- Online/Seminar delivery centers around classroom application of vocal methodologies in the studio and classroom. Course content will include the study of vocal physiology and acoustics.

MUST 550 GRADUATE RECITAL  
F, S, Su 1 cr., IND 1.  
PREREQUISITE: MUED 560.  
- Formal recital to include works from different eras.

MUST 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT  
F, S 1-4 cr. IND Maximum 6 cr.  
PREREQUISITE: Graduate standing.  
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

MUST 595 APPLIED MUSIC  
F, S, Su 1-2 cr. STU 1-2 May be repeated; Maximum 5 cr.  
PREREQUISITE: MUSI 495 or demonstrated proficiency and consent of instructor.  
- Advanced studies of techniques of performance and interpretation to develop musical ability, expression, accuracy and stylistic awareness in student's performance area.

MUST - Technology  
formerly part of MUS

MUST 112 BASIC HOME RECORDING  
F, S 3 cr., LAB 3.  
- This class will familiarize students with information and processes in a functioning home studio using Pro Tools. Through hands-on tutorials, the students will develop essential techniques for setup, recording, editing, and basic mixing.

MUST 115 INTRODUCTION TO DIGITAL MUSIC  
F 3 cr., LEC 5  
- First course in the Music Technology Sequence. Concepts and terms, creative projects using software and hardware, historical background, an introduction to the music industry, and tools for building self-directed careers within the changing field of music technology.

MUST 125 MIDI SEQUENCING & NOTATION  
S 3 cr., LEC 3  
PREREQUISITE: MUST 115, and permission of instructor.  
- Continuation of the MIDI component of Introduction to Digital Music. Composition and music notation, synthesizer programming, constructing an integrated music technology studio, and advanced applications for film and theatre.

MUST 217 ENTERTAINMENT BUSINESS  
F, S 3 cr., LEC 3  
PREREQUISITE: W and US core.  
- Explore the business of Music, Entertainment, and Film industries. Artist Copyright, Royalties, Mechanical Licensing, Performance Contract, and basic contracts will be discussed with regard to business history, organization, media channels, and customer base.

MUST 220 RECORDING I  
F 3 cr., LEC 2 LAB 1  
PREREQUISITE: MTEC Major status.  
- Exploration of, and exposure to, technologies and concepts used to create, record, edit, format, manufacture, reinforce and reproduce audio. Combination of lecture and hands-on learning.

MUST 225 ELECTRIC MONSTER LAPTOP ENSEMBLE  
On Demand 2 cr., LAB 2.  
PREREQUISITE: Permission of instructor required.  
- May be repeated for credit. Maximum 6 credits.  
- Performance and study of music making in an ensemble of many laptop computers. Computer music programming skills as well as music performance experience desirable.

MUST 259 MULTIMEDIA AUDIO PRODUCTION  
S 3 cr., RCT 2 LAB 1  
PREREQUISITE: Music Technology Majors: MTEC major status and MUST 220; Film Majors (SFP): FILM 212 or permission from instructor.  
- The study of theoretical and practical approaches to audio production for multimedia, to include ADR/Dual replacement, Foley, sound effects, field/location recording, studio recording, music integration and editing, surround sound techniques/encoding, delivery paradigms, and aesthetics of audio for multimedia.

MUST 290R UNDERGRADUATE RESEARCH  
On Demand 1-6 cr. IND May be repeated.  
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

MUST 291 SPECIAL TOPICS  
On Demand 1-4 cr. Maximum 12 cr.  
PREREQUISITE: None required but some may be determined necessary by each offering department.  
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

MUST 292 INDEPENDENT STUDY  
On Demand 1-3 cr. IND Maximum 6 cr.  
PREREQUISITE: Consent of instructor and approval of department head.  
- Directed research and study on an individual basis.

MUST 294 SEMINAR, WORKSHOP  
On Demand 1 cr., SEM Maximum 4 cr.  
- Topics offered which are not covered in regular courses. Students participate in preparing and presenting discussion materials.

MUST 305 ORCHESTRATION FOR NEW MEDIA  
F 2 cr., LEC 1 LAB 1  
PREREQUISITE: MTEC majors: MUST 125 and permission of instructor; other majors: permission of instructor only.  
- Study of the full orchestra, its subgroups, and integration of software instruments for orchestrating music in today's music world.

MUST 320 RECORDING II  
F 3 cr., LAB 3  
PREREQUISITE: MUST 220, formal admission to the MTEC Major, and permission of instructor.  
- Advanced laboratory course in recording and mixing, to include microphone techniques, outboard gear, recording and mixing individual instruments and ensembles, mastering techniques, session management, and business organization.

MUST 341 SOUND DESIGN AND SYNTHESIS  
F 3 cr., LEC 3  
PREREQUISITE: MTEC Major status and MUST 220.  
- Students will explore artistic and scientific applications of recent research in sound, including software for analysis/resynthesis, noise reduction, cross-synthesis, physical modeling, and acoustical analysis. Links between music composition, acoustics, computer science, and multimedia post production are emphasized.

MUST 350 REAL-TIME COMPUTER MUSIC  
S 3 cr., LEC 3  
PREREQUISITE: MTEC Major status and permission of instructor required.  
- Study of the real-time interactive computer music programming environment Max/MSP/Jitter. Students will learn standard objects and operational strategies in the program by building small modules and assembling them into larger patches, which then facilitate compositions and performances.

MUST 380 INTERDISCIPLINARY PROJECTS I: FILM I  
F 3 cr., RCT 3  
PREREQUISITE: MTEC Majors: MTEC Major status and permission of instructor.  
- For upper-level Film and Music Technology students. Exploration of cross-disciplinary techniques in multimedia art. Individual and collaborative projects with visuals and sound. Overview of the history of audio art, video art and experimental film.

MUST 382 INTERDISCIPLINARY PROJECTS II  
S 3 cr., RCT 3 May be repeated for credit when topics vary.  
PREREQUISITE: MTEC Majors: Music Technology major status and permission of instructor only.  
- Topics vary by semester in this interdisciplinary course connecting Music Technology with other departments.

MUST 384 FILM SCORING  
S 3 cr., LEC 1 LAB 2  
PREREQUISITE: MUST 125 and MUST 305 or consent of instructor.  
- The course objective is to provide the student with knowledge and guidance through the various stages of the process of creating original music to accompany a visual medium. While no previous film scoring experience is required, a fundamental background in music theory, keyboard skills, and music technology is necessary.

MUST 490R UNDERGRADUATE RESEARCH  
On Demand 1-6 cr. IND May be repeated. Maximum 12 cr.  
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.
MUST 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

MUST 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. END Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of School Director.
- Directed research and study on an individual basis.

MUST 494 SEMINAR/WORKSHOP
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

MUST 498 INTERNSHIP
On Demand 2 - 6 cr. END Maximum 12 cr.
PREREQUISITE: Consent of instructor.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

MUST 499R SENIOR RECITAL/CAPSTONE EXPERIENCE
S 3 cr. LEC 2, SEM 1
PREREQUISITE: Senior standing in MTEC program (MTEC and Composition/Orchestration coursework must be completed or in progress).
- Creation and public performance of a large-scale work incorporating original sound design (film score, multimedia work, EP length album, or theatrical soundtrack) plus research paper synthesizing knowledge and inquiry in the Music Technology major.

MUST 544 COMPUTER APPLICATIONS FOR MUSIC EDUCATORS
So 3 cr. LEC 1 LAB 2
PREREQUISITE: Admission to the Master of Education with emphasis in Music program. Other graduate programs and non-degree-seeking graduate students by permission of instructor.
- An introduction to computer applications in music, including music notation, audio recording, and basic composition with audio and MIDI. This course is particularly geared toward music educators.

NASX
Native American Studies formerly NAS

NASX 105D INTRODUCTION TO NATIVE AMERICAN STUDIES
F, S 3 cr. LEC 3
- A survey of traditional and contemporary American Indian cultures, the historical development of the unique relationship between the federal government and Indian nations, and current issues among Indian peoples.

NASX 205D NATIVE AMERICANS IN CONTEMPORARY SOCIETY
F 3 cr. LEC 3
- Selected contemporary economic, social, political, educational, and cultural issues facing American Indians today, with special emphasis on tribal groups in Montana.

NASX 232D MONTANA NATIVE ART CULTURES, HISTORIES, CURRENT ISSUES
S 3 cr. LEC 3
- Movements of Indians into Montana. Social structures including kinship, political affiliations; military, warrior societies, and religion. Establishment of Montana's reservations; treaties and agreements with the federal government; vested rights of Indians; sovereignty and self-government; contemporary tribal governments; contemporary Indian societies; socioeconomic problems.

NASX 239 SURVEY OF AMERICAN INDIAN ART
F 3 cr. LEC 3
- The aesthetic, cultural, and symbolic meanings of traditional and contemporary American Indian art: Plains, Southwestern, Northwest Coast, and Inuit art and artists.

NASX 253 NATIVE AMERICAN LITERATURE AND THE WEST
S 3 cr. SEM 3
- This course will familiarize you with Indigenous literature and its relation to the American and Canadian West. We will seek to retrace the creation of the Western myths while placing Indigenous perspectives and literature at the center of our discussions.

NASX 280S NAS RESEARCH THEORIES & METHODS
S 3 cr. SEM 3
PREREQUISITE: NASX 105.
- This course critically examines the political and academic foundations of Native American Studies. It analyzes the theoretical and methodological underpinnings, emphasizing indigenous paradigms and practices. Students are expected to think analytically, participate in discussion, and do original research.

NASX 290R UNDERGRADUATE RESEARCH
F, S, Su 1 - 8 cr. RCT
PREREQUISITE: Consent of department head.
- Directed undergraduate research/creative activity. Course will address responsible conduct of research.

NASX 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

NASX 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. END Max 6
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

NASX 294R SEMINAR/WORKSHOP
F, S, Su 1 - 2 cr. RCT
COREQUISITE: NASX 290.
- Classroom instruction associated with directed undergraduate research and creative activity projects.

NASX 304 NATIVE AMERICAN BELEIFS AND PHILOSOPHY
F, S 3 cr. LEC 3
PREREQUISITE: Junior standing.
- An in-depth analysis of specific contemporary and historic, tribal, and pan-Indian beliefs. Basic elements of Native American religions are defined from the perspective of the practitioner's understanding of their contributions to distinct cosmologies. The legal protection of Native American religions frames the analysis.

NASX 310 NATIVE CULTURES OF NORTH AMERICA
S alternate years, to be offered odd years 5 cr. LEC 3
PREREQUISITE: Junior standing.
- Histories and cultures of representative Native peoples of North America; impact of European discovery, conquest and colonization; political, social, and economic developments from Pre-Colombian to present times including contemporary issues facing the indigenous peoples of the Americas.

NASX 340 NATIVE AMERICAN LITERATURE
F, S 3 cr. LEC 3
PREREQUISITE: Junior standing and WRIT 101W.
- Traditional and contemporary Native American literature including oral narratives, folktales, poetry, short stories, essays, and the novel. Methods of literary analysis will be explored to assist students in determining the meaning and function of the various genres.

NASX 350 NATIVE AMERICAN AND CINEMA
F alternate years, to be offered odd years 3 cr. LEC 3
- Analysis of images and representations of American Indians in feature, independent, and telefilms based in a cultural studies approach to film and film production. Considerable attention is given to Indigenous aesthetics.

NASX 405 GENDER ISSUES IN NATIVE AMERICAN STUDIES
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: Previous course in NAS and junior standing, or permission of instructor.
- Compare and contrast the social construction of gender in Native American cultures and Euroamericans. Explore role of women, men and “two-spirit” gender of early North American Indigenous societies. Analyze the impact of European colonization on traditional roles and examine contemporary gender issues.

NASX 415 NATIVE FOOD SYSTEMS
F alternate years, will be offered even years 3 cr. LEC 1 SEM 2
PREREQUISITE: NASX 105 or NASX 232 and upper division standing.
- This course engages indigenous practices and beliefs, focusing particularly on the food systems of the Native Americans, and using comparative data from across time and place. Of specific interest are dynamic connections between Native foods and the health of people and place, both traditionally and in societies affected by colonization and rapid cultural change.
COURSE DESCRIPTIONS: NASX

NASX 450 AMERICAN INDIAN EDUCATION
S alternate years, will be offered even years 3 cr. LEC 3
PREREQUISITE: Junior standing. NASX 232.
- Historical development and contemporary directions in American Indian education, values and assumptions inherent in programs devised at the state and federal levels and their results, the cultural basis of Indian education, and selected materials appropriate to the various educational levels.

NASX 440 MONTANA INDIAN LITERATURE
F alternate years, will be offered odd years 3 cr. SEM 3
PREREQUISITE: Junior standing, or consent of instructor.
- Examination of literature written by and about Native American peoples in Montana. Emphasis on the changing status (function and value) of such writing and on social and political analyses of texts and writers, including Earling, McNickle, Mourning Dove, and Welch.

NASX 450 HISTORY OF AMERICAN INDIAN
On Demand 3 cr. LEC 3
PREREQUISITE: HSTA 101 or HSTA 102.
- Indian affairs in America from 1600-1970. Emphasis on white reaction to the American Indians and the effect of the European invasion on Indian culture.

NASX 476 AMERICAN INDIAN POLICY & LAW
S 3 cr. LEC 3
PREREQUISITE: NASX 105, and junior standing.
- Survey of institutions, laws, cultures, and political forces which shaped federal Indian policy from colonial times to the present. Examination of primary documents, treaties, case law, and agencies which are the foundations of federal relationships with Indian Tribes.

NASX 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisite as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

NASX 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

NASX 494R SEMINAR/WORKSHOP
F, S, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: NASX 490.
- Classroom instruction associated with directed undergraduate research/creative activity projects.

NASX 498 INTERNSHIP
On Demand 2 - 12 cr. IND
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

NASX 505 PROSEMINAR IN NATIVE AMERICAN STUDIES
F 3 cr. SEM 3
- This course is a Graduate introduction to Native American Studies.

NASX 520 FEMINIST AND GENDER THEORIES IN NATIVE AMERICAN STUDIES
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course is intended to explore gender issues in Native American Studies. It will critically explore the problems and points of conflict between Native American women’s gender concerns and Euroamerican feminist theories.

NASX 521 TRIBAL GOVERNMENT:
YESTERDAY AND TODAY
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- The course examines the complexities of American Indian governments’ organization, their histories, and the unique relationship between the Federal government and American Indian tribes. The course highlights several models of both traditional and contemporary tribal governance systems.

NASX 523 AMERICAN INDIANS AND MINORITIES IN HIGHER EDUCATION
On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- The course will develop and build the students’ understanding of the historical and current situation of American Indians and other minorities in the U.S. higher education. It will also focus on the unique place of tribal colleges in the U.S. higher education.

NASX 524 CONTEMPORARY ISSUES IN AMERICAN INDIANS
F to be offered every years 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- The course is intended to develop and refine the students’ knowledge of the historical background of American Indian issues and how history now affects the contemporary issues facing American Indians.

NASX 525 INDIGENOUS PHILOSOPHIES OF SACRED ECOCOLOGIES
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- This course begins by examining indigenous philosophies of sacred ecologies, contrasting these views with those held by Europeans regarding the natural world. It traces the impact of historical colonialism in the environment up to contemporary conflicts over sacred sites and environmental resources.

NASX 530 FEDERAL LAW AND INDIAN POLICY
S 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- Advanced analysis of theories, doctrines, case law, and legislation with a focus on key legal and policy concerns for contemporary Native America including treaties, criminal jurisdiction, land, environmental regulation, water rights, fishing and hunting, child welfare, gaming, taxation, repatriation, and religious freedom.

NASX 540 THEORETICAL POSITIONS IN NATIVE AMERICAN STUDIES
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- An introduction to the central conceptualizations of the academic discipline of Native American Studies and several of the theoretical paradigms operative within it. Students will gain an understanding of the contributions of Native American Studies to theoretical understandings within, across, and beyond dominant academic disciplines.

NASX 541 A CRITICAL APPROACH TO NAS METHODOLOGIES
S 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- A critical survey of the interdisciplinary approaches used in NAS grounded in a sociopolitical context with emphasis on ethical questions raised by research of Native Americans. Students receive individual attention toward formulating an effective methodology for their master’s project.

NASX 550 NATIVE AMERICA: DISPELLING THE MYTHS
S 3 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
- This course is designed around a series of commonly held assumptions or “myths”. When unexamined, these assumptions undermine our ability to communicate across cultures, and ultimately form the basis for some of the worst forms of racism and stereotyping. We wrestle with these preconceptions while learning the most basic elements of American Indian which is to say American-history.

NASX 551 AMERICAN INDIAN ART SURVEY
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- Exploration of the functions and purposes of the unique arts of North American indigenous peoples by culture area, in both the past and the present, within the overlapping contexts of culture area politics, cosmology, religion and spirituality, and gender.

NASX 552 INDIGENOUS NATIONS OF MONTANA
S 3 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
- NASX 552 is a graduate level introduction to Montana’s contemporary Indigenous Nations, with a summary overview of Montana’s Paleoindian pre-history and post-contact history. Students explore the traditional culture and history of each Montana tribe, and focus on the contemporary life and issues pertinent to each tribe.

NASX 553 INDIGENOUS LITERATURE AND THE WEST
S 3 cr. LEC 3
- This course will familiarize us with Indigenous literature and its relation to the American and Canadian West. We will seek to retrace the creation of the Western myths while placing Indigenous perspectives and literature at the center of our discussions.

NASX 560 NATIVE AMERICAN LITERARY TRADITIONS
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: Graduate standing.
- A survey of prose writing, mainly long fiction, by and about contemporary Native Americans.

NASX 575 PROFESSIONAL PAPER
F, S, Su 1-6 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.
NASX 389 GRADUATE CONSULTATION
F, S, Su 3 cr. TUT 3
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by graduate students who have completed all of their course work and their theses, if on a thesis plan, but who need additional faculty or staff time and assistance.

NASX 390 MASTER’S THESIS
F, S, Su 1-10 cr. May be repeated.
PREREQUISITE: Master’s standing.

NASX 391 SPECIAL TOPICS
On Demand 1-4 cr. RCT Maximum 6 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

NASX 392 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

NASX 394 SEMINAR
On Demand 1-4 cr. SEM
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

NASX 398 INTERNSHIP
F, S, Su 1-6 cr. IND
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

NRSG Nursing
formerly N

NRSG 115 NURSING AS A PROFESSION
F, S, Su 2 cr. LEC 2
- The purpose of this course is to initiate and foster the professional socialization process. Content and activities expose students to issues surrounding the profession of nursing, multiple roles of nursing in society and health care, and concepts related to the dimensions of nursing practice: nurse, client, health and environment.

NRSG 116 CO-OP PATHWAYS TO SUCCESS
F 2 cr. SEM 2
PREREQUISITES: Enrollment in the CO-OP Program.
- Explores career options in nursing, the Indian Health Service system, goal setting, study habits, time management, test taking, paper/lab report writing, and library research. Students create a service learning project addressing an American Indian healthcare issue.

NRSG 117 CO-OP ISSUES IN NATIVE NURSING
S 2 cr. SEM 2
PREREQUISITES: Enrollment in the CO-OP Program.
- Explores contemporary healthcare issues, traditional American Indian values, healthcare reform for American Indians, patient advocacy for the minority nurse and cultural competency. Students complete a service learning project and optional challenge project.

NRSG 216 CO-OP PROFESSIONAL COMPETENCIES FOR NATIVE NURSES
F 2 cr. SEM 2
PREREQUISITE: Enrollment in the CO-OP Program, sophomore status.
- Teaches, reviews, and practices competency and fluency in dosage calculation, medical terminology, and professional research writing skills. Students' research writing will inform a service learning project aimed at improving health outcomes for a specific population of American Indians.

NRSG 220 FOUNDATIONS OF ETHICAL NURSING RECITATION
F, S, Su 2 cr. LEC 1 RCT/DIS 1
- Drawing on contemporary issues in bioethics this foundational course explores influential moral values, philosophical principles and theories as formal grounding for ethical decision making and action in health care. A broad historical, cultural and societal perspective is emphasized to provide the background for understanding the everyday ethical problems that health professionals encounter in their practices. A psychological and social framework of analysis is used to foster sensitivity, skills of analysis and ethical behavior in situations of moral conflict.

NRSG 225 FOUNDATIONS FOR PLANNING AND PROVIDING CLINICAL NURSING CARE
F, S, Su 4 cr. LEC 2 LAB 2
PREREQUISITES: BIOH 201, BIOH 211, HDCF 150, and BIOM 250.
COREQUISITES: NRSG 238 or consent of instructor.
- Application of nursing principles, concepts and related skills for care of the individual needing assistance. The clinical decision-making process is utilized in the provision of nursing care in clinical settings.

NRSG 238 HEALTH ASSESSMENT ACROSS THE LIFE SPAN
F, S, Su 4 cr. LEC 2 LAB 2
PREREQUISITES: BIOH 201 and BIOH 211.
COREQUISITE: NRSG 225 or consent of instructor.
- This course is designed to teach the student a health oriented approach to nursing assessment of clients across the life span in a variety of community based settings. The primary focus of the course is on normal health assessment findings, with recognition of abnormal variations. This course emphasizes development of the skills needed to perform a comprehensive health assessment of children, adults, and the elderly. Data collection through comprehensive history taking and physical assessment is emphasized. Utilization of assessment findings in clinical decision making is discussed throughout the course.

NRSG 258 PATHOPHYSIOLOGY
F, S, Su 3 cr. LEC 3
PREREQUISITES: BIOH 201, BIOH 211, CHMY 121 and CHMY 122.
- This course provides an introduction to the abnormal functioning of human cells, tissues, and organ systems, and the physiological adaptations that occur. Commonly encountered age-related variations are addressed. The influences of environment, genetics, nutrition, and culture are emphasized. Current research that explains the changes that accompany a particular syndrome or disease are considered.

NRSG 290 UNDERGRADUATE RESEARCH
On Demand 1-4 cr. IND may be repeated
COREQUISITE:
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

NRSG 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: As determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

NRSG 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

NRSG 294 WORKSHOP/SEMINAR
On Demand 1 - 4 cr. IND Maximum 12 credits
PREREQUISITE: As determined for each offering.
- Topics offered at the lower division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

NRSG 336 NURSING PHARMACOTHERAPEUTICS
F, S, Su 5 cr. LEC 2 LAB 1
PREREQUISITE: CHMY 121, CHMY 123, NUTR 221, NRSG 258 and NRSG 238.
- The focus of this course is to examine pharmacotherapeutics in nursing practice. Clinical application of pharmacological and pathophysiological principles are integrated. Physical, psychological, social and cultural factors; age related variations; and alternative therapies are highlighted.

NRSG 341 PSYCHOSOCIAL NURSING CONCEPTS
F, S, Su 3 cr. LEC 2 LAB 3
PREREQUISITES: PSYX 100, SOCI 101, NRSG 115, NRSG 220, NRSG 225, NRSG 258 and NRSG 258.
- This course explores selected psychosocial concepts and theories basic to nursing practice with clients in a variety of settings. Topics include family theory, palliative care, crisis theory, anxiety, loss, grief & other human responses; and related psychosocial nursing strategies.

NRSG 346 NURSING CARE OF CHILDBEARING FAMILY
F, S 3 cr. LEC 2 LAB 3
PREREQUISITES: NRSG 341, NRSG 352 and NRSG 356.
- The focus of this course is the nursing care of childbearing women, neonates and their families in a variety of settings. Normal pregnancy and childbirth are addressed, as well as the identification and management of high risk childbearing situations. Selected health care of women content is included.
NRSG 348 NURSING CARE OF CHILDREN AND FAMILIES
F, S 5 cr. LEC 2 LAB 3
PREREQUISITES: NRSG 258, NRSG 336, NRSG 341, and NRSG 352.
- The focus of this course is health promotion, disease prevention, illness management and nursing care of children within the family context in a variety of settings. This course builds upon and integrates knowledge gained from nursing, sciences and the humanities.

NRSG 352 ACUTE AND CHRONIC ILLNESS
F, S 5 cr. LEC 2 LAB 3
PREREQUISITE: NRSG 325, NRSG 258 and NRSG 258.
- The focus of this course is application of theoretical and empirical knowledge to nursing care for clients across the adult lifespan with acute and chronic illness in a variety of settings. Health promotion, disease prevention, and symptom management are emphasized. This course builds upon and integrates knowledge gained from nursing, sciences and the humanities.

NRSG 377 INTRODUCTION TO COMMUNITY BASED NURSING
F, S 2 cr. LEC 2
- The focus of this course is to introduce the student to community based nursing practice for individuals, families, populations and communities. The course will emphasize health promotion, disease prevention and health determinants in a variety of settings.

NRSG 387R RESEARCH IN HEALTH CARE
F, S 3 cr. LEC 2 LAB 3
PREREQUISITE: STAT 216 or Consent of Instructor.
- Students are introduced to the research process and evidence-based practice. They develop knowledge, skills, and values necessary to be informed consumers of health related research. Students engage in research processes, examine research reports, and describe practice applications.

NRSG 418 ISSUES IN HEALTH POLICY AND HEALTH CARE ECONOMICS
F, S 2 cr. LEC 1 SEM 1
- Focus is on economics, public policy and political factors which affect the delivery of health and nursing care at the local, state, national and international levels. Students are encouraged to participate in efforts to influence health policy.

NRSG 435 SPIRITUALITY IN HEALTH CARE
F, S 2 cr. RCT/DIS 2
PREREQUISITES: PSYX 100 and NRSG 115 or consent of instructor.
- This elective course explores aspects of spirituality and the use of spiritually-based therapies in health-care from various faith traditions. Spiritual assessment and spiritually-based strategies to promote health and wellness are emphasized. Although a multi-disciplinary approach to spiritual care is presented, a nursing perspective is highlighted.

NRSG 437 PSYCHIATRIC NURSING
F, S 6 cr. LEC 3 LAB 3
PREREQUISITES: NRSG 341 and NRSG 357 and NRSG 346 or NRSG 348 or NRSG 352.
- The focus of this course is nursing care of clients with acute and chronic psychiatric disorders, including psychopathology associated with major mental illness. Community based experiences provide opportunity for continued development of therapeutic skills. Social, cultural, spiritual and environmental issues influencing mental health are explored.

NRSG 444 CARE MANAGEMENT
F, S 3 cr. LEC 2 RCT/DIS 1
PREREQUISITES: NRSG 352 and NRSG 387R.
- This course focuses on care management with application of ethical and legal concepts. The care management process is explored. Care management is examined as a method of managing health care.

NRSG 454 URGENT AND PALLIATIVE CARE
F, S 6 cr. LEC 3 LAB 3
PREREQUISITE: NRSG 352.
- The focus of this course is application of theoretical and empirical knowledge to nursing care for complex clients across the adult lifespan requiring urgent and palliative care in a variety of settings. Clinical decision making, triage and symptom management are emphasized. This course builds upon and integrates knowledge gained from nursing, sciences and the humanities.

NRSG 469 CULTURAL APPLICATIONS IN NURSING: THE [SPECIFIC CULTURE] EXPERIENCE
F, S 2 cr. LEC 1 LAB 1
PREREQUISITE: Enrolled in the undergraduate nursing program.
- This elective course is designed as an intense but time-limited immersion into another culture and is focused on health benefits, health care, and nursing applications. The experience is preceded by analysis of cultural principles applicable to nursing and concluded by analysis of actual clinical participation with (specific culture) nurses and clients.

NRSG 477 POPULATION BASED NURSING CARE IN THE COMMUNITY
F, S, Su 6 cr. LEC 3 LAB 3
PREREQUISITES: NRSG 437 and NRSG 454.
- The focus of this course is the health and well-being of the global community. National and global health problems are examined from a public health perspective. Community assessment and epidemiologic methods are used to identify populations at risk and potential areas for intervention.

NRSG 487C NURSING LEADERSHIP AND MANAGEMENT DEVELOPMENT
F, S, Su 6 cr. LEC 3 LAB 3
PREREQUISITES: NRSG 437, NRSG 444 and NRSG 454.
- Senior capstone course. The focus of this course is to provide an integration of theory and skill development in leadership, management and organizational concepts for the design, coordination, and management of health care using the community based philosophy.

NRSG 490R UNDERGRADUATE RESEARCH
On Demand 1 - 6 cr.
PREREQUISITE: Junior standing.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

NRSG 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

NRSG 492 INDEPENDENT STUDY
On Demand 1-3 cr. IND Maximum 6 cr.
PREREQUISITES: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

NRSG 494 WORKSHOP/SEMINAR
On Demand 1 - 4 cr. SEM Maximum 12 credits
PREREQUISITE: Junior standing and as determined for each offering.
- Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

NRSG 498 INTERNSHIP
Su 5 cr. LAB 3
PREREQUISITE: Satisfactory completion of all 1st semester junior level clinical nursing courses. Placement subject to availability.
- This elective course is designed to increase competence and confidence in previously learned clinical skills. The student works with a registered nurse (RN) in a cooperating clinical agency for a period of intensified clinical experience.

NRSG 501 TEACHING CONCEPTS FOR NURSING EDUCATORS
F 2 cr. LEC 2
PREREQUISITE: Graduate Standing.
- Designed for students interested in nursing education (academic or practice environment). Emphasizes teaching strategies and delivery of nursing education for diverse learners in a variety of settings. Roles and responsibilities are explored. Includes history and evolution of teaching and learning.

NRSG 502 EFFECTIVE CLINICAL TEACHING
S 2 cr. LEC 2
PREREQUISITE: Graduate Standing.
- Focuses on educator roles and responsibilities in teaching clinical nursing (academic or practice environments). Designed for students interested in developing clinical teaching skills. Major themes: development of learning activities, evaluation of student performance, concepts of student supervision, and agency coordination.

NRSG 503 CURRICULUM DEVELOPMENT
Su, alternate years, to be offered Su even years 3 cr. LEC 3
PREREQUISITE: Graduate Standing.
- Theories and models of curriculum development are explored and designed for nurses teaching in either academic or practice environments. Variables associated with design and planning of educational interventions are explored. Students synthesize appropriate theoretical concepts to develop a model curriculum.
NRSG 504 ASSESSMENT AND EVALUATION OF EDUCATION
Su, alternate years, to be offered Su odd years
3 cr. LEC 3
PREREQUISITE: Graduate Standing.
- Students engage in discussions around design, assessment, and evaluation of instruction by nurses. Topics include writing instructional objectives and constructing activities to assess student learning outcomes. Students complete a project to gain skills in evaluating learning related to a specific unit of study.

NRSG 505 EVIDENCE BASED PRACTICE
F 4 cr. LEC 4
PREREQUISITE: NRSG 387 (or equivalent) and STAT 216 (or equivalent).
- This course focuses on the various methods and processes used to translate knowledge into evidence-based practice. Students explore processes for acquiring, evaluating and using knowledge for clinical practice in both rural and urban areas.

NRSG 506 MANAGEMENT OF CARE ENVIRONMENTS
S 4 cr. LEC 3 LAB 1
PREREQUISITE: NRSG 505
- Introduces the role of Clinical Nurse Leader, examines internal and external forces which affect care delivery in a variety of settings within healthcare systems and organizations. Opportunity to learn strategies for team coordination, quality management, and risk reduction. Healthcare informatics is included.

NRSG 507 MANAGEMENT OF CLINICAL OUTCOMES
S 4 cr. LEC 3 LAB 1
PREREQUISITE: NRSG 505, NRSG 506, NRSG 517, NRSG 550, and NRSG 560 or consent of instructor.
COREQUISITE: NRSG 506.
- Focus on dynamic leadership, clinical decision-making models, and management of clinical outcomes for groups of clients across the wellness-illness continuum. Students apply evidence-based practice and knowledge management strategies to ensure optimum care in rural and urban environments.

NRSG 508 CLINICAL LEADERSHIP PRACTICUM
F 8 cr. LEC 1 LAB 1
PREREQUISITE: NRSG 505, NRSG 506, and NRSG 507.
- This course is an immersion clinical practicum. Students practice Clinical Nurse Leader competencies in their selected health care environment(s) to design, manage, and evaluate care to improve health outcomes for a selected population.

NRSG 509 DESIGN HC DELIVERY SYS-LAB
S
PREREQUISITE: NRSG 505 (nursing students); EIND 458 (IE students) or instructor’s permission.
COREQUISITE: NRSG 506
- Clinical Nurse Leader and Industrial Engineering students will learn how to analyze and improve systems of healthcare through mentored experiences and simulations. Strategies to promote interdisciplinary problem-solving, quality management and reduce risk of medical error in selected clinical settings will be highlighted.

NRSG 517 FOUNDATIONS OF PHARMACOTHERAPEUTICS
F 1 cr. LEC 1
PRE or COREQUISITE: NRSG 560, graduate standing, or consent of instructor.
- Introduces the student to the essentials of pharmacotherapy for advanced practice nurses. Provides a basis for understanding the pharmacokinetis and actions of selected classes of drugs commonly used in primary care practice. Legal and ethical considerations of prescriptive practice are addressed.

NRSG 518 PHARMACOTHERAPEUTICS FOR INFANTS, CHILDREN, AND ADULTS OF CHILDBEARING AGE
S 1 cr. LEC 1.
PREREQUISITE: NRSG 517 or consent of instructor.
- Addresses pharmacological intervention in managing common health care problems of childbearing families. Students will apply knowledge of medication management of commonly encountered pediatric and women’s health care concerns.

NRSG 519 PHARMACOTHERAPEUTICS FOR MIDDLE AGE ADULTS
Su 1 cr. LEC 1
PREREQUISITE: NRSG 517 or consent of instructor.
- Addresses pharmacological intervention in managing common health problems of middle aged adults and their families. Students will apply knowledge of pharmacological management of commonly encountered health problems of middle aged adults.

NRSG 520 PHARMACOTHERAPEUTICS FOR OLDER ADULTS
F 1 cr. LEC 1
PREREQUISITE: NRSG 517 or consent of instructor.
- Addresses pharmacological interventions in managing common health problems of elders and their families. Students will apply knowledge of pharmacological management of commonly encountered health problems for the aging population. Regulatory issues regarding prescriptive practice for APRNs are addressed.

NRSG 521 THEORY AND RESEARCH IN NURSING
F 5 cr. LEC 5.
PREREQUISITE: NRSG 387 (or equivalent) and STAT 216 (or equivalent).
- Provides an overview of the interrelationships among theory, research and practice. Students explore patterns and processes for acquiring knowledge and the utilization of knowledge in clinical practice.

NRSG 522 ADVANCED PRACTICE NURSING: ROLES AND ISSUES
S 2 cr. LEC 1 RCT 1.
PREREQUISITE: Graduate standing or consent of instructor.
- Introduction to theoretical foundations and competencies of advanced practice nursing and employment settings in which advanced practice nursing may occur. Emphasis on history and development of advanced practice nursing, roles, role transition, spheres of influence, core competencies, and target outcomes.

NRSG 523 RURAL HEALTH NURSING
S 3 cr. LEC 2 LAB 1
PREREQUISITE: NRSG 521 or consent of instructor.
- This course focuses on the health concerns, issues, and trends facing individuals and populations in rural areas. Rural environments will be assessed and data from a variety of sources will be analyzed through systematic approaches. Students will have the opportunity to build and expand upon rural nursing theory.
COURSE DESCRIPTIONS: NRSG

NRSG 550 ADVANCED HEALTH ASSESSMENT
F 3 cr. LEC 2 LAB 1
- This course consists of study modules and videos based on various components of health assessment with emphasis on rural populations. Students will be required to demonstrate assessment competency to faculty.

NRSG 552 ADMINISTRATION AND ORGANIZATION OF HEALTH CARE SYSTEMS
F 2 cr. LEC 2
- This course focuses on nursing leadership in community-focused health care systems. Emphasis is on organizational structure, culture, change and behavior. Traditional elements of leadership are blended with emerging nursing theory to strategically energize current and developing health care systems.

NRSG 553 FINANCING AND BUDGETING OF HEALTH CARE SYSTEMS
S 2 cr. LEC 2
- This course focuses on the application of fiscal management principles of health care systems. Emphasis is on health care economics, fiscal management and budgeting concepts.

NRSG 555 CONCEPTS OF FAMILY CARE
S 2 cr. LEC 2
PREREQUISITE: NRSG 521 or consent of instructor.
- Analysis and synthesis of family theories from nursing and other disciplines to form a family-focused foundation for application in advanced practice nursing. Related concepts and theories are analyzed as a basis for understanding the principles of family assessment. Emphasis is placed on family health promotion, nursing of families within a rural context and the influence of culture on family health.

NRSG 560 ADVANCED PHYSIOLOGY & PATHOPHYSIOLOGY
F 4 cr. LEC 4
- Focuses on a comprehensive study of the physiologic functioning and common pathophysiologic alterations in human organs and systems.

NRSG 561 PRIMARY CARE I FOR CHILDBEARING AND CHILDREARING FAMILIES
S 6 cr. LEC 3 LAB 3
PREREQUISITE: NRSG 517, NRSG 521, NRSG 550 and NRSG 560.
COREQUISITE: NRSG 551 and NRSG 555.
- Focuses on comprehensive assessment, intervention and preventive care for childbearing and child rearing families in primary health care for the advanced practice nurse. Includes content on physiologic, pathophysiologic, psychological, developmental, sociocultural and spiritual care.

NRSG 562 PRIMARY CARE II FOR MIDLIFE FAMILIES
Su 6 cr. LEC 3 LAB 3
PREREQUISITE: N 561.
- This course includes content on the physiologic, pathophysiologic, psychological, developmental, sociocultural and spiritual primary health care needs of midlife families. Addresses assessment, intervention and preventive care.

NRSG 563 PRIMARY CARE III FOR AGING FAMILIES
F 6 cr. LEC 3 LAB 3
PREREQUISITE: NRSG 562.
- Assessment, treatment and preventive care for aging families in primary health care settings. Physiologic, pathophysiologic, psychological, developmental, sociocultural and spiritual responses to acute and chronic conditions will be explored along with the advocacy role of the nurse practitioner.

NRSG 565 PRINCIPLES OF POPULATION-BASED HEALTH
F 3 cr. LEC 2 LAB 1
PREREQUISITE: NRSG 477 or equivalent, NRSG 578 or equivalent and STAT 216 or equivalent.
- Emphasizes public health concepts and skills essential to community-oriented leadership and practice in rural communities: concepts of risk, epidemiology, biostatistics, health planning, community empowerment and resource development. The values on health promotion and disease prevention are explored.

NRSG 571 PRIMARY CARE IV: CLINICAL PRECEPTORSHIP
S 6 cr. LAB 6
PREREQUISITE: Final semester of course work.
- This practicum allows students to further refine family nurse practitioner skills in practice settings such as family health, pediatrics, women’s health or gerontology or a broad based general practice based on availability.

NRSG 574 TEACHING PRACTICUM
F, S, Su 1 - 4 cr.
PREREQUISITE: NRSG 504 or consent of instructor.
- Teaching/learning principles are integrated into nursing education in academic or practice environments. Students practice, observe, and evaluate teaching/learning processes. The instructor and student negotiate laboratory activities.

NRSG 575 RESEARCH OR PROFESSIONAL PAPER PROJECT
F, S, Su 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

NRSG 581 CLINICAL NURSE SPECIALIST PRACTICE I
S alternate years, starting even years 6 cr.
LEC 3 LAB 3
PREREQUISITE: NRSG 550, NRSG 560, and NRSG 521 or consent of instructor.
COREQUISITE: NRSG 552 or consent of instructor.
- Focus on clinical management of adults with complex health care problems of selected body systems. Seminars and supervised practica allow students to develop CNS competencies. Emphasis is placed on the patient/client sphere of CNS influence.

NRSG 582 CLINICAL NURSE SPECIALIST PRACTICE II
F alternate years, starting even years 6 cr. LEC 3 LAB 3
PREREQUISITE: NRSG 550, NRSG 560, NRSG 521 or consent of instructor
COREQUISITE: NRSG 552 or consent of instructor
- Focus on clinical management of adults with complex health problems of selected body systems. Seminars and supervised practica provide opportunity for students to develop CNS competencies. Emphasis is placed on the nurses/nursing practice sphere of CNS influence.

NRSG 583 CLINICAL NURSE SPECIALIST PRACTICE III
S alternate years, starting odd years 6 cr. SEM 1
PREREQUISITE: NRSG 581, NRSG 582
PRE or COREQUISITE: NRSG 553
- Capstone course. Students implement the CNS role with adults with complex health problems. Emphasis on professional philosophy, scope of practice, collaborating within a multidisciplinary health care team, and working within health care systems to improve client outcomes.

NRSG 589 GRADUATE CONSULTATION
F, S, Su 3 cr. IND
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

NRSG 590 MASTER’S THESIS
F, S, Su 1 - 10 cr. IND May be repeated.
PREREQUISITE: Master’s standing.

NRSG 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

NRSG 592 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

NRSG 594 SEMINAR
On Demand 1 cr. SEM Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

NRSG 675 PROFESSIONAL PROJECT/PAPER
F, S, Su 1 6 cr. IND Maximum 6cr.
PREREQUISITE: Completion of DNP core courses and DNP Scholarly Project Seminar.
- Professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.
NRSM 235 RANGE AND PASTURE MONITORING
F 1 cr. LAB 1
PREREQUISITE: ANSC 100, NRSM 101, NRSM 102.
- Methods which can be used by private operators as well as state and federal land managers to identify site potential, inventory forage resources, evaluate range and pasture condition, estimate stocking rates, and measure forage utilization by wildlife and livestock.

NRSM 256 SMALL PASTURE MANAGEMENT
S 1 cr. LEC 1
PREREQUISITE: ANSC 100, NRSM 101, NRSM 102 or permission of the instructor.
- Management of small acreages (< 50 acre) to produce forage for horses and non-commercial livestock. Topics include determination of site productivity, plant and animal response to grazing, forage production, protection of water quality and controlling invasive plants. Field trips include operations with successful grazing programs and problem areas.

NRSM 240 NATURAL RESOURCE ECOLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: NRSM 101.
- Focus on the role of physical and biotic processes on ecosystem function, including natural and managed ecosystems. Emphasis on rangelands, wildlife habitat, watersheds, and disturbed environments.

NRSM 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated.
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

NRSM 490R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND. May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis.

NRSM 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

NRSM 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND. Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

NRSM 494 SEMINAR
On Demand 1 cr. SEM. Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

NUTR Nutrition
formerly part of HDFN

NUTR 221GS BASIC HUMAN NUTRITION
F, S, Su 3 cr. LEC 3
- Basic concepts of human nutrition which include carbohydrates, lipids, proteins, vitamins, minerals, absorption, digestion, metabolism, and energy utilization as they relate to health and food consumption at different stages of the life cycle.

NUTR 226 FOOD FUNDAMENTALS
S 3 cr. LEC 3
PREREQUISITE: NUTR 221.
- Principles of food composition, preparation, selection, food safety and storage with special reference to physical and chemical changes which occur during normal food handling. Includes an introduction to meal planning, sensory evaluation, and cultural food perspectives.

NUTR 227 FOOD FUNDAMENTALS LAB
S 2 cr. LAB 2
PREREQUISITE: NUTR 226 or equivalent course.
- Practical experiences which illustrate the principles of ingredient functionality, methods of preparation, preservation, food safety and sensory evaluation. Utilizes knowledge from NUTR 226.
NUTR 290 UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
– Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

NUTR 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

NUTR 292 INDEPENDENT STUDY
F, S, Su 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
– Directed research and study on an individual basis.

NUTR 321 NUTRITION IN THE LIFE CYCLE
F 3 cr. LEC 3
PREREQUISITE: NUTR 221.
– Nutritional needs and health concerns during the different stages of life: pregnancy, lactation, infancy, preschool years, middle childhood, adolescence, adulthood, and later maturity. Major service-learning project with agencies offering nutrition services.

NUTR 322 FOOD SERVICE SYSTEMS MANAGEMENT
F 3 cr. LEC 3
PREREQUISITE: NUTR 221, NUTR 226, and NUTR 227 or consent of instructor.
– Principles of quantity food procurement, production, and presentation. Emphasizes food demand and sanitation principles and organizational management in dietetics professions.

NUTR 351 NUTRITION AND SOCIETY
S 3 cr. LEC 5
PREREQUISITE: NUTR 221.
– Factors in the community influencing nutritional status, techniques to assess community nutritional needs, and methodology for planning, implementing, and evaluating community nutrition programs. Cultural food diversity emphasized. Major service-learning project completed for a public or private agency.

NUTR 395 PRACTICUM: QUANTITY FOODS PRODUCTION & MANAGEMENT
S 3 cr. LEC 5
PREREQUISITE: NUTR 221, NUTR 226, NUTR 227, and NUTR 322 or consent of instructor.

NUTR 401 NUTRITION ASSESSMENT AND COUNSELING
S 3 cr. LEC 3
PREREQUISITE: NUTR 221, junior standing or consent of instructor.
COREQUISITE: NUTR 321

NUTR 411 NUTRITION FOR SPORTS AND EXERCISE
F 3 cr. LEC 3
PREREQUISITE: NUTR 221 and HDPE 221, or BIOH 301/211 plus junior standing.

NUTR 421 MACRONUTRIENT METABOLISM
F 3 cr. LEC 3
PREREQUISITE: NUTR 221, BCH 380, BIOH 211.
– Digestion, absorption, and metabolism of macronutrients, metabolic pathways utilizing carbohydrates, fats, and proteins, and changes that occur in metabolism under different physiological conditions.

NUTR 422 MICRONUTRIENT METABOLISM
S 3 cr. LEC 5
PREREQUISITE: BCH 380, BIOH 211, NUTR 221.
– Digestion, absorption, and metabolism of micronutrients, metabolic roles of vitamins and minerals, and changes that occur in metabolism under different physiological conditions.

NUTR 425 MEDICAL NUTRITION THERAPY I
F 3 cr. LEC 5
PREREQUISITE: NUTR 221, NUTR 321, NUTR 421.
– Examination of metabolic and physiological changes in selected conditions and implications for medical nutrition therapy. Extensive case studies utilized to facilitate critical thinking for appropriate nutritional care.

NUTR 426 MEDICAL NUTRITION THERAPY II
S 3 cr. LEC 2 LAB 1
PREREQUISITE: NUTR 221, NUTR 321, NUTR 425.
– Senior capstone course. Application of principles of clinical nutrition. Supervised practice in a hospital for one week under the supervision of a registered dietitian (requires relocation for one week).

NUTR 490 UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Maximum 12 cr.
– Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

NUTR 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

NUTR 492 INDEPENDENT STUDY
F, S, Su 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
– Directed research and study on an individual basis.

NUTR 494 SEMINAR
F 1 cr. SEM 1
PREREQUISITE: Senior standing.
– Preparation of an application for a dietetic internship or graduate program. Emphasizes resume and portfolio development, ethics, professionalism, and interviewing.

NUTR 511 EXERCISE METABOLISM AND HEALTH
S 3 cr. LEC 3
PREREQUISITE: Knowledge in areas of anatomy and physiology, upper division courses in one or a combination of: exercise physiology, biochemistry, or nutrition.
– This course examines how cellular demands influence the need for carbohydrates, amino acids, lipids, vitamins, and minerals, how the availability of these nutrients influences adaptations, and the influence of these adaptations on exercise performance and disease risk.

NUTR 524 ADOLESCENT NUTRITION
S 2 cr. LEC 2
– This is an online course designed to provide teachers strategies for incorporating nutrition education into their curriculum. Course participants explore nutrition science relevant to adolescent health, gain exposure to quality education resources and investigate school wellness issues and strategies.

NUTR 526 NUTRITION FOR FITNESS AND PERFORMANCE
F 3 cr. LEC 3
PREREQUISITE: NUTR 221, BIOH 211, CHMY 121, BCH 380.
– Examine energy metabolism and physical activity. Use nutrition strategies to meet the energy, power output, and nutrient demands of exercise, and athletic performance. Examine behavioral relationships that affect fitness and health, including disordered eating and the female athlete triad, evaluation of nutrition information and dietary supplements, with extensive use of internet resources.

NUTR 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
– A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

NUTR 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. LEC
PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, and consent of instructor.
– Courses offered on a one-time basis to fulfill professional development needs of in-service educators. A specific focus is given to each course which is appropriately subtitled.

NUTR 589 GRADUATE CONSULTATION
F, S, Su 1 - 3 cr. IND
PREREQUISITE: Graduate standing in nutrition major.
– This course may be used only by students who have completed all of their course work (and thesis if on a thesis plan) but who need additional faculty or staff time or help.

NUTR 590 MASTER’S THESIS
F, S, Su 1 - 10 cr. IND
PREREQUISITE: Master’s standing.
– Directed graduate research/creative activity.

NUTR 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
– Courses not offered in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

COURSE DESCRIPTIONS: NUTR
PHL 101IH INTRODUCTION TO PHILOSOPHY: REASON AND REALITY
F, S 3 cr. LEC 3
- Exploration of the nature of reality and human knowledge. A critical look at the presuppositions of our common sense world view.

PHL 110IH INTRODUCTION TO ETHICS: PROBLEMS OF GOOD & EVIL
F, S, Su 3 cr. LEC 3
- An examination of traditional conceptions of good and evil and their implications for relativism.

PHL 250CS OTHER ANIMALS
3 cr. LEC 3
- Explores how animals have been understood over time from scientific, philosophical, and cultural perspectives, in the East as well as in the West. The various methodologies employed, their underlying assumptions and possible limits, will be discussed, as well as the larger moral issues that they raise.

PHL 212RH MORALITY AND SOCIETY
3 cr. LEC 3
PREREQUISITE: Consent of instructor.
- The philosophical study of contemporary moral issues such as capital punishment, euthanasia, racism, and terrorism. The term will culminate in a written paper on a topic chosen by the individual student.

PHL 236Q LOGIC
F, S 3 cr. LEC 3
PREREQUISITE: Q core or Level 4 math placement.
- Modern forms of valid inference with applications.

PHL 242CS SCIENCE, PSEUDO-SCIENCE, AND SUBJECTIVITY
3 cr. LEC 3
- Introduces both deductive and inductive aspects of scientific reasoning as a foundation for addressing broader questions such as, “Is there demarcation between science and non-science?”; “Is science subjective?”; “Is scientific knowledge cumulative?”; and many more.

PHL 270 PHLOSOPHIES OF ASIA
3 cr. LEC 3
- A critical examination of some classical schools of Indian and Asian philosophy such as Confucianism, Hinduism, or Buddhism.

PHL 278CS ORIGINS OF LIFE
F, alternate even years 3 cr. LEC 3
PREREQUISITE: None required but some may be determined necessary by each offering.
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

PHL 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
PREREQUISITE: Consent of instructor.
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

PHL 304 METAPHYSICS
5 alternate years, to be offered even years 5 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- The major readings, both classical and contemporary, on environmental ethics, and applications to moral problems of current interest such as abortion, euthanasia, human experimentation, and the distribution of scarce medical resources.

PHL 327 AESTHETICS AND THE ARTS
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- An examination of moral problems in medicine such as abortion, euthanasia, human experimentation, and the distribution of scarce medical resources.

PHL 328 PHILOSOPHY AND FILM
F, S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- The course gives an introduction to some epistemological problems like the problem of skepticism, the problem concerning the nature of justification, the problem of induction, and the problem associated with the nature and existence of God.

PHL 330 LANGUAGE AND THE WORLD
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- A discussion of linguistic meaning, the concept of truth, and the relation between thought and language as viewed by contemporary philosophers.

PHL 341 CONTEMPORARY MORAL PROBLEMS
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- An examination of moral problems in medicine such as abortion, euthanasia, human experimentation, and the distribution of scarce medical resources.

PHL 351 PHILOSOPHY AND FEMINISM
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: Philosophical analysis of concepts and assumptions central to feminist theories. Topics may include the nature of gender and oppression, masculinity, the relationship between sexism and other forms of oppression, the ideal society, and feminist challenges to traditional philosophical theories.
PHL 353 PHILOSOPHY AND TECHNOLOGY
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- An examination of certain concepts used to describe and explain technology and their application to questions concerning the limitations of a technological way of life.

PHL 354 PHILOSOPHY OF RACE
F alternate years, to be offered even years, 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- Examines the development of the concept of race in philosophy since the 17th century. Traces the effects race has had on concepts such as the person, self-respect, rationality, knowledge, state of nature, science, social justice, and ordinary life.

PHL 361H HISTORY OF PHILOSOPHY: ANCIENT & MEDIEVAL
F 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- Great systems of philosophic thought and their origins during ancient and medieval times.

PHL 362 HISTORY OF WESTERN PHILOSOPHY: MODERN
S 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- Foundations of contemporary thought, Descartes to Kant.

PHL 364 CONTEMPORARY PHILOSOPHY
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- This course introduces students to recent trends in analytical philosophy. Among the topics the course addresses are philosophy of mind that involves problems concerning the mind/body relationship, the nature of consciousness, artificial intelligence, and others.

PHL 365 PHILOSOPHY OF MIND & CONSCIOUSNESS
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- In this course we will examine different philosophical theories regarding the workings of the mind and the nature of consciousness. Are you the same thing as your mind? What is thought? Is conscious experience explainable by the physical sciences?

PHL 370 PHILOSOPHY OF RELIGION
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- Analysis of concepts of revealed truth, God, and immortality; the nature of religious emotion and experience, and of religious language; relation of faith to reason; traditional proofs of God’s existence; the problem of evil; religious diversity; spirituality.

PHL 378 PHILOSOPHY OF SCIENCE
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- An examination of the concepts of explanation, confirmation, and theory and their application to classic works in the history of the natural and social sciences.

PHL 383 REASON AND REVOLUTION
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- An examination of the scope and limits of reason and their role in revolution exemplified by leading nineteenth century philosophers.

PHL 385 EXISTENTIALISM AND AFTER
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
- Existentialism and related developments such as phenomenology and post modernism.

PHL 490 UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. Ind May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

PHL 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 4 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

PHL 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

PHL 494 SEMINAR
F, S 3 cr. SEM Maximum 9 cr.
PREREQUISITE: Junior standing.
- Senior capstone course. Each semester is given over to the detailed study of a major figure or problem in philosophy. Since the figures and problems studied vary from semester to semester, the course may be repeated for credit. Two semesters of Phil 400 are required for all philosophy majors.

PHL 498 INTERNSHIP
On Demand 1 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- An individual assignment arranged with an agency, business, or other organization to provide guided experience in the field.

PHL 501 SPECIAL TOPICS
On Demand 1 - 4 cr. LEC Maximum 4 cr.
Prerequisite: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

PHL 502 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head, and Division of Education.
- Directed research and study on an individual basis.

PHL 594 SEMINAR
On Demand 3 cr. SEM Maximum 4 cr
PREREQUISITE: Graduate standing or senior by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

PHOT

PHOT 113RA UNDERSTANDING PHOTOGRAPHY
F, S, Su 3 cr. LEC 2 LAB 1
- An introduction to traditional black and white photographic practice, theory and visual principles, including camera operation, use of B&W darkroom technique. Photography majors must take this class fall semester to fit into the sequential nature of the Photography program.

PHOT 154A EXPLORING DIGITAL PHOTOGRAPHY
F, S, Su 3 cr. LEC 1 RCT (non-majors only)
- Introduces technical and aesthetic ways of creating digital photographic images. Emphasis is on the production of photographic images, from acquiring them with digital cameras to editing them using computer software for manipulating digital images. Instructor and peer critique of student work is an integral part of the course.

PHOT 154A EXPLORING DIGITAL PHOTOGRAPHY (ONLINE)
F, S, Su 3 cr. LEC 1 RCT (non-majors only)
- Introduces technical and aesthetic ways of creating digital photographic images. Emphasis is on the production of photographic images, from acquiring them with digital cameras to editing them using computer software for manipulating digital images. Instructor and peer critique of student work is an integral part of the course.

PHOT 213 INTERMEDIATE PHOTOGRAPHY
S 3 cr. LEC 2 LAB 1
PREREQUISITE: B or better in PHOT 113RA
- Theory and continued application of image control in B&W photography, through the use of a variety of 35mm and medium format films and the introduction of basic zone system principles and digital technologies. Advanced traditional B&W printing techniques in preparation for portfolio review.

PHOT 255 INTRODUCTION TO COLOR PHOTOGRAPHY
S 4 cr. LEC 2 LAB 1 RCT 1
PREREQUISITE: Photo gate
- Introduction to view camera theory and practice. Basic studio and lighting techniques will be addressed as well as advanced contrast control through application of the zone system, large format color photography, digital view camera, and large format digital and analog printing techniques.

PHOT 258 VIEW CAMERA
F 4 cr. LEC 2 LAB 2
PREREQUISITE: Photo gate
- Introduction and analysis of color theory, color imagery and color materials. Exploration of image capture via film, scanning and digital cameras. Technical skills are developed in digital systems, applications and printing. Critical exploration of color visual language and aesthetic issues.

PHOT 258 VIEW CAMERA
F 4 cr. LEC 2 LAB 2
PREREQUISITE: Photo gate
- Introduction and analysis of color theory, color imagery and color materials. Exploration of image capture via film, scanning and digital cameras. Technical skills are developed in digital systems, applications and printing. Critical exploration of color visual language and aesthetic issues.

PHOT 298 UNDERGRADUATE RESEARCH
F, S 16 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.
PHOT 291 SPECIAL TOPICS
On Demand 1 - 4 cr.
PREREQUISITE: Consent of instructor.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

PHOT 295 PRACTICUM
F, S, Su 1-3 cr., IND. May be repeated, Maximum 6 credits.
PREREQUISITE: Photo gate.
- Practical experience associated with production and research projects in photography.

PHOT 303 EARLY HISTORY OF PHOTOGRAPHY
S alternate even years. 3 cr. LEC 3.
PREREQUISITE: WRIT 101W.
- The visual and technical evolution of photography within the cultural context. Personalities, ideas, and style of individual photographers are explored. Prehistory to 1913.

PHOT 304 RECENT HISTORY OF PHOTOGRAPHY
S alternate odd years. 3 cr. LEC 3.
PREREQUISITE: WRIT 101W.
- Continued exploration of the visual and technical evolution of photography from 1913 to the present, including study of criticism and the relationship to contemporary culture and art.

PHOT 331 PROFESSIONAL PRACTICES IN PHOTO
On Demand 4 cr. LEC 2 RCT 2.
PREREQUISITE: PHOT 255 and PHOT 258.
- Introduction to professional practices in photography. Emphasis on the fundamentals of business and marketing to prepare for entering the photographic profession.

PHOT 350 ADVANCED COLOR PHOTOGRAPHY
On Demand 4 cr. LEC 2 LAB 2.
PREREQUISITE: PHOT 255 and PHOT 258.
- Further applied study of color visual theory and the control of materials for color photographic expression. Emphasis on application of alternative forms - including animation, multimedia, interactivity, and the internet - to individual aesthetic practices.

PHOT 352 ADVANCED LIGHTING PRACTICES
On Demand 4 cr. LEC 2 LAB 2.
PREREQUISITE: PHOT 255 and PHOT 258.
- Advanced photographic theory and practice in studio and on location. Emphasis given to creative aspects of artificial lighting and staged subject matter in all camera formats.

PHOT 359 ALTERNATIVE PHOTOGRAPHIC TECHNIQUES
On Demand 4 cr. LEC 2 LAB 2.
PREREQUISITE: PHOT 255 and PHOT 258.
- Image creation through the use of historical contact printing processes. A variety of alternative processes will be addressed such as gum printing, cyanotype, and platinum/palladium. Extensive aesthetic exploration will be supported through a blend of the old processes and current digital negative making techniques.

PHOT 371 PORTRAiture
On Demand 4 cr. LEC 2 Lab 2.
PREREQUISITE: PHOT 255 and PHOT 258.
- Advanced portrait techniques, theory, and practice in studio and on location. Emphasis on creative exploration and application of a variety of styles in portraiture, such as informal, editorial, environmental, etc.

PHOT 373 NON-FICTION PHOTOGRAPHY
On Demand. 4 cr. LEC 2 RCT 2.
PREREQUISITE: PHOT 255 and PHOT 258.
- The applied study of photography as a narrative medium, emphasizing the practices and uses of non-fiction, editorial and essays using digital and analog processes.

PHOT 374 EXPERIMENTAL PHOTOGRAPHY
On Demand. 4 cr. LEC 2 LAB 2.
PREREQUISITE: PHOT 255 and PHOT 258.
- The applied study of experimental photographic techniques. These techniques will be explored both in image capture and traditional darkroom working methods.

PHOT 391 SPECIAL TOPICS
On Demand, 1 - 4 cr., IND.
PREREQUISITE: Consent of instructor.
- Courses not required in a curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

PHOT 394 SEMINAR/WORKSHOP
F, S, Su 1-3 cr., IND. May be repeated, Maximum 6 credits.
PREREQUISITE: PHOT 255 and PHOT 258.
- Practical experience associated with production and research projects in photography.

PHOT 401 CONTEMPORARY ISSUES IN PHOTOGRAPHY
F 3 cr. LEC 3.
PREREQUISITE: PHOT 303 or PHOT 304 or consent of instructor.
- The critical exploration of photography as cultural phenomenon, personal expression and art form. Emphasis on aesthetic, ethical, and political issues raised through application of the medium and consumption of its products.

PHOT 490R UNDERGRADUATE RESEARCH
F, S, Su 1-6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Consent of instructor.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

PHOT 491 SPECIAL TOPICS
On Demand, 1 - 4 cr., IND. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in a curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

PHOT 492 INDEPENDENT STUDY
On Demand 1-3 cr. IND. May be repeated, Maximum 6 cr. total for FILM, PHOT & THTR 492 combined.
PREREQUISITE: PHOT 255 and PHOT 258, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

PHOT 493 STUDY TOUR
On Demand 3-12 cr.
PREREQUISITE: PHOT 255 and PHOT 258.
- Photography classes offered abroad at the upper division level.

PHOT 494 SEMINAR/WORKSHOP
On Demand, 1 - 4 cr., SEM, may be repeated.
Maximum 12 cr.
PREREQUISITE: PHOT 255 and PHOT 258 or consent of instructor.
- Topics offered at the upper division level that are not covered in regular courses. Students participate in preparing and presenting discussion material.

PHOT 498 INTERNSHIP
F, S, Su 2-12 cr. IND. May be repeated, maximum 12 credits total for FILM, PHOT & THTR 498 combined.
PREREQUISITE: Consent of School Director.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

PHOT 499 SENIOR THESIS/CAPSTONE
F, S 5 cr. SEM 5. May be repeated, Maximum 10 cr.
PREREQUISITE: Senior standing in the Photography option and consent of the instructor.
- Senior capstone course. Independent production of a significant body of work in photography; extensive production combined with group critique and faculty consultation.

PHSX Physics
formerly PHYS

PHSX 103 THE PHYSICS OF HOW THINGS WORK
F 3 cr. LEC 3
PREREQUISITE: High School Algebra.
- A practical approach to a broad array of fundamental topics in physics for non-science majors taught by analyzing things that are used and observed in everyday life. Classroom demonstrations will provide the opportunity for in-class analysis, discussions, and hands-on activities. Physics principles will be used to scrutinize issues such as energy and recycling from economic and environmental perspectives. The latest technology in transportation, electronics, and energy production will be analyzed. The connection between basic research in physics and modern technology will be examined. Students will not receive credit if they have passed PHYS 205, PHYS 220, or PHYS 240.

PHSX 200 RESEARCH PROGRAMS IN PHYSICS
F 1 cr. LEC 1
- An introduction to some of the exciting ideas, developments, problems, and experiments of modern day physics.
PHSX 201IN PHYSICS BY INQUIRY
F, S 3 cr. LAB 3
- An in-depth exploration of basic physics principles. Scientific model building and proportional reasoning skills will be developed in the context of properties of matter, observational astronomy, and DC electric circuits. For pre-service elementary teachers.

PHSX 205 COLLEGE PHYSICS I
F, S, Su 4 cr. LEC 3 LAB 1
PREREQUISITE: High school trigonometry or M 151.
- First semester of sequence. Topics include kinematics and dynamics of linear and rotational motion; work and energy; impulse and momentum; and fluids. Students will not receive credit if they have passed PHSX 220 or PHSX 240.

PHSX 207 COLLEGE PHYSICS II
F, S 4 cr. LEC 3 LAB 1
PREREQUISITE: PHSX 205 or PHSX 220.
- Second semester of sequence. Topics include simple harmonic motion; electric forces and fields; dc electric circuits; magnetic forces and fields; and magnetic induction and motors. Students will not receive credit if they have passed PHSX 222 or PHSX 242.

PHSX 220 PHYSICS I
F, S 4 cr. LEC 3 LAB 1
COREQUISITE: M 171 or M 181.
- First semester of a three-semester sequence primarily for engineering and physical science students. Covers topics in mechanics (such as motion, Newton’s laws, conservation laws, work, energy, systems of particles, and rotational motion) and in mechanical waves (such as oscillations, wave motion, sound, and superposition).

PHSX 222 PHYSICS II
F 4 cr. LEC 3 LAB 1
PREREQUISITE: PHSX 220 or PHSX 240; M 171 or M 182
COREQUISITE: M 172 or M 182.
- Covers topics in electricity and magnetism (such as Coulomb’s law, Gauss’ law, electric fields, electric potential, dc circuits, magnetic fields, Faraday’s law, ac circuits, and Maxwell’s equations) and optics (such as light, geometrical optics, and physical optics).

PHSX 224 PHYSICS III
F 4 cr. LEC 3 LAB 1
PREREQUISITE: PHSX 222 or PHSX 242; M 172 or M 182
- Covers topics in thermodynamics (such as temperature, heat, laws of thermodynamics, and the kinetic theory of gases) and modern physics (such as relativity; models of the atom; quantum mechanics; and atomic, molecular, solid state, nuclear, and particle physics).

PHSX 240 HONORS GENERAL AND MODERN PHYSICS I
F 4 cr. LEC 3 LAB 1
COREQUISITE: M 171 or M 181.
- The honors section of PHSX 220. The concepts are discussed in more depth and the range of applications is greater.

PHSX 242 HONORS GENERAL AND MODERN PHYSICS II
S 4 cr. LEC 3 LAB 1
PREREQUISITE: PHSX 220 or PHSX 240; M 171 or M 181
COREQUISITE: M 172 or M 182.
- The honors section of PHSX 222. The concepts are discussed in more depth and the range of applications is greater.

PHSX 253 PHYSICS OF PHOTOGRAPHY
F 2 cr. LEC 2
PREREQUISITE: High school algebra.
- Improvement of photographic skills through an understanding of the basic principles of photography. The nature of light and color and the physical principles involved in the operation of a camera will be presented. Unusual effects and recent developments will be discussed. Numerous demonstrations, photographs, and slides will be used to illustrate the principles.

PHSX 261 LABORATORY ELECTRONICS I
F 2 cr. LEC 1 LAB 1
PREREQUISITE: PHSX 222 or PHSX 242.
- Laboratory electronic measurements and analysis, and design of basic linear circuits.

PHSX 262 LABORATORY ELECTRONICS II
S 2 cr. LEC 1 LAB 1
PREREQUISITE: PHSX 261.
- Analysis and design of basic digital circuits and advanced laboratory electronic measurements.

PHSX 290R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. RCT
PREREQUISITE: Consent of instructor and approval of department head.
- Directed undergraduate research. Course will address responsible conduct of research.

PHSX 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

PHSX 292 INDEPENDENT STUDY
On Demand 1-5 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed study on an individual basis.

PHSX 301 INTRODUCTION TO THEORETICAL PHYSICS
S 3 cr. LEC 3
PREREQUISITE: M 273 or M 285; PHSX 222 or PHSX 242.
COREQUISITE: M 274 or M 284.
- Mathematical methods essential to the practice of theoretical physics, such as matrices, vector calculus, differential equations, complex variables, and Fourier series, with applications to examples from mechanics and electromagnetism.

PHSX 365RN ART AND SCIENCE OF HOLOGRAPHY
S 3 cr. LEC 2 LAB 1
PREREQUISITE: Junior standing. M 151 or equivalent M Placement Test.
- Beginner’s course on creating holograms. Pictorial and geometric interpretations of lasers, interference, coherence, film, and holography enable students with limited science and M backgrounds to create their own holographic masterpieces. Lab techniques and documenting the creative process are emphasized.

PHSX 320 CLASSICAL MECHANICS
F 4 cr. LEC 4
PREREQUISITE: PHSX 224, PHSX 301.
- Principles of Newtonian, Lagrangian, and Hamiltonian mechanics including single particle motion, systems of particles, rigid body motion, moving coordinate systems, and small oscillations.

PHSX 331 METHODS OF COMPUTATIONAL PHYSICS
F 1 cr. LEC 1
PREREQUISITE: PHSX 301.
- Introduction to the use of computational methods in physics. Emphasis will be placed on common methods of casting problems into forms amenable to numerical solution and for displaying numerical results.

PHSX 343 INTERMEDIATE PHYSICS
F 3 cr. LEC 3
PREREQUISITE: PHSX 224, PHSX 301, and M 284 or M 274.
- Waves in classical physics and quantum mechanics: complex representation, amplitude mechanics, and interference; Special relativity; postulates, Lorentz transformations, applications in nuclear and particle physics; Quantum mechanics: interpretation of key experiments, Schrodinger equation, particles in potentials, spin, the atom; Introduction to nuclear and particle physics.

PHSX 401 PHYSICS BY INQUIRY I
Su 3 cr. LAB 3.
PREREQUISITE: Teacher Certification.
- An in-depth and hands-on exploration of basic physics principles. Scientific model building and proportional reasoning skills will be developed in the context of dc electricity, one and two dimensional kinematics, and dynamics. For middle school and high school science teachers.

PHSX 402 PHYSICS BY INQUIRY II
Su 3 cr. LAB 3.
PREREQUISITE: PHSX 401.
- An in-depth and hands-on exploration of basic physics principles. Scientific model building and proportional reasoning skills will be developed in the context of light, color, geometrical optics, heat, and temperature. For middle school and high school teachers.

PHSX 403 PHYSICS BY INQUIRY III
Su 3 cr. LAB 3.
- PHSX 403 is a continuation of the PHSX 401 experience, but it may also be taken concurrently with PHSX 401. The course will begin with a careful investigation of geometrical optics, leading to an understanding of pinhole cameras, lenses, and prisms. This will be followed by an exploration of magnetic interactions and magnetic materials.
PHSX 405 SPECIAL RELATIVITY ONLINE
S alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: PHSX 222, M 172 or M 182, Bachelor’s degree, and one year teaching experience.
→ This online course addresses the question: In what ways does nature behave differently at high relative speeds than at low speeds? Designed for practicing high school physics teachers. Assignments and discussions use electronic computer conferencing and interactive virtual software.

PHSX 423 ELECTRICITY AND MAGNETISM I
S F 3 cr. LEC 3
PREREQUISITE: PHSX 301 or M 348, PHSX 343.
→ Electrostatic fields, dielectric materials, magnetic fields, magnetic materials, and Maxwell’s equations.

PHSX 425 ELECTRICITY AND MAGNETISM II
F 3 cr. LEC 3
PREREQUISITE: PHSX 423.
→ Propagation of electromagnetic waves, radiation, and general wave phenomena.

PHSX 435 ASTROPHYSICS
S alternate years, to be offered even years 3 cr. LEC 3
→ A survey covering basic problems in modern astrophysics such as stellar structure and evolution, solar physics, compact objects, quasars, and cosmology.

PHSX 446 THERMODYNAMICS AND STATISTICAL MECHANICS
S 3 cr. LEC 3
PREREQUISITE: PHSX 320.
→ Statistical physics and thermodynamics and their applications to physical phenomena. This course is strongly recommended for students intending to study physics in graduate school.

PHSX 451 ELEMENTARY PARTICLE PHYSICS
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: PHSX 301, PHSX 343.
→ A survey of elementary particle physics, beginning with an historical viewpoint and leading up to today’s remarkably successful “Standard Model” of quarks, leptons, and gauge bosons.

PHSX 461 QUANTUM MECHANICS I
F 5 cr. LEC 3
PREREQUISITE: PHSX 320, PHSX 343.
→ Operators, eigenvalues, and correspondence with observables. Solutions to the Schrödinger equation: one dimensional problems, bound and unbound states, harmonic oscillator, and angular momentum.

PHSX 462 QUANTUM MECHANICS II
S 3 cr. LEC 3
PREREQUISITE: PHSX 461.
→ Three-dimensional problems, hydrogen atom, matrix mechanics, spin, perturbation theory, and applications to atomic, molecular, nuclear, and particle physics.

PHSX 490R UNDERGRADUATE RESEARCH
F, S, Sn 1 - 3 cr. IND May be repeated. Max 6 cr.
PREREQUISITE: PHSX 462. 
→ Directed undergraduate research/creative activity, which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

PHSX 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
→ Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

PHSX 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
→ Directed study on an individual basis.

PHSX 494 SEMINAR/WORKSHOP
On Demand 1 cr. SEM 1 Maximum 4 cr
PREREQUISITE: Junior standing and as determined for each offering.
→ Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

PHSX 499 SENIOR CAPSTONE SEMINAR
S 1 cr SEM 1
PREREQUISITE: Senior standing, completion of a senior project, and 2 credits of PHSX 490R.
→ Senior capstone course. Participation in this course requires the completion of a senior project that integrates the student’s knowledge and skills acquired during the undergraduate curriculum. Students will be required to complete: i) an APS-style abstract, ii) an APS-style 10-minute oral presentation, iii) a poster session, and iv) a written research report, based on their research/creative activity.

PHSX 501 ADVANCED CLASSICAL MECHANICS
F 3 cr. LEC 3
PREREQUISITE: PHSX 320.

PHSX 506 QUANTUM MECHANICS I
S 3 cr. LEC 3
PREREQUISITE: PHSX 402.

PHSX 511 ASTRONOMY FOR TEACHERS
F, S 3 cr. LEC 3
PREREQUISITE: PHSX 506.

PHSX 518 THERMODYNAMICS AND STATISTICAL MECHANICS
S 3 cr. LEC 3
PREREQUISITE: PHSX 461.
→ Statistical physics and thermodynamics and their applications to physical phenomena. This course is strongly recommended for students intending to study physics in graduate school.

PHSX 519 SPECIAL TOPICS
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: PHSX 222 or PHSX 242; M 182, PHSX 405 and Bachelor’s degree and one year teaching experience.
→ This online course addresses the theory of general relativity, which underlies our understanding of gravity and the large-scale structure of the cosmos. Designed for practicing high school physics teachers. Assignments and discussions use electronic computer conferencing and simulation software.
PHSX 513 QUANTUM MECHANICS ONLINE
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: PHSX 222 or PHSX 242; M 182, EDD 566 and Bachelor’s degree and one year teaching experience.
- This online course addresses the key ideas behind quantum mechanical observations and devices, including the fundamental behavior of electrons and photons. Designed for practicing high school physics teachers. Assignments and discussions use electronic computer conferencing and simulation software.

PHSX 514 COMPARATIVE PLANETOLOGY: ESTABLISHING A VIRTUAL PRESENCE IN THE SOLAR SYSTEM
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: EDD 566 or EDCI 325, professional teaching certification, Bachelor’s degree and at least one year K-12 teaching experience, and a background knowledge of astronomy at the level of ASTR 119 (or its equivalent).
- Establishing a Virtual Presence in the Solar System has been developed and tested as an Internet-delivered course for off-campus students. Its audience consists of practicing elementary and secondary teachers who have experience in teaching general science but have little, if any, formal course work in astronomy. Its goal is to help graduate-level teachers learn solar system astronomy concepts to integrate the new National Science Education Standards and NASA resources into existing instructional strategies. Course participants learn advanced solar system concepts, utilize WWW resources, communicate with research scientists using the Internet, analyze digital images using image processing software, and organize materials for use in K-12 classroom environments.

PHSX 515 ADVANCED TOPICS IN PHYSICS
On Demand 3 cr. LEC 3 Maximum 6 cr.
PREREQUISITE: Graduate standing.
- Topics in astrophysics, condensed matter physics, optics, mathematical physics, or particle physics are presented as needed to supplement the curriculum.

PHSX 516 EXPERIMENTAL PHYSICS
F, S 3 cr. LAB 3 Maximum 6 cr.
PREREQUISITE: PHSX 261, PHSX 425, and PHSX 435.
- Experiments chosen from laser optics and atomic, solid-state, and nuclear physics are carried out in depth to introduce the graduate student to methods, instrumentation, and data acquisition techniques useful for experimental thesis projects.

PHSX 519 ELECTROMAGNETIC THEORY I
S 3 cr. LEC 3
PREREQUISITE: PHSX 245.
- Electro- and magnetostatics, conservation laws and covariance of Maxwell’s equations, and dynamics of relativistic particles and fields.

PHSX 520 ELECTROMAGNETIC THEORY II
F 3 cr. LEC 3
PREREQUISITE: PHSX 519.
- Radiation by moving charges. Electromagnetic waves in condensed matter and plasma.

PHSX 523 GENERAL RELATIVITY I
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: PHSX 519.
- Tensor calculus, differential geometry, and an introduction to Einstein’s theory of gravity. The Schwarzschild solution and black hole physics.

PHSX 524 GENERAL RELATIVITY II
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: PHSX 523.
- Advanced topics in gravitation theory such as singularities, cosmological models, and gravitational waves.

PHSX 531 NONLINEAR OPTICS & LASER SPECTROSCOPY
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: PHSX 507.
- Two-level atoms in laser fields and applications to nonlinear optics such as photon echoes, second harmonic generation, and stimulated Raman scattering. Atomic and molecular energy level structure, linear and nonlinear spectroscopy, and applications to gaseous and solid state laser materials.

PHSX 535 STATISTICAL MECHANICS
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: PHSX 546.
- Basic concepts of equilibrium statistical mechanics, with application to classical and quantum systems, will be presented as well as theories of phase transitions in fluid, magnetic, and other systems.

PHSX 544 CONDENSED MATTER PHYSICS I
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: PHSX 416, PHSX 507.
- Crystal structure and the reciprocal lattice. Quantum theory of electrons and phonons.

PHSX 545 CONDENSED MATTER PHYSICS II
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: PHSX 546.
- Applications to the transport, optical, dielectric, and magnetic properties of metals, semiconductors, and insulators.

PHSX 555 QUANTUM FIELD THEORY
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: PHSX 507.
- Techniques of canonical and path integral quantization of fields. Renormalization theory. Quantum electrodynamics; gauge theories of the fundamental interactions.

PHSX 560 ASTROPHYSICS
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: PHSX 425, PHSX 462, PHSX 446, and PHSX 455.
- The purpose of this course is to prepare graduate students for thesis-level research in astrophysics, solar physics or related fields. Topics covered include: fluid mechanics, hydrodynamics, plasma physics, radiation processes and stability of equilibrium states.

PHSX 561 MODERN PHYSICS FOR TEACHERS: PARTICLES AND WAVES
So S, Su 3 cr. LEC 3
PREREQUISITE: Secondary teaching certification; 2 years teaching experience. PHSX 224, PHSX 401, and PHSX 580 (Advanced Physics by Inquiry.)
- Students in this capstone course will discuss, perform, and analyze several experiments that demonstrate the particle and wave behaviors of light and electrons. Students will develop methods and models for teaching these concepts of modern physics to high school students.

PHSX 565 ASTROPHYSICAL PLASMA PHYSICS
F alternate years, to be offered odd years 5 cr. LEC 3
COREQUISITE: PHSX 520.
- An introduction to the physics of fluids and plasma relevant to astrophysical plasmas such as the solar corona. Topics covered include: magnetostatics, one-fluid (MHD) and two-fluid approaches, linear waves and instabilities, shocks, transonic flows and collisional effects.

PHSX 566 MATHEMATICAL PHYSICS I
F 3 cr. LEC 3
PREREQUISITE: M 349, M 472, PHSX 520.

PHSX 567 MATHEMATICAL PHYSICS II
S alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: PHSX 566.
- Theory of computational techniques, and applications such as numerical integration, differential equations, Monte Carlo methods, and fast Fourier transforms.

PHSX 582 ASTROBIOLOGY FOR TEACHERS
F, S 5 cr. Online Lec 3
PREREQUISITE: ASTR 371, PHSX 511, or equivalent; PHSX 205, PHSX 220, PHSX 224, or equivalent; BIOB 375 or equivalent; EDD 366 or equivalent; and Bachelor’s degree and minimum of one year of full-time teaching experience at the secondary level or above.
- Astrobiology is the study of the origin, evolution, distribution, and destiny of life in the universe. It defines itself as an interdisciplinary science at the intersection of physics, astronomy, biology, geology, and mathematics, to discover where and under what conditions life can arise and exist in the Universe. The course topics will cover the discovery of planetary systems around other stars, the nature of habitable zones around distant stars, the existence of life in extreme environments. These concepts will serve as a foundation to study possible extraterrestrial ecosystems on planets and moons like Mars and Europa.

PHSX 583 THE INVISIBLE UNIVERSE ONLINE: THE SEARCH FOR ASTRONOMICAL ORIGINS
F, S 5 cr. Online Lec 3
PREREQUISITE: ASTR 371, PHSX 511, or equivalent; PHSX 205, PHSX 220, PHSX 224, or equivalent; EDD 366 or equivalent; and Bachelor’s degree and minimum of one year of full-time teaching experience at the secondary level or above.
- This course covers the long chain of events from the birth of the universe in the Big Bang, through the formation of galaxies, stars, and planets by focusing on the scientific questions, technological challenges, and space missions pursuing the search for origins in alignment with the goals and emphasis of the National Science Education Standards.

PHSX 589 GRADUATE CONSULTATION
F, S, Su 3 cr. TUT
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.
- This course may be used only by students who have completed all of their coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

PHSX 590 MASTER’S THESIS
F, S, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.
PHSX 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

PHSX 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

PHSX 594 SEMINAR
On Demand 1 cr. SEM Maximum 8 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Courses offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

PHSX 599 DOCTORAL READING & RESEARCH
On Demand 3 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: Doctoral standing.
- This course may be used by doctoral students who are reading research publications in the field in preparation for beginning doctoral thesis research.

PSYX 100S INTRODUCTORY PSYCHOLOGY
FS, Su 4 cr. LEC 3 LAB 1
- Introduction to methods and approaches to psychology including exploration of problems in physiological psychology, learning, memory and information processing, abnormal behavior, and social psychology, with selected individual study of other areas related to the student’s interests.

PSYX 223 RESEARCH DESIGN AND ANALYSIS I
FS 4 cr. LEC 3 LAB 1
PREREQUISITE: PSX 100 and either M 145 (or higher) or STAT 216.
- Introduction to the design and analysis of psychological research. Topics include logic and philosophy of psychological research, conceptualizing research questions, hypothesis testing, data collection and analysis strategies used by researchers in psychology, and introduction to using statistical software for data analysis.

PSYX 225 RESEARCH DESIGN AND ANALYSIS II
FS 3 cr. LEC 3
PREREQUISITE: PSYX 223.
- Continuation of PSYX 223. Topics include experimental, quasi-experimental, and non-experimental designs and methodological issues; assessing research questions; reliability and validity of psychological measures; ethics of psychological research; writing research reports; using statistical software for data analysis.

PSYX 235 DEVELOPMENTAL PSYCHOLOGY
F 3 cr. LEC 3
PREREQUISITE: PSX 100.
- Human development across the lifespan using major theories of development including psychodynamic, psychosocial, learning, and cognitive. Physical, cognitive, social, emotional, and personality development are explored from conception to death.

PSYX 235D CONTEMPORARY ISSUES IN HUMAN SEXUALITY
S 3 cr. LEC 3
PREREQUISITE: PSX 100.
- Issues of diversity and difference in human sexuality will be examined. The development and expression of sexual behavior as a complex sociocultural, biological, psychological, and historic phenomenon will be discussed. Course will examine sexual behavior and identity in both the majority culture and other cultures in the U.S. and world.

PSYX 235CS PSYCHOLOGY OF FILM
S,Su 3 cr. LEC 3
PREREQUISITE: College Writing (W) and University Seminar (US) core.
- Uses psychological science to understand the persuasive power of media as portrayed in popular films. Evaluates the media’s ability to both reflect and affect behavior. Focus is on contemporary themes such as aggression, drug use, sexuality, and prejudice.

PSYX 270 FUND PSYCHOLOGY OF LEARNING
On Demand 3 cr. LEC 3
PREREQUISITE: PSX 100.
- Introduction to scientific principles, theories, and applications of learning, including respondent and operant conditioning, social learning, verbal learning. Other types and approaches to learning will also be discussed.

PSYX 274 PSYCHOLOGICAL MEASUREMENT
On Demand 3 cr. LEC 3
PREREQUISITE: PSX 225.
- Principles of psychological testing and measurement as related to intelligence, aptitudes, attitudes, occupations, and personality. Topics include nature and types of psychological tests, test construction, test administration, basic psychometric theory, methods for estimating the reliability and validity of psychological tests, and ethical issues regarding psychological testing and measurement.

PSYX 290R UNDERGRADUATE RESEARCH
FS 1-6 cr. IND May be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

PSYX 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

PSYX 292 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor.
- Directed research and study on an individual basis.

PSYX 293R ADVANCED RESEARCH
F,S 3 cr. LEC 3
PREREQUISITE: PSX 100.
- Examination of major theories of learning and motivation. Classical and operant conditioning, discrimination learning, incentive motivation, reward and punishment, and concept learning.

PSYX 325 APPLIED CRITICAL THINKING
On Demand 3 cr. LEC 2 RCT 1
PREREQUISITE: PSX 100, and any Quantitative core course.
- Study of critical thinking skills through an understanding of psychological factors involved. Practical strategies are explored in relation to hypothesis formation and evaluation, decision making, problem solving and creativity, reasoning, and memory. Applications are emphasized.

PSYX 333 PSYCHOLOGY OF AGING
S 3 cr. LEC 3
PREREQUISITE: PSX 100 and Junior standing or consent of instructor.
- Surveys different domains in which human behavior is influenced by aging. Topics include the influence of age on cognitive processes (e.g., attention and memory), social processes (e.g., personality and well being), and biological processes (e.g., brain-related changes).

PSYX 335 PSYCHOLOGY OF GENDER
F 3 cr. LEC 3
PREREQUISITE: PSX 100.
- Traditional and feminist perspectives on psychological needs and concerns specific to women, including gender stereotyping and beliefs, cognitive differences between the sexes, psychological disorders common to women, women’s sexuality; and cultural and biological roles and norms.

PSYX 340 ABNORMAL PSYCHOLOGY
F 3 cr. LEC 3
PREREQUISITE: PSX 100.
- Historical and current perspectives on psychopathology, including neuroscience, behavioral cognitive, psychodynamic, and humanistic/existential approaches. Traditional approaches and recent innovations in therapy and diagnosis are considered along with current diagnostic categories, especially DSM.

PSYX 350 PHYSIOLOGICAL PSYCHOLOGY
F 3 cr. LEC 3
PREREQUISITE: PSX 100 and BIOL 100, BIOL 102, or BCHM 104.
- Introduction to the biological bases of behavior; brief review of functional neuroanatomy and physiology in relation to such topics as sensation, movement, motivation, emotion, sleep, learning and memory, consciousness, and abnormal behavior.

PSYX 354 SENSATION & PERCEPTION
F 3 cr. LEC 3
PREREQUISITE: PSX 350.
- Basic principles of sensory systems (with emphasis on the visual system), contemporary psychophysical procedures, and principles of perception.

PSYX 356 SOCIAL PSYCHOLOGY
F 3 cr. LEC 3
PREREQUISITE: PSX 100.
- Experimental research and theoretical viewpoints in social psychology, including such topics as: interpersonal attraction, perception, aggression, attitudes and attitude change, altruism, group behavior, social influence, stereotypes and prejudice, and the self.

PSYX 370 PSYCHOLOGY OF LEARNING
S 3 cr. LEC 3
PREREQUISITE: PSX 225.
- Examines basic principles and theories of learning and motivation. Classical and operant conditioning, discrimination learning, incentive motivation, reward and punishment, and concept learning.
PSYX 375 BEHAVIOR MODIFICATION
F 3 cr. LEC 3
PREREQUISITE: PSX 225 and PSX 370.
– Human behavior change with emphasis on practical techniques for changing individual and group behavior in real-life situations.

PSYX 380 MEMORY & COGNITION
FS 3 cr. LEC 3
PREREQUISITE: PSX 100, Junior standing or consent of instructor.
– Theories and evidence concerning human information processing, focusing especially on attention and memory, problem solving, decision making, reasoning, and related topics.

PSYX 384 CONSCIOUSNESS
On Demand 3 cr. LEC 3
PREREQUISITE: PSX 225 and PSX 350
– Theories and evidence concerning consciousness and altered states of consciousness, including dreaming, meditation, hypnosis, sensory deprivation, psychoactive drug effects, temporal experience, psychic phenomena, and related topics.

PSYX 385 PSYCHOLOGY OF PERSONALITY
S 3 cr. LEC 3
PREREQUISITE: PSX 225
– Theories and evidence concerning consciousness and altered states of consciousness, including dreaming, meditation, hypnosis, sensory deprivation, psychoactive drug effects, temporal experience, psychic phenomena, and related topics.

PSYX 400 HISTORY & SYSTEMS IN PSYCHOLOGY
On Demand 3 cr. LEC 3
PREREQUISITE: PSX 225.
– Examination of the historical development of major concepts, theoretical ideas, and approaches to psychology, with emphasis on perspectives of broad current interest such as behavioral science, cognitive science, and neuroscience.

PSYX 461 INDUST & ORGANIZ PSYCH
On Demand 3 cr. LEC 3
PREREQUISITE: PSX 225.
– Basic concepts and theoretical frameworks for the fundamental areas of industrial and organizational psychology. Topics include history of I/O psychology, personnel selection, psychological testing, personnel training, performance appraisal, managerial decision making, job satisfaction, work motivation, leadership, job stress, organizational conflict, job design, and organizational development.

PSYX 462 PSYCHOLOGY OF PREJUDICE
S 3 cr. LEC 3
PREREQUISITE: PSX 100 or consent of instructor.
– Reviews theory and research on prejudice. Topics include stereotyping and discrimination, cognitive and affective dynamics of prejudice, causes of prejudice, eliminating prejudice, affirmative action, and diversity programs, and psychological effects of prejudice.

PSYX 463 SOCIAL COGNITION
F 3 cr. LEC 3
PREREQUISITE: PSX 100.
– Addresses how fundamental cognitive processes (e.g., concept activation, attention, memory) influence social behavior and thought. Topics include impression formation, mental simulations of alternative realities, nonconscious mental processes, subliminal stimuli, mental representations, stereotypes, and heuristics and biases.

PSYX 475 ADVANCED BEHAVIOR ANALYSIS
S,Su 3 cr. LEC 3
PREREQUISITE: PSX 225 and PSX 375.
– Advanced Behavior Analysis is designed to deepen students’ understanding of antecedent stimuli, behaviors, and consequences. Functional behavioral assessments, systems for increasing appropriate behavior, and ways of promoting generalization will be described. Ethical considerations of Applied Behavioral Analysts will be discussed.

PSYX 477 THE SCIENCE OF PSYCHOLOGICAL WELL-BEING
F 3 cr. LEC 3
PREREQUISITE: PSX 100 (or 191).
– The Science of Psychological Well-Being examines topics under the rubric of Positive Psychology. Positive psychology focuses upon identifying, researching, and promoting the development of human strengths, thereby shifting the focus in psychology from psychopathology to human growth and potential.

PSYX 481 JUDGMENT & DECISION MAKING
On Demand 3 cr. LEC 3
PREREQUISITE: PSX 100, Quantitative core and Junior standing.
– Theories and evidence on the psychology of judgment and decision making, including rationality, normative rules for choice, irrationality of some human judgments, and group decision making. Applications of decision theory at the personal, organizational, and societal levels are reviewed.

PSYX 482 PSYCHOLINGUISTICS
F 3 cr. LEC 3
PREREQUISITE: PSX 100 and either PSX 380 or ENGL 256.
– Examines the psychological processes that make it possible for humans to learn and acquire language. Emphasizes on how spoken and written language is understood, how speech is produced, and how language is acquired.

PSYX 490R UNDERGRADUATE RESEARCH
FSu 1 - 6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Junior or Senior standing, PSX 225 and consent of instructor.
– Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

PSYX 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
– Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

PSYX 492 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor.
– Directed research and study on an individual basis.

PSYX 494 SEMINAR
On Demand 1 cr. SEM Maximum 4 cr
PREREQUISITE: PSX 225, Junior standing and as determined for each offering.
– Topics offered at the upper division level which are not covered in regular courses. Students help prepare and present discussion material, and attend presentations by guest speakers.

PSYX 495 FIELD PRACTICUM IN APPLIED PSYCHOLOGY
FSu 3 - 12 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Junior or Senior standing, PSX 225 and consent of instructor.
– Exposure to the various roles and demands of a field setting, including specialization in one of the following areas: applied research, behavior modification, psychological assessment, industrial/organizational behavior, or others (to be arranged).

PSYX 499R SENIOR THESIS/CAPSTONE
FS 3 cr. SEM 3
PREREQUISITE: PSX 490 (minimum 3 cr.) or PSX 491.
– Senior capstone course. Written and oral presentation of senior thesis work.

PSYX 501 ADVANCED RESEARCH DESIGN AND ANALYSIS
F 3 cr. LEC 3
PREREQUISITE: Graduate standing or PSX 225.
– Advanced topics in the design and analysis of psychological research.

PSYX 502 ADVANCED RESEARCH DESIGN AND ANALYSIS I
S 3 cr. SEM 3
PREREQUISITE: Graduate standing in psychological science or PSX 225 and a 3.25 GPA and consent of instructor.
– This is the first course in a sequence on advanced research design and statistical analysis in psychological science. Topics include designs, methodological issues, hypothesis testing, basic (e.g., t-tests, ANOVA) and advanced statistical tests (e.g., factorial ANOVA, ANCOVA, MUltiple Regression).

PSYX 539 PHYSIOLOGICAL PROCESSES
S 3 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
– Overview of research methods and relevant aspects of neurophysiology, neuroanatomy and neuropharmacology. Applications of prior work to the problem of discovery in biopsychology.

PSYX 541 COGNITIVE PROCESSES
S 3 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
– Theories, methods, findings, and applications concerning memory and cognitive processes.

PSYX 542 LEARNING
S 3 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
– Principles and theories of learning and motivation. Topics include conditioning, learning, incentive motivation, reward and punishment. Application to organizational and human resource management problems.

PSYX 543 MEMORY
F 3 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
– Theories and applications of human memory from cognitive psychological perspective. Topics include memory in social, legal, and organizational contexts; memory conformity; memory across the lifespan, memory and expertise; autobiographical memory; metamemory; and forgetting.
PSYX 544 SOCIAL PSYCHOLOGY  
F 3 cr. LEC 3  
PREREQUISITE: Graduate standing or consent of instructor.  
- Advanced experimental and applied research and theoretical viewpoints in social psychology. Topics include social cognition, interpersonal attraction, aggression, attitudes and attitude change, the self, group dynamics, stereotypes and prejudice, and social influence.

PSYX 545 ORGANIZATIONAL PSYCHOLOGY  
On Demand 3 cr. LEC 3  
PREREQUISITE: Graduate standing or consent of instructor.  
- Introduction to major concepts and theories in organizational psychology through examination of research, theory and application in organizational psychology topics such as: organizational entry and socialization, leadership, motivation, group processes, conflict, job design, and personality.

PSYX 546 SOCIAL COGNITION  
S 3 cr. LEC 3  
PREREQUISITE: Graduate standing.  
- This course examines decision making, judgment, cognition, and affect from a social-cognitive perspective. Topics may include theory development, stereotypes, prejudice and discrimination, group behavior, attitudes and attitude change, mood and affect, heuristics and biases, memory, the self, and decision making. The primary goal is to understand theory and research in social cognition.

PSYX 557 RESEARCH OR PROFESSIONAL PAPER/PROJECT  
ES 3-6 cr. IND. Maximum 6 cr.  
PREREQUISITE: Graduate standing.  
- A research or professional paper dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

PSYX 589 GRADUATE CONSULTATION  
ES 3 cr. TUT.  
PREREQUISITE: Graduate standing and approval of Division of Graduate Education.  
- This course may be used only by students who have completed all of their course work (and thesis, if on a thesis option) for a master’s degree but who need additional faculty help or time.

PSYX 590 MASTER’S THESIS  
ES 1-10 cr. IND. Maximum 15 cr.  
PREREQUISITE: Graduate standing.

PSYX 591 SPECIAL TOPICS  
On Demand 1-4 cr.  
PREREQUISITE: Graduate standing and consent of instructor.  
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requiring a regular course number.

PSYX 592 INDEPENDENT STUDY  
On Demand 1-3 cr. IND Maximum 6 cr.  
PREREQUISITE: Graduate standing, consent of instructor.  
- Directed research and study on an individual basis.

PSYX 594 SEMINAR  
On Demand 1 cr. SEM Maximum 4 cr.  
PREREQUISITE: Graduate standing or consent of instructor.  
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

PSYX 595 SPECIAL TOPICS  
On Demand 1-4 cr.  
PREREQUISITE: Graduate standing and consent of instructor.  
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requiring a regular course number.

PSYX 596 HERBICIDE PHYSIOLOGY  
F 3 cr. LEC 3  
PREREQUISITE: BCH 380 and BIOO 435 or equivalents.  
- A team-taught, distance delivery course on the biochemistry and physiology of herbicide action in plants. Herbicide discovery, classification, and mechanisms of action and resistance are explored. Offered through Extended University.

PSPP 546 RESEARCH DESIGN AND ANALYSIS  
F 3 cr. LEC 3  
PREREQUISITE: STAT 401.  
- Data analysis and interpretation of problems unique to agricultural and biological research. Topics include: sample size determination, transformation of data scale, completely random, randomized block and Latin square designs, comparisons among means, factorial experiments with restricted randomization and analysis of covariance.

PSPP 519 PLANT VIRUS DISEASES LAB  
F alternate years, to be offered every even years 1 cr. LAB 1  
COREQUISITE: PSPP 518.  
- Laboratory exercises related to plant virology.

PSPP 521 ADVANCED PLANT PATHOLOGY  
F alternate years, to be offered every even years 5 cr. LEC 3  
- This course is designed to give graduate students in the Department of Plant Sciences & Plant Pathology or other departments a broad survey of plant pathology subject matter at the graduate level and to give all graduate students in PSPP a common experience and introduction to PSPP graduate faculty. This course will serve as a companion to Genetic Plant Improvement (PSPP 542) taught in spring even years and alternate years by our plant breeding faculty.

PSPP 526 PLANT BACTERIAL DISEASES  
F alternate years, to be offered odd years 3 cr. LEC 3  
PREREQUISITE: BIOM 421.  
- An in-depth study of bacteria and their etiology in causing plant disease.

PSPP 527 PLANT BACTERIAL DISEASES LAB  
F alternate years, to be offered odd years 1 cr. LAB 1  
PREREQUISITE: BIOM 421.  
COREQUISITE: PSPP 526.  
- Laboratory exercises related to the study of plant bacterial diseases.

PSPP 531 PHYSIOLOGY OF HOST-PARASITE INTERACTIONS  
- Advanced study of the physiological and biochemical aspects of host-parasite interactions.

PSPP 541 ADVANCED PLANT GENETICS  
F alternate years, to be offered odd years 3 cr. LEC 3  
- Genome and genetic analysis of flowering plants, including structure of the genome, methods of genetic analysis and the genetic basis of plant morphology and development. A familiarity with current and classical literature is stressed.

PSPP 542 GENETIC PLANT IMPROVEMENT  
S alternate years, to be offered every even years 3 cr. LEC 3  
PREREQUISITE: STAT 401.  
- The past, present and future of plant improvement. Emphasis on genetic principles underlying classical plant breeding, and on molecular biological principles underlying plant genetic engineering.

PSPP 546 HERBICIDE PHYSIOLOGY  
F 3 cr. LEC 3  
PREREQUISITE: BCH 380 and BIOO 435 or equivalents.  
- A team-taught, distance delivery course on the biochemistry and physiology of herbicide action in plants. Herbicide discovery, classification, and mechanisms of action and resistance are explored. Offered through Extended University.

PSPP 549 FLOWERING PLANTS OF THE NORTHERN ROCKY MOUNTAINS  
Su alternate years, to be offered every even years 2 cr. LEC 2  
- A field oriented study of the flowering plants of Montana with a emphasis on plant keying skills. Objectives are: 1) to identify the parts of flowering plants and become familiar with botanical terms; 2) to learn morphological characteristics of common plant families; 3) to learn how to use a plant key to successfully identify flowering plants; application of these skills and botanical texts to the classroom. Mon - Tues are class/lecture days; Wed - Fri are day field trips to local trail heads.

PSPP 552 ADVANCED SOIL AND ENVIRONMENTAL MICROBIOLOGY  
S alternate years, to be offered every even years 3 cr. LAB 3  
PREREQUISITE: Graduate standing and instructor's permission.  
- Advanced laboratory course. Microorganisms are targeted for isolation and characterization, emphasizing those not normally encountered in general microbiology laboratory. Biogeochemical cycling, contaminant biodegradation, extremophiles, and plant-microbe interactions are typical topics investigated. Students employ classical and novel cultivation approaches, identifying microbes based morphology, physiology, and phylogeny. Cross-listed with LRES 552.

PSPP 553 PLANT FUNGAL DISEASE  
S alternate years, to be offered every even years 3 cr. LEC 3  
PREREQUISITE: BIOM 421.  
- An in-depth study of fungi and their etiology in causing plant diseases.

PSPP 554 PLANT FUNGAL DISEASE LAB  
S alternate years, to be offered every even years 1 cr. LAB 1  
PREREQUISITE: BIOM 421.  
COREQUISITE: PSPP 553.  
- Laboratory exercises related to the study of plant fungal diseases.

PSPP 575 PROFESSIONAL PAPER  
ES,SU 1-10 cr. IND 1-10 cr.  
PREREQUISITE: Graduate standing.  
- A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

PSPP 589 GRADUATE CONSULTATION  
ES,SU 3 cr. IND  
PREREQUISITE: Master’s standing and approval of the Dean of Graduate Studies.  
- This course may be used only by students who have completed all of their coursework (and thesis, if on a thesis plan), but who needs additional faculty or staff time help.

PSPP 590 MASTER’S THESIS  
ES,SU 1-10 cr. IND Maximum credits unlimited.  
PREREQUISITE: Master’s standing.
RLST 100D RELIGION, CONFLICT & POLITICS
4 cr. LEC 3 RCT 1
This course will focus on issues in which political events and conflict have had their roots in religion or in interpretations of religion.

RLST 201 ISLAM
3 cr. LEC 3
The textual traditions and historical forms of Islam will be studied from literary, historical, archaeological, and/or cultural perspectives.

RLST 203D BUDDHIST TRADITIONS
3 cr. LEC 3
The sacred texts and images of the religious thought and practice in the traditions of India.

RLST 205IH ORIGINS OF GOD
3 cr. LEC 3
The study of religion through story and image from their early contexts to their re-imagined forms. We will examine riddles such as myth and metaphor within a demythologized or literal worldview. We will apply and critique theorists of myth and of metaphor to topics such as the monster or the trickster, and to themes such as cosmogony or metaphors.

RLST 206IH ORIGINS OF GOD
3 cr. LEC 3
The study of religion through story and image from their early contexts to their re-imagined forms. We will examine riddles such as myth and metaphor within a demythologized or literal worldview. We will apply and critique theorists of myth and of metaphor to topics such as the monster or the trickster, and to themes such as cosmogony or metaphors.

RLST 207IH MYTH AND METAPHOR
3 cr. LEC 3
We will apply and critique theorists of myth and metaphor within a demythologized or literal worldview. We will examine riddles such as myth and metaphor within a demythologized or literal worldview.

RLST 212IH RELIGION AND SCIENCE
3 cr. LEC 3
The great themes of the world’s religions and the methodological approaches to the academic study of religion and culture.

RLST 217IH RELIGION AND SCIENCE
3 cr. LEC 3
The interdisciplinary course investigates models for interpreting the relationship of religion, science, and nature using cultural, textual, and historical approaches. The purpose of this course is neither to examine nor to critique the conclusions of scientific work; neither is it a course in theology nor a testing ground for faith.

RLST 220IH INTERPRETATION OF AMERICAN RELIGION
3 cr. LEC 3
Religion in America and America as religion: an examination of figures, texts, movements, and material culture in creating America’s religious and cultural landscapes.

RLST 223IH NATURE AND CULTURE
3 cr.
We will examine the religious roots of various social and political categories in today’s world which might include, among others, national, fundamentalism, or sexism, and examine the means by which these categories affect contemporary society and events.

RLST 231 RELIGION AND GENDER
3 cr. LEC 2 RCT 1
PREREQUISITE: Any RLST course.
- Interpretation of metaphors and myths of gender and world cultures.

RLST 235 RELIGION AND LITERATURE
3 cr. SEM 3
PREREQUISITE: At least two 200 level courses in any one or combination of Religious Studies, English, Humanities, Modern Languages, or permission of the instructor.
- This course explores the intersection of religion with literary and other narrative cultures, with a focus on close reading and the interpretation of texts.

RLST 236 MYSTICS, FOUNDERS, REFORMERS
3 cr. SEM 3
PREREQUISITE: Any RLST course.
- Charismatic individuals, whether they found, reform, or depart from existing tradition, are an important feature of religion worldwide. This course examines such persons from different disciplinary perspectives. Topics may include guru culture; religion and colonialism; mystical experience and more.

RLST 320 RELIGION AND SCIENCE
3 cr. LEC 3
The study of religion through story and image from their early contexts to their re-imagined forms. We will examine riddles such as myth and metaphor within a demythologized or literal worldview. We will apply and critique theorists of myth and of metaphor to topics such as the monster or the trickster, and to themes such as cosmogony or metaphors.

RLST 325 RELIGION AND LITERATURE
3 cr. SEM 3
PREREQUISITE: At least two 200 level courses in any one or combination of Religious Studies, English, Humanities, Modern Languages, or permission of the instructor.
- This course explores the intersection of religion with literary and other narrative cultures, with a focus on close reading and the interpretation of texts.

RLST 326 MYSTICS, FOUNDERS, REFORMERS
3 cr. SEM 3
PREREQUISITE: Any RLST course.
- Charismatic individuals, whether they found, reform, or depart from existing tradition, are an important feature of religion worldwide. This course examines such persons from different disciplinary perspectives. Topics may include guru culture; religion and colonialism; mystical experience and more.

RLST 330 ANCIENT EGYPT
3 cr. LEC 3
PREREQUISITE: Any RLST course.
- Survey of Egyptian culture, religion, and society from the beginning of the history of a unified Kingdom of Ancient Egypt in the middle of the third millennium BCE through the Hellenistic conquest of Egypt by Alexander the Great.

RLST 332 ARCHAEOLOGY AND RELIGION
3 cr. LEC 3
PREREQUISITE: Any RLST course.
- This course will utilize archaeology and archaeological method and theory as a means to study the history and development of the peoples, places, writings, and religious beliefs of the ancient Near Eastern world.

RLST 370 PHILOSOPHY OF RELIGION
3 cr. LEC 3
PREREQUISITE: Any RLST or PHIL course.
- Analysis of concepts of God, revealed truth, and immortality; the nature of religious emotion and experience, and of religious language; relation of faith to reason; traditional proofs of God’s existence; the problem of evil.

RLST 402 NATURAL/UNNATURAL/SUPERNATURAL
4 cr. SEM 4
PREREQUISITE: Any RLST course.
- This course considers how secular and religious thinkers have defined the supernatural and distinguished it from the natural world, with attention to the contemporary implications of debates about supernaturalism.

RLST 405 TEXT AND IMAGE
4 cr. LEC 3 RCT 1
PREREQUISITE: Any RLST course.
- This course will examine the religious roots of various social and political categories in today’s world which might include, among others, national, fundamentalism, or sexism, and examine the means by which these categories affect contemporary society and events.

RLST 407 ISMS: RELIGION & CATEGORIES
3 cr. SEM 3
PREREQUISITE: Any RLST course.
- This course will examine the religious roots of various social and political categories in today’s world which might include, among others, national, fundamentalism, or sexism, and examine the means by which these categories affect contemporary society and events.

PSPP 591 SPECIAL TOPICS
3 cr. On Demand 1 - 4 cr.
PREREQUISITE: Doctoral standing.
- An individualized assignment arranged with an instructor and approval of Department Head, and Dean of Graduate Studies.

PSPP 600 DOCTORAL THESIS
3 cr. On Demand 1 - 4 cr.
Maximum 12 cr.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

RLST 401H INTRODUCTION TO THE STUDY OF RELIGION
3 cr. LEC 3
The great themes of the world’s religions and the methodological approaches to the academic study of religion and culture.

PSPP 690 DOCTORAL THESIS
3 cr. On Demand 1 - 4 cr.
Maximum 12 cr.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

PSPP 692 INDEPENDENT STUDY
3 cr. LEC 1 RCT 2
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

PREREQUISITE:
- Doctoral standing.

PSPP 590 SEMINAR
3 cr. SEM Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Students prepare, present, and critique scientific presentations.

PSPP 598 INTERNSHIP
3 cr. SEM Maximum 12 cr.
PREREQUISITE: Graduate standing, consent of instructor and approval of Department Head, and Dean of Graduate Studies.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

PREREQUISITE:
- Doctoral standing.

PSPP 591 SPECIAL TOPICS
3 cr. On Demand 1 - 4 cr.
Maximum 12 cr.
- An individualized assignment arranged with an instructor, approval of Department Head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

COURSE DESCRIPTIONS: PSPP, RLST

- The sacred texts and images of the religious thought and practice in the traditions of China, Korea, India, Southeast Asia, and/or Japan.

- The great themes of the world’s religions and the methodological approaches to the academic study of religion and culture.

- The study of religion through story and image from their early contexts to their re-imagined forms. We will examine riddles such as myth and metaphor within a demythologized or literal worldview. We will apply and critique theorists of myth and of metaphor to topics such as the monster or the trickster, and to themes such as cosmogony or metaphors.

- The study of religion through story and image from their early contexts to their re-imagined forms. We will examine riddles such as myth and metaphor within a demythologized or literal worldview. We will apply and critique theorists of myth and of metaphor to topics such as the monster or the trickster, and to themes such as cosmogony or metaphors.

- The study of religion through story and image from their early contexts to their re-imagined forms. We will examine riddles such as myth and metaphor within a demythologized or literal worldview. We will apply and critique theorists of myth and of metaphor to topics such as the monster or the trickster, and to themes such as cosmogony or metaphors.

- The great themes of the world’s religions and the methodological approaches to the academic study of religion and culture.

- The sacred texts and images of the religious thought and practice in the traditions of China, Korea, India, Southeast Asia, and/or Japan.

- The sacred texts and images of the religious thought and practice in the traditions of India.

- The sacred texts and images of the religious thought and practice in the traditions of India.

- The sacred texts and images of the religious thought and practice in the traditions of China, Korea, India, Southeast Asia, and/or Japan.

- The sacred texts and images of the religious thought and practice in the traditions of China, Korea, India, Southeast Asia, and/or Japan.

- The study of religion through story and image from their early contexts to their re-imagined forms. We will examine riddles such as myth and metaphor within a demythologized or literal worldview. We will apply and critique theorists of myth and of metaphor to topics such as the monster or the trickster, and to themes such as cosmogony or metaphors.

- The great themes of the world’s religions and the methodological approaches to the academic study of religion and culture.

- The sacred texts and images of the religious thought and practice in the traditions of China, Korea, India, Southeast Asia, and/or Japan.

- The sacred texts and images of the religious thought and practice in the traditions of China, Korea, India, Southeast Asia, and/or Japan.

- The sacred texts and images of the religious thought and practice in the traditions of China, Korea, India, Southeast Asia, and/or Japan.

- The study of religion through story and image from their early contexts to their re-imagined forms. We will examine riddles such as myth and metaphor within a demythologized or literal worldview. We will apply and critique theorists of myth and of metaphor to topics such as the monster or the trickster, and to themes such as cosmogony or metaphors.

- The great themes of the world’s religions and the methodological approaches to the academic study of religion and culture.

- The sacred texts and images of the religious thought and practice in the traditions of China, Korea, India, Southeast Asia, and/or Japan.
RLST 410 PSYCHE AND THE SACRED
5 cr. LEC 3
PREREQUISITE: Any RLST course.
- This course is a cross cultural investigation of the ideas of personhood, including theories of the individual, the social, the body, and the transpersonal and transtemporal.

RLST 415 MYTH, MAGIC, & RELIGION
5 cr. LEC 3.
PREREQUISITE: Any RLST course.
- Forms of religious representation and practice in cultural and historical context; from liminality and symbolic innovation to mythic charts and social transformations, cosmological scenarios and ritual forms are explored in this course.

RLST 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Junior standing and consent of department head.
- Directed undergraduate research. Course will address responsible conduct of research.

RLST 491 SPECIAL TOPICS
1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

RLST 492 INDEPENDENT STUDY
1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

RLST 499RH SENIOR CAPSTONE
SEM 3 cr.
PREREQUISITE: Consent of instructor.
- Religious Studies majors will explore significant themes relevant to the academic study of religion, using advanced research techniques, appropriate bibliographic tools, and in-depth analysis of historical, literary, theoretical, and/or visual sources.

RLST 592 INDEPENDENT STUDY
1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of Associate Dean, and Dean of Graduate Studies.
- Directed research and study on an individual basis.

SFBS
Sustainable Food & Bioenergy Systems
formerly part of HDFN, PSPP

SFBS 146 INTRODUCTION TO SUSTAINABLE FOOD AND BIOENERGY SYSTEMS
S 3 cr. LEC 3
- A systems perspective on local, state and national food, agriculture and energy issues. Key topics include Agroecology, Sustainable Crop Production, and Sustainable Food Systems. For majors and non-majors.

SFBS 296 PRACTICUM: TOWNE’S HARVEST
Su 3 cr. LEC 1 LAB 2
PREREQUISITE: SFBS 146 or permission of instructor.
- Emphasizes hands-on field experience with small scale market gardening, distribution through community supported agriculture, and market sales at local farmers’ markets. Students will complete one independent project, service-learning at local farms and complete weekly writing assignments.

SFBS 298 INTERNSHIP
SF, S, Su 1-12 cr. IND
PREREQUISITE: Consent of instructor.
- An individualized assignment with a professional agency to provide a guided field experience.

SFBS 346 SUSTAINABLE FOOD & BIOENERGY SYSTEMS SUMMER FIELD COURSE
So 2 cr. LEC 1 IND
PREREQUISITE: SFBS 296 or consent of instructor.
- This field trip course compares and contrasts large-scale agricultural operations across Montana. Students will gain an appreciation of the choices, opportunities, and challenges facing conventional, diversified, and organic producers. Interdisciplinary and systems level thinking will be practiced.

SFBS 429 SMALL BUSINESS & ENTREPRENEURSHIP IN FOOD & HEALTH
S 3 cr. LEC 3
PREREQUISITE: HDFC 158, or HDFC 239, or ECNS 101 and senior standing or permission of instructor.
- Basic bookkeeping, marketing, and management concepts for owning and operating a successful small business. Students will prepare a modified business plan based on individual interests. Special emphasis on sustainable design and corporate responsibility in food system enterprises.

SFBS 445R CULINARY MARKETING: FARM TO TABLE
Su 3 cr. LEC 1 LAB 2
PREREQUISITE: HDFC 371, NUTR 221, NUTR 226, NUTR 227, and NUTR 322 or permission of instructor.
- Emphasizes hands-on food experience, including market garden tending and harvesting, distribution by community supported agriculture, food marketing and retail at farmers’ markets, culinary practice with seasonal garden produce and food preservation, educational outreach and culinary demonstrations, and independent research projects.

SFBS 451R SUSTAINABLE FOOD SYSTEMS
S 3 LEC 3.
PREREQUISITE: NUTR 221, HDFC 371, and senior standing or consent of instructor.
- This course examines the connections among the food industry, agriculture, and the environment and considers the sustainability of food choices. Students gain a systems perspective on current nutrition problems such as hunger, obesity, and disordered eating. Students conduct independent research.

SFBS 498 INTERNSHIP
On Demand
PREREQUISITE: Consent of internship director in academic area.
- An individualized professional assignment arranged for specific discipline. Some academic areas will offer specific sections in sequence for their students. All students must receive department permission prior to registration, and register for a senior seminar in their major area.

SFBS 499 SENIOR THESIS/CAPSTONE
F 3 cr. LEC 3
PREREQUISITE: SFBS 146, SFBS 246, SFBS 498 and senior standing.
- Capstone experience for SFBS majors. Emphasizes systems thinking about food and bioenergy from production to consumption. Integrates SFBS field experience into development of outreach materials, interdisciplinary team project work, and honing of professional skills including oral and written communication; leadership.

SFBS 541 CULINARY MARKETING: FARM TO TABLE
So 3 cr. LEC 1 LAB 2
PREREQUISITE: HDFN 226; HDFN 227; HDFN 322; HDFN 323; or equivalent & Graduate standing.
- Emphasizes hands-on food experience, including market garden tending and harvesting, distribution by community supported agriculture, food marketing and retail at farmers’ markets, culinary practice with seasonal garden produce, food preservation and product development, teaching and culinary demonstrations, and marketing plan development.

SFBS 545 EXPLORATION OF FOOD BIOTECHNOLOGY
On Demand 2 cr. LEC 2
- This course will delve into the history, techniques, applications and ethical concerns associated with the rapidly growing areas of biotechnology in food production, food processing and agriculture. All course participants will receive food biotechnology curriculum materials for incorporation into the high school biology classroom.
COURSE DESCRIPTIONS: SFBS, SOCI

SFBS 551 GLOBAL FOOD PERSPECTIVES
F 3 cr. LEC 3
- Explores the making of the American diet by examining the impact of global historical events, cultural trends, economic pressures and political activities. Students think critically about the relationship between health and the food supply, proposing solutions to common food problems.

SOCI 1101S INTRODUCTION TO SOCIOLGY
F, S 3 cr. LEC 3
- Theoretical and methodological underpinnings of sociology. How theory guides investigation of social life and results in creation of factual knowledge. How sociological questions are studied and results are interpreted.

SOCI 1105S HONORS SOCIOLOGICAL INQUIRY
On Demand 3 cr. LEC 3
-In-depth study of the sociological enterprise: the broad range of theories and research used by sociologists to think about and examine the social world. All major areas of sociology are covered with an emphasis on institutions and systems of stratification.

SOCI 150D SOCIAL DIFFERENCE
S 3 cr. LEC 3
- Examination of social differences by focusing on the construction and consequences of a limited set ascribed social characteristics: race, ethnicity, gender, sexual orientation and class. Focus on how these ascribed statuses are central to the sociological study of inequality.

SOCI 201D SOCIAL PROBLEMS
On Demand 3 cr. LEC 3
- Major social problems such as human deviance, discrimination, crime, mental illness, and economic inequality. These problems will be considered primarily as consequences of cultural premises and values in American society. Competing theoretical explanations.

SOCI 202 SOCIAL STATISTICS
F, S 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course; Quantitative Core; or consent of instructor.
- Topics covered include: Levels of measurement; measures of central tendency; dispersion and association; normal curve, statistical inference; logic of quantitative comparison and decision making utilized by social scientists; introduction to data collection techniques.

SOCI 221S CRIMINAL JUSTICE SYSTEM
On Demand 3 cr. LEC 3
- This course is an overview of the institutions that comprise our justice system. The emphasis is on criminal justice and the sources of crime but topics relevant to the broader study of the law and justice included.

SOCI 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

SOCI 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

SOCI 305 SOCIETY AND THE INDIVIDUAL
F 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Social behavior of the individual in the group, linguistic behavior, social perception, motivation and learning, and self-focus on symbolic interaction.

SOCI 307 SOCIOLGY OF CHILDHOOD AND ADOLESCENCE
alternate years, to be offered every even years 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Examination of cultural and societal forces influencing development among children and adolescents from a sociological perspective.

SOCI 311 CRIMINOLOGY
Varies, to be offered F even years, S odd years and S even years 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, SOCI 202 or STAT 210; or consent of instructor.
- Discussion of major theories of crime and delinquency with special attention to systems of adult and juvenile deterrence.

SOCI 313 PRINCIPLES OF CRIMINAL LAW AND PROCEDURES
F 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- This course introduces the student to fundamental American legal principles as developed in criminal law. In addition, the student will gain a basic understanding of key issues in the application and development of contemporary legal procedures.

SOCI 318R SOCIOLOGICAL RESEARCH METHODS
F, S 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Introduction to research methods in sociology with emphasis on defining variables, hypothesis formulation, and development of strategies used to test hypotheses. Student research project.

SOCI 320 SOCIOLOGY OF RELIGION
alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.

SOCI 325 SOCIOLOGY OF GENDER
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- The family as a structural and functional unit in social life and organization, as a unit of social control; its status, change, and associated problems.

SOCI 332 SOCIOLOGY OF FAMILY
alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- This course focuses on the family as a social institution. How family is studied; historical and cultural contexts of family; changes in family over time; the social and cultural consequences of gender differences for men and women.

SOCI 333 SOCIOLOGY OF EDUCATION
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- This course focuses on the family as a social institution. How family is studied; historical and cultural contexts of family; changes in family over time; the social and cultural consequences of gender differences for men and women.

SOCI 344 SOCIOLOGY OF THE FAMILY
F 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- A sociological analysis of crimes committed by individuals from a sociological perspective.

SOCI 345 SOCIOLOGY OF ORGANIZATIONS
F 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Rational, natural, and open systems theories of complex organizations. Introduction to organizational structure. Irrational aspects of organizations. Organizational environments and their effects on structure and activity.

SOCI 355 POPULATION AND SOCIETY
F 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Distribution, growth trends, and future prospects of human population numbers in local, national, and world communities including analysis of birth, death, and migration changes. Elementary methods and theories of demographic analysis.

SOCI 357 OCCUPATIONAL/ CORPORATE CRIME
F alternate years, to be offered odd years.
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- A sociological analysis of crimes committed by individuals within the workplace and by corporations. Addressed are the extent of the problems, social costs, legal responses, and theoretical perspectives assessing the etiology of such crimes.
SOCI 358 CRIME & INEQUALITY
F 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- This course examines how crime and justice play out in the context of a stratified society. Students explore how social organization, inequality and conflict influence and shape the nature and distribution of crime and social control.

SOCI 359 CRIME, JUSTICE, AND THE MEDIA
F 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Examines interrelationships between mass media, criminal justice system and crime in the US; public policy implications of media portrayals of crime, criminals, police and court system; relationship between media consumption and crime.

SOCI 368 LATINO IMMIGRATION
F alternate years, to be offered even years 5 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- In this course we explore the forces behind labor flows between Latin America and the US and the parallel reality of immigrant life. Although rooted in immigration theory, we use Latino daily life experience as our primary analytical lens.

SOCI 370 SOCIOLOGY OF GLOBALIZATION
S 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Examines the global interconnectedness of economic, political and cultural processes. Topics covered include the historical and historical analysis of globalization, global culture and consumerism. The human struggles that accompany these changes including gender, family, and immigration.

SOCI 373 SOCIOLOGY OF INDIGENOUS PEOPLES
S 3 cr. LEC 3
PREREQUISITE: SOCI 101 and Quantitative core; or consent of instructor.
- A survey of indigenous peoples in global, historical, and comparative perspective, with special emphasis on the development of indigenous rights and identity in the Anglo-derived settler societies of North America and Australia (although other regions will be considered).

SOCI 380 SOCIOLOGY OF HEALTH & MEDICINE
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- An in-depth exploration of differing perspectives on health, medicine, practitioners, and healthcare systems with a focus on how gender, race/ethnicity, and social class affect health care systems, policies, practice and individual experiences of health and illness.

SOCI 414 FAMILY VIOLENCE
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: SOCI 101, or equivalent course, Quantitative core; or consent of instructor.

SOCI 423 SOCIOLOGY OF CORRECTIONS
F alternate years, to be offered even years 5 cr. LEC 3
PREREQUISITE: SOCI 101S or equivalent course, Quantitative core; or consent of instructor.
- Examination of the nature and extent of corrections in the United States as well as the purposes, structures, and procedures of penal sanctioning and the institutional systems of correction. Emphasis on historical developments and current trends and issues in corrections.

SOCI 427 SOCIOLOGICAL ANALYSIS
On Demand 3 cr. LEC 3
PREREQUISITE: SOCI 101, or equivalent course, Quantitative core; or consent of instructor.
- Application of analytical tools to the analysis of sociological data.

SOCI 434 SOCIOLOGY OF HUMAN SEXUALITY
S 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Investigation of human sexuality from a sociological perspective. Focus on social aspects of human desires experiences, and meanings in historical and cultural context primarily using a social construction of human sexuality perspective.

SOCI 435 LAW & SOCIETY
S 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Analysis of law, legal processes, and legal and quasi-legal institutions from sociological and philosophical perspectives. Some issues that are addressed include the functions of the law in modern society, the issue of the law’s power (or impotence) in the everyday, and the law’s violence.

SOCI 436 LAW & INEQUALITY
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- This course addresses the problem of social inequality by examining the contradictory ways in which the law may be used as both an instrument of social change and as a medium to formalize and solidify social inequality.

SOCI 455 CLASSICAL SOCIOLOGICAL THEORY
F, S 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Introduction to major sociological theories with focus on the implication for the development of empirical research. Theory as a set of tools to guide research. The explanations provided by theorists are compared and their contributions to the study of selected social phenomena are discussed.

SOCI 470 ENVIRONMENTAL SOCIOLOGY
On Demand 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.

SOCI 485 POLITICAL SOCIOLOGY
On Demand 3 cr. LEC 3
PREREQUISITE: SOCI 101 or equivalent course, Quantitative core; or consent of instructor.
- Power. Who has it, who doesn’t, and why. Political sociology explores the omnipresence of power in society from political power in government to power relationships in our day-to-day lives. Political economy will also be examined.

SOCI 490 UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

SOCI 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

SOCI 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

SOCI 494 SEMINAR/WORKSHOP
On Demand 1 - 3 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: As determined for each offering.
- Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

SOCI 498 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: [junior standing, SOCI 318, consent of instructor, approval of department head, and at least one additional upper division sociology course.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field. See departmental qualification standards for internships.

SOCI 499 SENIOR THESIS CAPSTONE
F, S 3 cr. SEM 3
PREREQUISITE: Senior standing, SOCI 455, and SOCI 318 and at least one additional upper division Sociology course.
- Senior capstone course. The application of theory and methods in the development of an integrated framework for understanding and explaining issues of current concern. Verbal and written presentation of research paper.

SOCI 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular need, or given on a trial basis to determine acceptability and demand.

SOCI 592 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.
NOTE: Offered on a rotating basis with French and German in the summer.

- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

SPNS

Spanish

formerly MLS

SPNS 101 ELEMENTARY SPANISH I
F, S, Su alternate years 4 cr. RCT 4
NOTE: Offered on a rotating basis with French and German in Summer.

- An elementary-level course designed to help students acquire basic proficiency in communicating within culturally significant contexts. An integrated approach to teaching language skills with emphasis on vocabulary acquisition and basic grammatical structures.

SPNS 102D ELEMENTARY SPANISH II
F, S. Su alternate years 4 cr. RCT 4
PREREQUISITE: SPNS 101 or equivalent, or two years of high school Spanish. Offered on a rotating basis with French and German in Summer.

- This course builds upon the foundation established in 101. Greater emphasis is placed upon oral and written expression. Reading and discussions are designed to increase comprehension of more linguistically complex texts and more conceptually complex cultural issues.

SPNS 201D INTERMEDIATE SPANISH I
F, S 3 cr. RCT 3
PREREQUISITE: SPNS 102 or equivalent, or a minimum three years of high school Spanish, or placement interview.

- Intensive, methodical review of grammar and syntax combined with the integrated development of proficiency in the four language skills. Expansion of cultural knowledge and functional vocabulary through intermediate-level readings and discussions. Increased emphasis on written communication.

SPNS 220D SPANISH LANGUAGE & CULTURE
F, S 3 cr. RCT 3
PREREQUISITE: SPNS 201 or equivalent, or placement interview.

- Designed to follow the third semester review of grammar and basic skills. Taught through a series of carefully selected readings in Spanish culture, civilization, and literature which will provide the basis for writing essays and reports and developing advanced language skills.

SPNS 320 SPANISH CULTURE & CIVILIZATION
F 3 cr. LEC 3
PREREQUISITE: SPNS 220

- Readings, lectures, and discussions in Spanish. This course examines the historical, social, and ideological aspects of Spanish culture from the Middle Ages to the modern period. Taught in Spanish.

SPNS 323 SPANISH:
ADV GRAMMAR & PHONETICS
F 3 cr. LEC 3
PREREQUISITE: SPNS 220 for majors & minors; or Junior standing for non-majors.
- Examination of the major authors, works, and literary movements of U.S. Latino literature. Taught in English. Spanish majors and minors will read and write in Spanish.

SPNS 324 SPANISH:
ADV CONVERSATION & COMP
S 3 cr. RCT 3
PREREQUISITE: SPNS 323 or 324.
- Development and refinement of advanced oral and writing skills, intensive practice in expository and imaginative composition, review of idiomatic expressions, and vocabulary expansion.

SPNS 325 SURVEY OF SPANISH LIT
S alternate years, to be offered every year 3 cr. LEC 3
PREREQUISITE: SPNS 323 or 324.
- A survey of Spanish literature from the Middle Ages to the modern period through an examination of the masterpieces of each literary period. Taught in Spanish.

SPNS 329 EARLY CULTURES OF LATIN AMERICA
F 3 cr. LEC 3
PREREQUISITE: SPNS 220.
- Readings, lectures, and discussions in Spanish. This course examines the historical, social, and ideological aspects of Latin American culture from the precolombian period through independence.

SPNS 330 MODERN CULTURES OF LATIN AMERICA
F 3 cr. LEC 3
PREREQUISITE: SPNS 323 or 324.
- Readings, lectures, and discussions in Spanish. This course examines the historical, social, and ideological aspects of modern Latin American culture. Taught in Spanish.

SPNS 332 CONTEMPERARY SPANISH LIT & FILM
S 3 cr. LEC 3
PREREQUISITE: SPNS 323 or 324.
- The course examines travel in Latin America texts and films as exploration and search for individual and national identity and as disruptive displacements caused by political and economic forces and the problems of adapting to a new environment. Taught in Spanish.

SPNS 335IH TRAVEL IN LATIN AMERICA LIT & FILM
Su 3 cr. RCT 3
PREREQUISITE: SPNS 220 or junior standing.
- The course examines travel in Latin America texts and films as exploration and search for individual and national identity and as disruptive displacements caused by political and economic forces and the problems of adapting to a new environment. Taught in Spanish.

SPNS 350 US LATINO CULTURES
F 3 cr. LEC 3
PREREQUISITE: SPNS 220 for majors and minors or Junior standing for non-majors.
- Examines the history and culture of Latino communities in the US. It centers on the largest Hispanic populations found in the US today: Mexican, Dominican, Puerto Rican, and Cuban. Taught in Spanish.

SPNS 351 US LATINO LITERATURE
F 3 cr. RCT 3
PREREQUISITE: SPNS 220.
- In-depth review of problem areas in grammar, complete review of the verb system and a practical study of Spanish sounds. This class is designed to provide prospective teachers and advanced students with an understanding of the function of Spanish grammar in Spanish.

SPNS 361 HISPANIC TEXTS AND CINEMA
S 3 cr. LEC 3
PREREQUISITE: SPNS 325.
- This course will focus on different topics of Latin America and/ or Spain through the reading and viewing of a variety of Hispanic literature and movies. These themes may include history, race, gender, politics and literary trends in Latin America or Spain. Focus will vary depending on the professor. In Spanish.

SPNS 416 SPANISH:
CULTURE AND REVOLUTION
F 3 cr. SEM 3
PREREQUISITE: SPNS 220.
- An intensive study of the cultural materials produced as a result of dictatorships and revolutions in Latin America and Spain including movies, documentaries, songs, literature and art. Will encourage the understanding of the mutual influence between historical events and cultural production in Hispanic countries. Focus will vary depending on the professor. In Spanish.

SPNS 430 LATINO AMERICAN PERSPECTIVES
S 3 cr. LEC 3
PREREQUISITE: SPNS 220 or equivalent.
- This course approaches historical developments, literature, and constructions of identity in twentieth-century Latin America. Taught in English with Spanish reading/writing option. Focus will vary by professor.

SPNS 460 CONTEMPORARY SPAIN AND NATIONS
F 3 cr. LEC 3
PREREQUISITE: SPNS 220 or equivalent.
- Examines several facets of contemporary Spain, including three of Spain’s peripheral nations: Basque Country, Catalonia, and Galicia. Students read and write about issues such as the current battle of memory, immigration, feminism, and cinema.

SPNS 470R SEM:
MODERN HISPANIC LITERATURE
F, S 3 cr. SEM 3
PREREQUISITE: SPNS 325 or SPNS 332 or SPNS 351.
- Senior capstone course. An in-depth examination of the most important Hispanic works and authors of the 19th and 20th, and 21st centuries. In Spanish.

SPNS 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.
COURSE DESCRIPTIONS: STAT

STAT 498 INTERNSHIP
F, S, Su 2-12 cr. IND
PREREQUISITE: junior standing, consent of instructor, and approval of department head. - An individualized assignment arranged with an agency business, or other organization to provide guided experience in the field.

STAT 501 INTERMEDIATE PROBABILITY & STATISTICS F 3 cr. LEC 3
PREREQUISITE: STAT 422 or M 382.

STAT 502 INTERMEDIATE MATHEMATICAL STATISTICS S 3 cr. LEC 3
PREREQUISITE: STAT 501 or M 501.
- Mathematical foundation and theory of point estimation, particularly maximum likelihood estimation, interval estimation, and hypothesis testing.

STAT 505 LINEAR MODELS
F 3 cr. LEC 3
PREREQUISITE: STAT 422 and STAT 412.

STAT 506 ADVANCED REGRESSION ANALYSIS
S 3 cr. LEC 3
PREREQUISITE: STAT 505.
- Diagnosis of assumptions of constant variance, linearity and normality. Methods for working with violations of the assumptions. Mixed effects models.

STAT 509 STOCHASTIC PROCESSES
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: STAT 421.
- Conditional probability theory, discrete and continuous time markov chains including birth and death processes and long run behavior; Poisson processes; queuing systems; system reliability. Crosslisted with M 509.

STAT 510 STATISTICAL CONSULTING SEMINAR
F, S 1 cr. SEM 1 Maximum 6 cr.
PREREQUISITE: Graduate standing in statistics.
- Seminar discussions of issues and cases in statistical consulting. Supervised practice in consulting with researchers from various disciplines.

STAT 511 METHODS OF DATA ANALYSIS I
F, S 3 cr. LEC 3 cr.
PREREQUISITE: Graduate standing and STAT 216. This course is intended for graduate students not majoring in a mathematical science.
- Graphical techniques, data collection plans, populations, samples, and sampling distributions, inferences on means and proportions of one and two populations, analysis of variance for one-way classifications and multiple comparisons, simple linear regression.

STAT 512 METHODS OF DATA ANALYSIS II
S 3 cr. LEC 3 cr.
PREREQUISITE: STAT 410/STAT 511 (co-convened).
- Continuation of STAT 410/STAT 511 to cover principles of experimental design, multifactor ANOVA, repeated measures, logistic regression, Poisson log-linear regression, and introduces to multivariate and time series analyses, with an emphasis on statistical thinking, appropriate inference and interpretation, and writing.

STAT 520 TOPICS IN APPLIED STATISTICS
F alternate years, offered in even years 3 cr. LEC 3
PREREQUISITE: STAT 422 and consent of instructor.
- Current topics selected from computational statistics, time series and spatial statistics, decision theory, sampling, linear and mixed models, and multivariate statistics.

STAT 524 BIOSTATISTICS
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: STAT 410.
- Statistical methodology applicable to vital statistics, life tables and survival curves, clinical trials, epidemiologic investigations, and cause-effect studies.

STAT 526 EXPERIMENTAL DESIGN
S 3 cr. LEC 3
PREREQUISITE: STAT 410 and M 221.
- Randomization, multiple comparisons and contrasts, balanced complete and incomplete blocking designs. Latin square designs, factorial designs, nested designs, split-plot designs, random and fixed effects.

STAT 528 STATISTICAL QUALITY CONTROL
F alternate years, to be offered odd years 3 cr. LEC 3
PREREQUISITE: STAT 421 or an equivalent transfer course in probability theory.
- Modeling process quality, traditional SQC tools, control charts for variable and attribute data. CUSUM and WMA charts, process capability analysis, reliability statistics, accelerated testing.

STAT 532 BAYESIAN DATA ANALYSIS
F 3 cr. LEC 3
PREREQUISITE: STAT 422 or STAT 502 or M 502, and either M 384, M 505, or M 547.
- Sufficiency, completeness, ancillary statistics, invariance, likelihood-based inference, large sample theory, Edgeworth and saddlepoint approximations.

STAT 534 SPATIAL DATA ANALYSIS
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: STAT 506.
- Theoretical coverage of the fundamental principles of Bayesian inference, coverage of computational methods commonly used for Bayesian inference, introduction to applied Bayesian data analysis and hierarchical models.

STAT 536 INTRODUCTION TO TIME SERIES ANALYSIS
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: STAT 410 and consent of the instructor.
- An introduction to time series analysis considering time series regression, autoregressive, moving average, and ARIMA models, time series model building, estimation, and forecasting, and basic frequency domain methods.

STAT 557 MULTIVARIATE ANALYSIS I
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: STAT 506.
- Multivariate graphical methods, Wishart distribution, Hotellings T-squared, multivariate regression, multivariate analysis of variance and covariance, analysis of repeated measures, principal components analysis, factor analysis, canonical correlation, multivariate graphical displays, robust estimation discriminant and classification analysis, cluster analysis.

STAT 558 MULTIVARIATE ANALYSIS II
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: STAT 537.
- Special topics in multivariate analysis including general latent variable methods, analysis of covariance structures, common principal components, robust and distribution free multivariate analysis.

STAT 559 GENERALIZED LINEAR MODELS
S alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: STAT 528.
- Analysis of categorical data including logistic regression, log-linear models, analysis of deviance, extrabinomial variation, quasi-likelihood.

STAT 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1-4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
- A research or professional paper or project dealing with a topic in the field. This topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

STAT 576 INTERNSHIP
F, S, Su 2-12 cr. IND Maximum credits unlimited
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

STAT 578 RESPONSE SURFACE METHODOLOGY
F alternate years, to be offered even years 3 cr. LEC 3
PREREQUISITE: STAT 506.
- Diagnostics; fractional factorial designs; method of steepest ascent; canonical analysis; response optimization; ridge analysis; response surface design including central composite designs, orthogonal designs, rotatable designs, and optimal designs; mixture designs.

STAT 589 GRADUATE CONSULTATION
F, S, Su 3 cr. IND 3
PREREQUISITE: Master’s standing.
- This course may be used only by students who have completed all of their coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time.
STAT 590 MASTER’S THESIS
F, S. Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.

STAT 591 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

STAT 592 INDEPENDENT STUDY
F, S. Su 1-3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
- Directed research and study on an individual basis.

STAT 594 SEMINAR
F, S. Su 1 cr. SEM 1 Maximum 6 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

STAT 598 INTERNSHIP
F, S. Su 2 - 12 cr. IND Maximum credits unlimited.
PREREQUISITE: Graduate standing, consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

STAT 689 DOCTORAL READING & RESEARCH
F, S. Su 3 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: Doctoral standing.
- This course may be used by doctoral students who are reading research publications in the field in preparation for doctoral thesis research.

STAT 690 DOCTORAL THESIS
F, S. Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

TE Technology Education

TE 101 INTRODUCTION TO TECHNOLOGY EDUCATION
F 1 cr. LEC 1
- Introduction to the rationale, principles, concepts, and philosophy of technology education. An overview of the Technology Education paradigm is provided through a variety of class activities.

TE 113 BASIC ELECT/COMPUTER NETWORKS
S
- Provides basic understanding of electricity/electronics as it can be used to design and control devices. Basic principles and theory behind computer operation and networking are also reviewed.

TE 207 MATERIALS AND PROCESSES
S alternate years, to be offered 2012 4 cr. LEC 2 LAB 2
- Exploration of technical competencies in engineering, applications, processes, tools and equipment as they are employed by industry in the application of materials including but not limited to wood, metal, and composite materials.

TE 214 MAT MACHINE SAFETY
S alternate years, to be offered even years.
PREREQUISITE: TE 207
- Materials processing information and laboratory practice with emphasis on laboratory/machine facility safety. Machine tool technology practices emphasized.

TE 230 2-D COMPUTER-AIDED DRAFTING
F, S 3 cr. LEC 1 LAB 2
- Provides the learner with an understanding of two-dimensional computer-aided drafting. Students explore and create two dimensional drawings with the aid of AutoCAD software (made by Auto desk). Drawings focus on architecture, mechanical and civil engineering applications.

TE 250CS TECHNOLOGY & SOCIETY
F, S 5 cr. LEC 5
- Closely linked to the various sciences, technology has developed out of human need to solve real problems of society and to advance science. An exploration and examination of major technological periods, inventions, and innovations that have altered the course of humanity and their impact on the civilization process will lead to a perspective on technological literacy. This course will introduce students to the study of technology, not so much as a method for "doing technology", but as an impetus for social and cultural change related to technology.

TE 290B UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND May be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

TE 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

TE 294 SEMINAR
F, S Max 4 cr.
- Topics offered at the lower division level which are not covered in regular courses.

TE 330 ALTERNATIVE POWER/ENERGY TECHNOLOGY
S alternate years, to be offered odd years 3 cr. LEC 1 LAB 2
PREREQUISITE: TE 101 and TE 207
- Through a variety of research and applied learning activities, students will develop an understanding of various power/energy sources while at the same time gaining new perspectives on the feasibility and appropriateness of adopting and implementing a variety of power/energy systems to meet current societal needs.

TE 331 ELECTRONIC COMMUNICATION TECHNOLOGY
S 4 cr. LEC 2 LAB 2
- Students explore the technical and technological concepts of communication systems and subsystems including audio/video production and web-based applications.

TE 355 TEACHING PRACTICES
F 1 cr. LAB 1
COREQUISITE: EDSD 452
- Provides additional experiences in planning, teaching and evaluating lessons in Technology Education.

TE 360 TECHNOLOGY PRACTICUM
F, S 3 cr. LAB 3
PREREQUISITE: Consent of Instructor.
- Self-selected, self-directed interdisciplinary field experience arranged with and supervised by an academic advisor. This practicum will pertain to the transfer of technological literacy in a variety of settings.

TE 406 CURRICULUM AND FACILITIES PLANNING
F 3 cr. LEC 3
PREREQUISITE: Acceptance in Teacher Education program; junior standing.
COREQUISITE: EDSD 352
- Determining appropriate development of Technology Education and Agricultural Education programs based on an analysis of student and community needs. Organizing subject matter materials and laboratory resources to promote the development of standard based curricula.

TE 410 COMPUTER AIDED AND INDUSTRIAL MACHINING & MANUFACTURING
On Demand 4 cr. LEC 2 LAB 2
PREREQUISITE: TE 207 and 250.
- Understanding of computer aided machining and manufacturing. Includes instruction in the use and operation of a complete CAM system including applications on a CNC milling machine. Course content includes machine tools technology practice related to traditional machining techniques.

TE 417C MANUFACTURING TECHNOLOGY
F, S 3 cr. LEC 1 LAB 2
PREREQUISITE: TE 207 and TE 250 and junior or senior standing.
- Capstone course. Study and application of manufacturing concepts common to industry, including the stages of initial planning, prototype construction through the use of modern manufacturing techniques, market research, and analysis.

TE 490B UNDERGRADUATE RESEARCH
F, S. Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

TE 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

TE 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

TE 494 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as determined for each offering.
- Topics offered at the upper division level not covered in regular courses. Students participate in preparing and presenting discussion material.
COURSE DESCRIPTIONS: TE, THTR, UC, UH

TE 498 INTERNSHIP
F, S, Su 2 - 12 cr. IND (Maximum 12 cr.)
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- An individualized assignment arranged with an agency, business or other organization to provide guided experience in a technology field.

TE 501 HISTORY & PHILOSOPHY OF TECHNOLOGY EDUCATION
F, S 3 cr. LEC 3
- A review of national trends and issues in Technology Education and their implications for program development at the local, state and national level.

TE 530 3D MODELING & ANIMATION
S alternate years, to be offered even years 3 cr. LEC 1 LAB 2
PREREQUISITE: TE 230 or EGEN 115, 116, 117 or have consent of instructor
- This course is designed to provide the learner with experiences that build on previous AutoCAD use and focuses primarily on the creation of 3D solild models.

TE 594 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.
- Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

THTR
Theatre
formerly part of MTA

THTR 122A ACTING FOR NON-MAJORS
F 3 cr. LEC 3
- An introduction to the creative process engaged by a performer on a stage. Taught in a workshop format in which the individual student engages in exercises designed to convey stories and emotions through the understanding of human behavior as expressed on a stage.

THTR 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND May be repeated. Max. 12 cr.
PREREQUISITE: Senior standing in MPVT.
- Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

THTR 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in a curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

THTR 492 INDEPENDENT STUDY
On Demand 1-5 cr. IND. May be repeated. Maximum 6 cr. total for FILM, PHOT & THTR 492 combined.
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
- Directed research and study on an individual basis.

THTR 498 CAREER INTERNSHIP
F, S, Su 2-12 cr. IND, may be repeated, maximum 12 credits total for FILM, PHOTO & THTR 498 combined.
PREREQUISITE: Consent of School Director.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

UC
University College

UC 202 LEADERSHIP FOUNDATIONS
F, S 1-6 cr. IND may be repeated
- Provides students with the opportunity to develop leadership skills by examining individual and organizational leadership effectiveness through case studies and experiential learning on campus in the community and nationally. Introductory course for students interested in pursuing the MSU Leadership Fellows Certificate.

UC 292 INDEPENDENT STUDY
On Demand
PREREQUISITE: Consent of instructor and approval of Director.
Description: Directed research and study on an individual basis.

UC 298 INTERNSHIP
On Demand 1 - 6 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

UC 302 LEADERSHIP CAPSTONE
F, S 1 cr. SEM 1
PREREQUISITE: UC 292, Junior standing, and permission of instructor.
- Capstone course for students completing the requirements of the MSU Leadership Fellows Certificate. Emphasizes leadership development to empower students to become effective agents of change.

UC 498 INTERNSHIP
On Demand 1 - 6 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

UH
University Honors

UH 201 US TEXTS AND CRITICS: KNOWLEDGE
F 4 cr. SEM 4
PREREQUISITE: Restricted entrance; admission to the University Honors Program.
- University Seminar in critical reading/analysis of fundamental texts in the humanities, arts, communication, social studies, science, and history of ideas. Socratic teaching methodology. Particular emphasis on development of analysis and criticism through argument, writing, and oral communication. Academic writing and oral argumentation presentations.

UH 202 TEXTS AND CRITICS: IMAGINATION
S 4 cr. SEM 4
PREREQUISITE: Restricted entrance; admission to the University Honors Program.
- Critical reading/analysis of fundamental texts in the humanities, arts, communication, social studies, science, and history of ideas. Socratic teaching methodology. Particular emphasis on development of analysis and criticism through argument, writing, and oral communication. Academic writing and oral argumentation presentations. Honors students completing this course are exempt from the IH requirements in the core.

UH 204 GREAT EXPEDITIONS
On Demand 3 cr. SEM 3 Maximum credits unlimited.
PREREQUISITE: Consent of instructor.
- Preparation and execution of an expedition paralleling a portion of a historically and/or culturally significant expedition. Students study the original expedition journals, history, social, scientific, artistic, and environmental context as well as plan their own expedition. The expedition occurs over a vacation break and students are required to make a public presentation on the expedition and their specific research project during the subsequent semester.

UH 210 MENTORING GIFTED STUDENTS
F, S 2 cr. SEM 2 Maximum 4 cr.
PREREQUISITE: Admission to the University Honors Program.
- University Honors Program students mentor gifted students from the Bozeman Public Schools. Students meet together in seminar discussion, plan and implement projects, and evaluate their projects.

UH 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND may be repeated
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

UH 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.
UH 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of Director.
- Directed research and study on an individual basis.

UH 301 TEXTS AND CRITICS II
F S 4 cr. SEM 4
PREREQUISITE: Restricted entrance; admission to the University Honors Program.
- Critical reading/analysis of fundamental texts in the humanities, arts, communication, social studies, science, and history of ideas. Socratic teaching methodology. Particular emphasis on development of analysis and criticism through argument, writing, and oral communication. Academic writing and oral argumentation presentations.

UH 401RA HONORS RESEARCH SEMINAR IN THE ARTS
On Demand 2 - 4 cr. SEM Maximum credits unlimited.
PREREQUISITE: UH 201 and UH 202.
- Advanced Honors seminars are interdisciplinary courses which emphasize class discussion, development of analytic thinking and writing skills, and require independent creativity/research.

UH 402RH HONORS RESEARCH SEMINAR IN THE HUMANITIES
On Demand 2 - 4 cr. SEM Maximum credits unlimited.
PREREQUISITE: UH 201 and UH 202.
- Advanced Honors seminars are interdisciplinary courses which emphasize class discussion, development of analytic thinking and writing skills, and require independent creativity/research.

UH 491 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

UH 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 12 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of Director.
- Directed research and study on an individual basis.

UH 494 HONORS SEMINAR
On Demand 2 - 4 cr. SEM Maximum credits unlimited.
PREREQUISITE: UH 201 and UH 202.
- Advanced Honors seminars are interdisciplinary courses which emphasize class discussion, development of analytic thinking and writing skills, and encourage independent creativity/research.

US
University Studies

US 101US FIRST-YEAR SEMINAR
F S 5 cr. SEM
PREREQUISITE: First year students (less than 30 credits) only.
- This multi-disciplinary course, presented in seminar format, draws from the disciplines of psychology, sociology, history, and philosophy and encourages students to explore ethical questions and the role of education in their lives. The course emphasizes verbal communication, academic writing and research, critical thinking and intellectual development. Fulfills university seminar requirement of the core curriculum. This course cannot be repeated.

US 102 CAREER CONNECTIONS
On Demand 1 cr. SEM 1
- Course is designed to assist students in the selection of a major in accordance with their interests and abilities.

US 121US EDUCATION, SOCIAL ISSUES, AND THE DIGITAL AGE
F, S Su 3 cr. SEM
PREREQUISITE: Successful completion of at least 12 credits, including WRIT 101W or its equivalent.
- This multi-disciplinary course, delivered in an online seminar format, draws from psychology, sociology, history, and philosophy and asks students to consider the role of education in their lives and the social responsibilities of educated, engaged individuals living in the digital age. The course emphasizes critical thinking, communication and support of ideas, and intellectual development. US 121US fulfills the university seminar requirement of the core curriculum. This course cannot be repeated.

US 191 SPECIAL TOPICS
On Demand 1 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

US 210 EDUCATION, WORLD OF WORK, AND YOU
F, S 5 cr. LEC 1 RCT 2
PREREQUISITE: Sophomore standing or consent of instructor.
- Provides students who are unsure of a major/career path, or those who want to make the most of their undergraduate education, with knowledge and skills to prepare themselves for the "world of work".

US 290R UNDERGRADUATE RESEARCH
F S 6 cr. IND May be repeated.
- Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

US 291 SPECIAL TOPICS
On Demand 1 - 3 cr.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

US 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of the Director of University Studies.
- Directed study on an individual basis.

US 460 PEER LEADERSHIP
F S 6 cr. LEC 1 RCT 2 Maximum 6 cr.
PREREQUISITE: Accepted Peer Leader Status, Restricted Entry.
- Provides selected upper division students an opportunity to develop leadership and mentoring skills through the involvement with the US 101US First-Year Seminar course. Includes training in group leadership and includes topics such as counseling and communication skills, student development, problem solving, and conflict resolution. Peer leaders work closely with faculty to enhance the academic, cultural, and social experiences of students in the seminar course.

US 490R UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F, S, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

US 491 SPECIAL TOPICS
On Demand 1 - 3 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

US 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of the Director of University Studies.
- Directed study on an individual basis.

US 494 ADVOCAT SEMINAR
F S 1 cr. SEM 1
PREREQUISITE: Sophomore standing and consent of instructor.
- As student ambassadors on campus, Advocats are trained to market the programs and activities at MSU to prospective students and their families.
US 498 INTERNSHIP
On Demand 1 - 12 cr. IND
PREREQUISITE: junior standing, consent of instructor, and approval of the Director of University Studies.
- An individual assignment arranged with an agency, business, or other organization to provide guided experience in the field.

USP Undergraduate Scholars Program

USP 290R UNDERGRADUATE SCHOLARS PROGRAM
On Demand 1 - 4 cr. IND
PREREQUISITE: 1st or 2nd year student and consent of collaborating faculty member.
- First and second year students in this course will conduct research in collaboration with a faculty member which may culminate in a research paper, journal article, or an oral presentation. Course will address responsible conduct of research.

USP 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Maximum 12 cr.
- Improvement and rehabilitation of habitats used by wildlife and free-ranging livestock in the western United States. Topics include methods used to improve wildlife habitat as well as livestock forage. Design criteria for stock ponds, off-site water development, construction of bird/small mammal guzzlers, use of prescribed fire, mechanical, chemical and biological techniques to rehabilitate and improve wildlife and livestock habitats.

USP 491 SPECIAL TOPICS
On Demand 1 - 3 cr. IND May be repeated. Maximum 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

USP 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND
PREREQUISITE: approval of intern program by instructor and the department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

USP 498 INTERNSHIP
On Demand 1 - 4 cr. IND
PREREQUISITE: Approval of intern program by instructor and the department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

WILD Fish and Wildlife Science & Management
formerly ARNR and F&WIL

WILD 201 INTRODUCTION TO FISH & WILDLIFE
F 1 cr. SEM 1
- An introduction to the career opportunities and current issues associated with management of fisheries and wildlife. For Fish and Wildlife Majors or those interested in the profession.

WILD 290R UNDERGRADUATE RESEARCH
F, S 1-6 cr. IND May be repeated.
- Directed undergraduate research/creative activity which may culminate in a written work or other creative project. Course will address responsible conduct of research.

WILD 291 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

WILD 292 INDEPENDENT STUDY
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

WILD 301 PRINCIPLES OF FISH & WILDLIFE MANAGEMENT
S 3 cr. LEC 3
PREREQUISITE: BIOL 160 and BIOL 170.
- Overview of history and ecological principles underlying fish and wildlife management. In-depth discussion of current issues.

WILD 325 WILDLIFE-LIVESTOCK NUTRITION
S
PREREQUISITE: ANSC 100 and NRSM 101 and NRSM 102.
- Nutrition of free ranging ungulates including deer, elk, antelope, bison, sheep, cattle and feral horses. Topics will include digestive systems, intake, food habits, feeding behavior and management.

WILD 555 WILDLIFE/LVSTCK HABITAT RESTOR
F
PREREQUISITE: NRSM 101 or ENSC 110 or F&WIL 301, and BIOL 290, and NRSM 240 or BIOE 370.
- Improvement and rehabilitation of habitats used by wildlife and free-ranging livestock in the western United States. Topics include methods used to improve wildlife habitat as well as livestock forage. Design criteria for stock ponds, off-site water development, construction of bird/small mammal guzzlers, use of prescribed fire, mechanical, chemical and biological techniques to rehabilitate and improve wildlife and livestock habitats.

WILD 573 WILDLIFE TECHNIQUES
On Demand 3 cr. LEC 1 LAB 2
PREREQUISITE: junior standing and minimum 3.0 GPA or consent of instructor.
- The goal of this class is to introduce students to a suite of techniques routinely employed by natural resource professionals for gaining knowledge of the ecology and status of wildlife populations.

WILD 401 FISH & WILDLIFE TOPICS
S 2 cr. LEC 1 LAB 1
PREREQUISITE: WILD 301.
- Senior capstone course. Course emphasizes solving problems related to management of fish and wildlife. Students will be introduced to field techniques, analysis approaches, and scientific literature used to develop management plans for terrestrial and aquatic vertebrates. For Fish and Wildlife Majors.

WILD 426 WILDLIFE HABITAT MANAGEMENT
S
PREREQUISITE: NRSM 240 or BIOE 370 or consent of instructor.
- Emphasis is placed on wildlife habitat management in coordination with other land uses (i.e. agriculture, recreation, and development). Students gain insight into the details of wildlife habitat management by delving into the historical and current literature on the subject. Real world issues and solutions based on case study examples are emphasized.

WILD 429 YELLOWSTONE WILDLIFE HABITAT ECOLOGY
Su
PREREQUISITE: junior standing and a Biology course or consent of instructor.
- This course will describe the native communities of the internationally prominent northern Yellowstone winter range for wild ungulates. The ecology of many organisms, both plant and animal will be studied. Plant identification skills will be incorporated with an emphasis on the recognition of the Yellowstone northern range's flora and its importance as wildlife habitat. Ecosystem interrelationships will form the basis for understanding the ecology of the range and interpreting the consequences of management alternatives.

WILD 438 WILDLIFE HABITAT ECOLOGY
S
PREREQUISITE: NRSM 240 or BIOE 370 or consent of instructor.
- Principles of habitat importance and management. Habitat requirements within wildlife population constraints will be emphasized with consideration of other natural resource demands.

WILD 490R UNDERGRADUATE RESEARCH
F, S, Su 1 - 6 cr. IND May be repeated. Maximum 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

WILD 491 SPECIAL TOPICS
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
- Courses not required in any curriculum for which there is a particular one-time need, or given on a trial basis to determine acceptability and demand.

WILD 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
- Directed research and study on an individual basis.

WILD 498 INTERNSHIP
On Demand 1 - 4 cr. IND
PREREQUISITE: Approval of intern program by instructor and the department head.
- An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

WILD 501 APPLIED POPULATION ECOLOGY
S 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOE 370 or WILD 301.
- An in-depth review of the (1) key theories of population ecology, (2) the application of theory in contemporary population management, and (3) managing populations in the face of uncertainty.

WILD 502 ANALYSIS OF POPULATION & HABITAT DATA
Offered in alternate fall semesters in odd numbered years 3 cr. LEC 2 LAB 1
PREREQUISITE: Completion of, or concurrent enrollment in a five-hundred level statistics course.
- Study of the theory and methods of sampling and analyzing population data for vertebrates. Estimation of population size, survival, and recruitment using competing models that relate population states and rates to habitat conditions and other covariates of interest. Computer lab.

WILD 504 WILDLIFE-HABITAT RELATIONSHIPS
Offered in alternate spring semesters in even numbered years 3 cr. LEC 2 LAB 1
PREREQUISITE: Completion of, or concurrent enrollment in a five-hundred level statistics course.
- This course will help students develop a conceptual and practical understanding of wildlife-habitat relationships and the use, application, and limitations of the analytical tools used to analyze these data. Course will be a blend of discussion and lecture; students will be responsible for written assignments based on readings and data sets.
COURSE DESCRIPTIONS: WILD, WLDG

WILD 510 FISHERIES SCIENCE
Offered in alternate spring semesters in even numbered years 3 cr. LEC 2 LAB 1.
PREREQUISITE: BIOO 413, WILD 301.
-An in depth review of fisheries data types and the analysis and interpretation of those data as it relates to freshwater fisheries research and management.

WILD 513 FISHERIES HABITAT MANAGEMENT
F alternate years, to be offered even years 5 cr. LEC 3.
PREREQUISITE: Graduate standing or consent of instructor.
- Techniques of protection, and restoration of stream, lake and reservoir; habitats for management of fishes and other aquatic organisms.

WILD 525 HUMAN DIMENSIONS OF FISHERIES AND WILDLIFE MANAGEMENT
S, alternate years, to be offered even years 3 cr.
LEC 3
PREREQUISITE: Graduate standing.
- This course provides fisheries and wildlife management graduate students with an understanding of how social, cultural, behavioral, and demographic characteristics of humans affect fisheries and wildlife management.

WILD 548 RESEARCH PERSPECTIVES
S 2 cr. LEC 2
PREREQUISITE: Graduate standing or consent of instructor.
- An introduction to the philosophical underpinnings of resource science and management, with the goal of helping students to develop their own ideological perspective. A broad array of interdisciplinary readings is used to survey philosophical worldviews and explore their influence on science.

WILD 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, S, Su 1-4 cr. IND Maximum 4 cr.
Graduate standing and committee approval and consent of instructor.
- A research or professional paper or project dealing with a topic in the field. The topic must be mutually agreed upon by the student and his or her major advisor and graduation committee.

WILD 591 SPECIAL TOPICS
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
- Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

WLDG
Welding Technology

WLDG 104 TECHNICAL MATHEMATICS
S 5 cr.
LEC 5
-This course presents basic mathematical topics as they are applied in a trades program. Topics covered include: use of measuring tools, measurement systems, dimensional arithmetic, percent, proportion, applied geometry, basic trigonometry. This course is intended for CAS and AAS degree seeking students and does NOT provide sufficient Pre-Algebra material to serve as a prerequisite for students wanting to take AA or AS level mathematics.

WLDG 109 WELDING TECHNOLOGY I
F 2 cr.
-This course covers welding safety, oxy-fuel and shielded metal arc welding (SMAW), definitions covering joining common metals, joint and weld classifications, welding positions, power source selection, plus manual and semiautomatic cutting principles, and terminology.

WLDG 110 WELDING THEORY I
F 3 cr.
Corequisite: WLDG 110
-This course covers welding safety, oxy-fuel and shielded metal arc welding (SMAW), definitions covering joining common metals, joint and weld classifications, welding positions, power source selection, plus manual and semiautomatic cutting principles, and terminology.

WLDG 111 WELDING THEORY I PRACTICAL
F 3 cr.
Corequisite: WLDG 110
-Oxy-fuel practical work will involve fusion welding, brazing, and cutting. Shielded metal arc welding (SMAW) practical work will involve flat and horizontal welding skills using a variety of electrodes.

WLDG 117 BLUEPRINT READING & WELDING SYMBOLS
WLDG 120 WELDING THEORY II S 1 cr.
Prerequisites: WLDG 110, WLDG 111, WLDG 121
Corequisites: WLDG 122
-This course will concentrate on the processes which use inert and/or inert and active gas mixtures for shielding during welding. Gas metal arc welding (GMAW) or MIG, gas tungsten arc welding (GTAW) or TIG, and plasma welding and cutting (PAC/PAG) operations will be thoroughly covered. Process selection and use for welding ferrous and nonferrous metals will be covered.

WLDG 121 WELDING THEORY II PRACTICAL
F 3 cr.
Corequisites: WLDG 110, WLDG 111
-Practical work involves the application of GMAW and GTAW as it is used in industry today. Use of the various modes of metal transfer, joint styles, welding positions, welding of carbon and stainless steels, and aluminum alloys on various joint styles and in various welding positions, and manipulation techniques will be emphasized.

WLDG 122 WELDING THEORY III PRACTICAL
S 3 cr.
Prerequisites: WLDG 110, WLDG 111, WLDG 121
Corequisites: WLDG 120
-This course continues skill development from WLDG 121. Practical work involves the application of GMAW and GTAW as it is used in industry today. Use of the various modes of metal transfer, joint styles, welding positions, welding of carbon and stainless steels, and aluminum alloys on various joint styles and in various welding positions, and manipulation techniques will be emphasized.

WLDG 130 INTRODUCTION TO STRUCTURAL WELDING
S 3 cr.
Prerequisites: WLDG 110, WLDG 111, WLDG 121, WLDG 205
Corequisites: WLDG 120, WLDG 122
-This course covers Gas Metal Arc Welding (GMAW), Shielded Metal Arc Welding (SMAW), and Flux Core Arc Welding (FCAW) of structural steel and stresses certification code welding on plate and structural steel in all positions. Course instruction and related information will include gas metal and flux core arc welding equipment and welding variables, shielding gases, troubleshooting equipment and weld defects, welder certification and welding codes.

WLDG 141 WELDING SHEET METAL
F 1 cr.
Corequisites: TB 121, TB 122, TB 123
-Covers the basic methods and techniques used when Metal Inert Gas (MIG) welding sheet metal. This class focuses on the thinner gauge metals used on today’s automobiles.

WLDG 145 FABRICATION BASICS
S 5 cr.
Prerequisites: WLDG 110, WLDG 111, WLDG 121, WLDG 205
Corequisites: WLDG 120, WLDG 122
-The introduction to basic fabrication of structural steel in accordance with industry standards.

WLDG 185 FABRICATION BASICS
S 2 cr.
Prerequisites: WLDG 110, WLDG 111, WLDG 121, WLDG 205
Corequisites: WLDG 120, WLDG 122
-This is an advanced course in Gas Metal Arc Welding (GMAW), Shielded Metal Arc Welding (SMAW), and Flux Core Arc Welding (FCAW) procedures to prepare for industrial certification. This includes welding single vee groove weld but joints with backing strips in the flat, horizontal, vertical, and overhead position following the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME) code specifications.

WLDG 194 PCE TOPIC
Credits vary (sufficient demand)
-Credit-bearing professional and continuing education (PCE) courses offered to provide condensed coursework to meet the needs of working students and professionals. These courses are eligible for Continuing Education Units (CEU’s) and OPI Renewal Units and are transcripted on the student’s continuing education transcript.
WLDG 205 APPLIED METALLURGY
F 2 cr.
- This course covers basic metallurgical principles and their relationship to the following processes: welding, machining, forming, heat treating, and finishing of ferrous and nonferrous metals. Includes applied metallurgy lab testing exercises.

WRIT English - Writing
formerly part of ENGL

WRIT 080 BUILDING BASIC WRITING SKILLS
F 4 cr. LEC 4
- Building Basic Writing Skills introduces students to critical reading practices by focusing on textual analysis of non-fiction works and to writing for academic purposes by focusing on the development of the paragraph. The course also provides, in the context of writing, a review and reinforcement of principles of English grammar and punctuation associated with successful college-level writing. The goal of this course is to develop confidence and the ability to write clear and effective paragraphs and to read college-level texts. Offered by Gallatin College Programs.

WRIT 095 DEVELOPMENTAL WRITING
F, S 4 cr. LEC 4
- Developmental Writing introduces students to critical reading practices within thematic non-fiction, fosters students' critical thinking based on textual analysis, and encourages questioning and exploration. Composing paragraphs and short essays provides a review and reinforcement of principles of English grammar and punctuation associated with successful college-level writing. Confidence and ability to write clear and effective sentences are assumed. Offered by Gallatin College Programs.

WRIT 101W COLLEGE WRITING I
F, S, Su 3 cr. RCT 3
- Studies in the discovery and written expression of ideas, stressing organization, support, audience awareness, clarity, and persuasive presentation. Taught around a particular topic or theme varying with each offering.

WRIT 104 WORKPLACE COMMUNICATIONS
F 2 cr.
- This course reviews the basic elements of grammar and language arts skills in business writing. Emphasis is placed on writing business letters, memos, emails, and reports for a variety of business applications as well as giving oral presentations. Letters of application and resumes are also covered.

WRIT 122 INTRO TO BUSINESS WRITING
S 3 cr.
- Introduces students to important types and strategies of business writing and provides opportunities to apply those types and strategies. This course provides instruction in the preparation of business memos, letters, reports, oral presentations, and computer-assisted writing in business contexts.

WRIT 201 COLLEGE WRITING II
F, S 3 cr. RCT 3
PREREQUISITE: WRIT 101W.
- Study and practice of strategies and devices of expository and argumentative prose. Builds upon writing skills learned in WRIT 101.

WRIT 205 INTRODUCTION TO WRITING STUDIES
F 3 cr. SEM 3
PREREQUISITE: WRIT 101 or equivalent.
- Overviews the Writing Option and the field of Writing Studies, its areas and methods of inquiry, and questions and issues of interest to writers an writing researchers and theorists from historical, cultural, social and psychological perspectives.

WRIT 221 INTERMEDIATE TECH WRITING
F, S 5 cr. RCT 3
PREREQUISITE: WRIT 101W.
- Focuses on kinds of writing done in technical or business environments: business letters, proposals, formal reports, technical presentations, user manuals, etc. Prepares students for technical writing in a range of disciplines and with attention to the social implications of technology.

WRIT 292 INDEPENDENT STUDY
On Demand 1 - 3 cr. END Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
- Directed research and study on an individual basis.

WRIT 326 ADVANCED COMPOSITION
F 3 cr. RCT 3
PREREQUISITE: WRIT 201 or WRIT 221.
- Advanced composition with attention to research writing, academic standards of evidence, logic, and development of style.

WRIT 328 CREATIVE WRITING
F, S 3 cr. RCT 3
PREREQUISITE: WRIT 101 and junior standing and consent of instructor.
- Beginning exploration, through workshops, discussions, and readings, of creative writing techniques in genres that might include fiction, poetry, play writing, autobiographical writing, or creative nonfiction.

WRIT 371 DIGITAL RHEtorics AND MULTIMODAL WRITING
F alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: Junior standing or consent of instructor.
- Covers topics concerned with rhetoric and writing in digital environments. Students will study theories, principles, and techniques of writing in blended modes and alternative (usually electronic) genres, e.g., web writing and other digital formats that integrate alphabetic-print, image, and audio texts.

WRIT 372 SCIENCE WRITING
S alternate years, to be offered even years 3 cr. RCT 3
PREREQUISITE: WRIT 101 and one IS, RS, RN, or CS Core course; and by enrollment in the English major or Writing minor; or by consent of the instructor.
- Study of science journalism and nonfiction that reports scientific research to non-specialist audiences. Students will study research, reporting, and narrative writing techniques and consider ethical challenges and industry practices in professional science writing.

WRIT 373 NEWS & PUBLIC RELATIONS WRITING
S 3 cr. RCT 3
PREREQUISITE: WRIT 101 and enrollment in English major or Writing minor, or consent of instructor.
- Familiarizes students with the professional news and public relations writing environment. In writing breaking and feature news stories and press releases, students will master processes by which written information is disseminated to the public, both through news media and government and corporate public information operations.

WRIT 428 ADVANCED CREATIVE WRITING
S, F 3 cr. RCT 3. Maximum 6 cr.
PREREQUISITE: WRIT 328 and consent of instructor.
- Continuing exploration of creative writing in which experienced writers act as an audience for each other through workshops, discussions, and readings. Emphasis on techniques in a particular genre, such as fiction, poetry, play writing, autobiographical writing, or creative nonfiction.

WRIT 429 PROFESSIONAL WRITING
S alternate years, to be offered odd years 3 cr. RCT 3
PREREQUISITE: WRIT 201 or WRIT 221.
- Intended for students who already have considerable skill and experience in expository writing. Focuses on professional writing designed to be read by the general public or a specialized audience.

WRIT 490R UNDERGRADUATE RESEARCH
F, S, Su 1-6 cr. END May be repeated. Max 12 cr.
- Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research.

WRIT 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. END Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of department chair.
- Directed research and study on an individual basis. May not be used in lieu of another required course in the English curriculum.

WRIT 494 SEMINAR: WRITING RESEARCH & PUBLICATIONS
F 3 cr. SEM 3
PREREQUISITE: Senior standing and consent of instructor.
- Senior capstone course for writing majors. Integration and assessment of students’ cumulative experiences as English writing majors. Offered alternately as Research in Writing and Rhetoric, emphasizing expository writing and scholarly practice; Critique and Publication, emphasizing creative writing. Restricted entry.

WRIT 498 INTERNSHIP
On Demand 1 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor and approval of department chair.
- An individual assignment arranged with an agency, business or other organization to provide guided experience in the field.

COURSE DESCRIPTIONS: WRIT
WS
Women’s Studies

WS 201H INTRODUCTION TO FEMINIST THEORIES AND METHODOLOGIES
F 3 cr. LEC 3
Major directions in feminist scholarship. Examination of the various schools of thought which have addressed gender inequities, and review of the strategies of cultural criticism which incorporate gender.

WS 290R UNDERGRADUATE RESEARCH
F S 1-6 cr. IND may be repeated
Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research.

WS 301RH INTEGRATIVE SEMINAR IN WOMEN’S STUDIES
S 3 cr. SEM 3 Maximum 9 cr.
The seminar builds on the theoretical issues in women’s studies and addresses special topics each year from a variety of disciplines.

WS 492 INDEPENDENT STUDY
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of the Director of University Studies.
Directed study on an individual basis.
Academic Faculty
The following alphabetized list contains the titles and degrees of the faculty in MSU’s academic colleges.

AAMOT, KIRK
Associate Professor, Music
M.A. University of Colorado-Boulder 2001
M.A. University of Minnesota 1996
B.A. St Olaf College 1992

ABDELRAHMAN, ABDUL
Adjunct Associate Professor, Arabic
Ph.D. Univ of Texas-Austin 1999
M.A. Indiana University 1983
B.A. Tanta University 1979

ACTON, LOREN W
Research Professor, Physics
Ph.D. University of Colorado-Boulder 1965
B.S. Montana State Univ-Bozeman 1959

ADAMS, DEAN S
Assistant Professor, Art
M.F.A. Univ of Iowa, 1995
M.A. Univ of Iowa, 1994
B.A. Montana State Univ-Bozeman 1992

ADAMS, EDWARD E
Professor, Civil Engineering
Ph.D. Montana State Univ-Bozeman 1987
M.S. Montana State Univ-Bozeman 1982
B.S. Montana State Univ-Bozeman 1979
B.A. Mount Saint Mary's College 1972

ADAMS, ERIC K
Assistant Professor, Civil Engineering
Ph.D. Montana State Univ-Bozeman 1987
M.S. Montana State Univ-Bozeman 1982
B.S. Montana State Univ-Bozeman 1979
B.A. Montana State Univ-Bozeman 1992

ADAMS, ROBERT
Professor, Business
M.S. Montana State Univ-Bozeman 1987
B.S. Montana State Univ-Bozeman 1982
B.A. Montana State Univ-Bozeman 1979
B.A. Mount Saint Mary's College 1972

AIG, DENNIS
Professor, Film
Ph.D. Cornell University 2007
M.A. Cornell University 2000
B.A. Wesleyan University 1991

ALI, AHMED
Associate Professor, Civil Engineering
Ph.D. Queens University 1990
M.S. University of Baghdad 1985
B.S. University of Baghdad 1982

ALLEN, THOMAS LEE
Assistant Professor, Extension Agents
B.S. Montana State Univ-Bozeman 1988
BABCOCK, ALEX M  
Professor, Psychology  
Ph.D. Colorado State University 1985  
M.A. Colorado State University 1982  
B.S. Colorado State University 1981

BABCOCK, TRACY C  
Adjunct Instructor, Psychology  
M.S.N. University of South Alabama 1989  
B.S.N. University of South Alabama 1988

BAH, CHRISTIAN S  
Adjunct Professor, Chemistry & Biochemistry  
Ph.D. Colorado School of Mines 1996  
B.S. United States Naval Academy 1987

BAILEY, SANDRA KO  
Professor, Health and Human Development  
Ph.D. Oregon State University 1996  
M.S. Montana State Univ-Bozeman 1993  
B.S. Montana State Univ-Bozeman 1988

BAJARIAN, KYLE  
Adjunct Instructor, Photography  
M.F.A. Arizona State University 1997  
M.S. Boston University 1987  
B.A. University of Vermont 1982

BAKER, LARRY J  
Adjunct Associate Professor, Education  
Ed.D. Montana State Univ-Bozeman 1990  
M.Ed. Montana State Univ-Bozeman 1982  
B.A. University of Virginia 1967

BALES, RONDA L  
Adjunct Assistant Professor, Nursing  
M.S.N. Montana State Univ-Bozeman 2000  
B.S. Montana State Univ-Bozeman 1996

BANCROFT, JERRY A  
Professor Emeritus of Architecture  
M.Arch. University of Washington 1971  
B.Arch. Univ of Southern California 1968

BANDYOPADHYAY, PRASANTA S  
Professor, Philosophy  
Ph.D. University of Rochester 1995  
M.A. University of Rochester 1990  
M.A. Jadavpur University 1981  
B.A. University of Calcutta 1979

BANFIELD, JEFFREY D  
Associate Professor, Statistics  
Ph.D. University of Washington 1987  
M.S. Univ of Arkansas-Little Rock 1982  
B.S. Colorado State University 1979

BANGER, ARTHUR WILLIAM  
Associate Professor, Education  
Ed.D. University of South Dakota 1995  
Ed.S. University of Nebraska-Kearney 1991  
M.S. Youngstown State University 1979

BANTA, CHRISTINE M “SHELLY”  
Adjunct Assistant Professor, Nursing  
M.S.N. University of Pennsylvania 1997  
B.S.N. University of Scranton 1987

BARGE, MARCY M  
Professor, Mathematics  
Ph.D. University of Colorado-Boulder 1980  
M.A. Arizona State University 1974  
B.A. Fort Lewis College 1972

BARTHEL, JOHN CAMPBELL  
Assistant Professor, Extension  
M.S.Ed. Virginia Polytechnic Institute 2004  
B.B.A. Roanoke College 1996

BARTHOLOMEW, DOUGLAS  
Professor, Music  
Ph.D. Case Western Reserve Univ 1985  
M.A. Ball State University 1976  
B.M.Ed. University of North Texas 1972

BAUDER, JAMES W  
Professor Emeritus, Land Resources & Environmental Sciences  
Ph.D. Utah State University 1974  
M.S. U of Massachusetts-Amherst 1971  
B.S. U of Massachusetts-Amherst 1969

BAUMBAUER, DAVID A  
Adjunct Assistant Professor, Plant Sciences & Plant Pathology  
M.S. University of Montana 1985  
B.S. Purdue University 1982

BEAMISH, ROLLIN  
Assistant Professor, School of Art  
M.F.A. Ohio University 2004  
B.F.A. Cleveland Institute of Art 2000

BECKER, JAMES P  
Associate Professor, Electrical & Computer Engineering  
Ph.D. Univ of Michigan-Ann Arbor 2001  
M.S. Colorado State University 1995  
B.S. U of Illinois at Urbana-Champaign 1991

BEEHLER, MICHAEL T  
Professor Emeritus, English  
Ph.D. Univ of California-Los Angeles 1978  
M.A. Univ of California-Los Angeles 1974  
B.A. Univ of California-Irvine 1972

BEEHLER, SHARON A  
Professor Emeritus, English  
Ph.D. Univ of California-Los Angeles 1978  
M.A. Univ of California-Los Angeles 1974  
B.A. Univ of California-Irvine 1972

BECKMAN, ANTON  
Assistant Professor, Agricultural Economics & Economics  
Ph.D. North Carolina St Univ-Raleigh 2009  
M.S. North Carolina St Univ-Raleigh 2007  
B.A. Loyola College 2005

BELASCO, ERIC J  
Assistant Professor, Agricultural Economics & Economics  
Ph.D. North Carolina St Univ-Raleigh 2007  
M.S. North Carolina St Univ-Raleigh 2005  
B.S. Saint Mary's College 2001

BENHAM, HARRY CUNNINGHAM  
Assoc Professor, Management & Intern Assoc Dean, Business  
Ph.D. Univ of California-Berkeley 1978  
B.A. Univ of California-Berkeley 1970

BENNETT, ROBERT  
Associate Professor, English  
Ph.D. U of California-Santa Barbara 2001  
M.A. Brigham Young University 1994  
B.A. Brigham Young University 1991

BERARDINELLI, JAMES G  
Professor, Animal Science  
Ph.D. West Virginia University 1979  
M.S. West Virginia University 1976  
B.S. University of Connecticut 1973

BERKRAM, GEORGE  
Adjunct Assistant Professor, Nursing  
Ed.D. University of Montana 1998  
M.N. Montana State Univ-Bozeman 1990  
B.S.N. Montana State Univ-Bozeman 1975  
B.S. Montana State Univ-Bozeman 1973

BERREY, MICHAEL PATRICK  
Assistant Professor, Civil Engineering  
Ph.D. University of Washington 2006  
M.S. University of Washington 2003  
B.A. Carroll College 2009

BIRKELAND, KARLE W  
Adjunct Assistant Professor, Snow Science  
Ph.D. Arizona State University 1997  
M.S. Montana State Univ-Bozeman 1990  
B.A. University of Colorado-Boulder 1986

BISHOP, DOUGLAS D  
Professor Emeritus, Agricultural Education  
Ph.D. Ohio State University 1969  
M.S. Colorado State University 1962  
B.S. Colorado State University 1955

BISHOP, GARY L  
Adjunct Instructor, Business  
M.S. Embry-Riddle Aeronautical Univ 1988  
B.S. Embry-Riddle Aeronautical Univ 1979

BLACK, LAURA J  
Associate Professor, Business  
M.B.A. Univ of Texas-Austin 1993  
B.A. Univ of Texas-Austin 1983

BLAKE, THOMAS K  
Professor, Plant Sciences & Plant Pathology  
Ph.D. Washington State University 1982  
M.S. South Dakota State University 1979  
B.S. Univ of California-Davis 1976

BLOCH, RICHARD A  
Professor, Psychology  
Ph.D. University of Oregon 1973  
M.A. University of Oregon 1970  
B.A. Univ of Michigan-Ann Arbor 1968

BOLES, JANE ANN  
Associate Professor, Animal Science  
Ph.D. Iowa State University 1990  
M.S. Iowa State University 1987  
B.S. Univ of Missouri-Columbia 1985

BOLTE, JASON  
Assistant Professor, Music  
D.M.A. Univ of Missouri at Kansas City  
M.M. Ball State University 2005  
B.M. Ball State University 1999

BONNAND, SHEILA M  
Assistant Professor, Library  
M.A. University of Arizona 1997  
M.Ed. University of Montana 1986  
B.S. Montana State Univ-Bozeman 1979

BORKOWSKI, JOHN J  
Professor, Statistics  
Ph.D. University of Delaware 1992  
M.A. Rutgers, The State University 1987  
M.A. Pennsylvania State University 1982  
B.A. Rutgers, The State University 1980
BOSS, DARRIN LEWIS  
Assistant Research Professor, Northern Ag Research Center  
Ph.D. Montana State Univ-Bozeman 2008  
M.S. Montana State Univ-Bozeman 1994  
B.S. Ohio State University 1992  
B.S. Ohio State University 1990

BOTHNER, BRIAN  
Associate Professor, Chemistry & Biochemistry  
Ph.D. University of Tennessee 2002  
M.A. Humboldt State University 1991  
B.A. U. of California-Santa Barbara 1984

BOWEN, DAVID WAYNE  
Associate Research Professor, Geology  
M.S. Montana State Univ-Bozeman 1980  
B.S. Hobart William Smith College 1978

BOWERS, KENNETH L  
Professor, Mathematics  
Ph.D. Colorado State University 1982  
M.A. Ball State University 1976  
B.S. Ball State University 1974

BOWERS, SANDRA S  
Adjunct Instructor, Mathematics  
M.A.T. Colorado State University 1982  
B.S. Ball State University 1976

BOWMAN, JANICE G  
Professor, Animal Science  
Ph.D. Univ of Missouri-Columbia 1986  
M.S. Univ of Missouri-Columbia 1979  
B.S. Univ of Missouri-Columbia 1977

BOYD, ERIC STEPHEN  
Assistant Research Professor, Chemistry & Biochemistry  
Ph.D. Montana State Univ-Bozeman 2007  
B.S. Iowa State University 2002

BRADLEY, HEATH LEE  
Adjunct Assistant Professor, Architecture  
M.Arch. Montana State University 2003  
B.A. Montana State University 2002

BRADLEY, MELISSA DIANE  
Director, Bookkeeping Gallatin College Programs  
B.S. Montana State Univ-Bozeman 2009

BRADLEY, ROGER S  
Associate Professor, Cell Biology & Neuroscience  
Ph.D. Cornell University 1995  
M.S. Montana State Univ-Bozeman 1987  
B.A. Carroll College 1984

BRAMLETT, ROBERT GLENN  
Assistant Research Professor, Ecology  
Ph.D. Montana State Univ-Bozeman 1996  
M.S. Colorado State University 1989  
B.S. Utah State University 1983

BRANCH, KIRK MACHugh  
Associate Professor, English  
Ph.D. University of Washington 1997  
M.A. University of Washington 1991  
B.A. Marquette University 1988

BRATTON, VIRGINIA K  
Assistant Professor, Business  
Ph.D. Florida State University 2001  
M.A. Florida State University 2001  
B.A. Concordia College 1995

BRAWNER, DIANE L  
Adjunct Professor, Microbiology  
Ph.D. Montana State Univ-Bozeman 1985  
M.S. University of Washington 1981  
B.S. Montana State Univ-Bozeman 1970

BRESTER, GARY W  
Professor, Agricultural Economics & Economics  
Ph.D. North Carolina St Univ-Raleigh 1990  
M.S. Montana State Univ-Bozeman 1982  
B.S. Montana State Univ-Bozeman 1980

BRETTINGHAM, JOHN C  
Professor, Architecture  
M.Arch. Harvard University 1987  
B.A. Bowdoin College 1979

BRITTON, JENNIFER  
Assistant Professor, Plant Sciences & Plant Pathology  
M.L.A. Univ of Georgia 2006

BRODERICK, JOAN  
Professor, Chemistry & Biochemistry  
Ph.D. Northwestern University 1992  
B.S. Washington State University 1987

BRODERICK, WILLIAM E.  
Adjunct Professor, Chemistry & Biochemistry  
Ph.D. Washington State University 1986  
B.S. Northern Arizona University 1981

BRODY, MICHAEL J  
Associate Professor, Education  
Ph.D. Cornell University 1985  
M.S. University of New Hampshire 1979  
B.S. Boston College 1974

BROESER, JOSEPH T  
Associate Professor, Extension Service  
M.S. University of Nevada-Reno 1989  
B.S. Montana State Univ-Bozeman 1985

BROOKSHIRE, ELAN N  
Asst Professor, Land Resources & Environmental Sciences  
Ph.D. Virginia Tech - Blacksburg 2006  
M.S. Oregon State University 2000  
B.S. Oregon State University 1997

BROWN, FREDERICK WILLIAM  
Professor, Business Management  
Ph.D. George Washington University 1987  
M.B.A. Golden Gate University 1979  
B.A. Louisiana St Univ-Baton Rouge 1970

BROWN, JENNIFER RUTH  
Assistant Professor, Chemical & Biological Engineering  
Ph.D. Montana State Univ-Bozeman 2007  
B.S. Montana State Univ-Bozeman 2001

BROWN, JENNIFER L  
Professor, Microbiology  
Ph.D. Montana State Univ-Bozeman 1985  
M.S. University of Washington 1981  
B.S. Montana State Univ-Bozeman 1970

BRUG, GLENNA R  
Assistant Clinical Professor, Nursing  
B.S. Southern Utah University 1996

BURROWS, CAROL S  
Adjunct Instructor, Family & Consumer Sciences  
M.S. Montana State Univ-Bozeman 1988  
B.S. Montana State Univ-Bozeman 1986

BURROWS, ELIZABETH A  
Associate Professor, Mathematics Education  
Ph.D. University of New Mexico 2003  
M.A. University of New Mexico 1999  
B.A. U of N Carolina - Chapel Hill 1992

BURROWS, MARY EILEEN  
Assistant Professor, Plant Sciences & Plant Pathology  
Ph.D. Univ of Wisconsin-Madison 2003  
B.A. Minnesota State Univ-Moorhead 1997

BUTTLER-NELSON, CHRISTY LYNN  
Adjunct Assistant Professor, Nursing  
M.S.N. Montana State Univ-Bozeman 2007  
B.S.N. Walla Walla University 1982

BYKER, CARMEN J.  
Assistant Professor, Food & Nutrition  
Ph.D. Virginia Tech - Blacksburg 2011  
B.S. Virginia Tech-Blacksburg 2009

CADI, FREDRIK M  
Professor Emeritus, Electrical & Computer Engineering  
Ph.D. University of Canterbury 1980  
B.S. Pennsylvania State University 1966

CAHOON, JOEL E  
Professor, Civil Engineering  
Ph.D. Univ of Arkansas 1987  
M.S. Montana State Univ-Bozeman 1985  
B.S. New Mexico State Univ 1985

CAIRNS, DOUGLAS S  
Professor, Mechanical Engineering  
Ph.D. Massachusetts Inst of Tech 1987  
M.S. California Inst of Technology 1970  
B.S. Pennsylvania State University 1966

CALKIN, JAMES W  
Professor, Agriculture  
Ph.D. Cornell University 1989  
M.S. Montana State Univ-Bozeman 1985  
B.S. New Mexico State Univ 1985

CALLIS, PATRIK R  
Professor, Chemistry & Biochemistry  
Ph.D. University of Washington 1965  
B.S. Oregon State University 1960
CAMERON, CATHERINE C  
Professor, Cell Biology & Neuroscience, Medical Science  
Ph.D. University of Washington 1979  
B.A. Occidental College 1974

CAMPBELL, HENRY C  
Professor Emeritus, Music  
M.M. 1949  
B.M. University of Rochester 1948

CAMPBELL, ROBERT BRUCE  
Associate Professor, History  
Ph.D. Yale University 2003  
M.A. University of Colorado-Boulder 1994  
B.A. Middelbury College 1985

CAMPBELL, STEPHANIE L  
Professor, Theatre  
M.F.A. University of Arizona 1983  
B.A. Univ of Northern Colorado 1970

CAMPER, ANNE K  
Professor, Civil Engineering  
Ph.D. Montana State Univ-Bozeman 1995  
M.S. Montana State Univ-Bozeman 1977  
B.S. Montana State Univ-Bozeman 1975

CANFIELD, RICHARD C  
Research Professor, Physics  
Ph.D. University of Colorado-Boulder 1968  
M.S. Univ of Michigan-Ann Arbor 1961  
B.S. Univ of Michigan-Ann Arbor 1959

CARBON, JOSEPH M  
Professor Emeritus of Plant and Soil Science

CARGILL, KARI L  
Adjunct Professor, Microbiology  
M.S. Montana State Univ-Bozeman 1990  
B.A. Saint Cloud State University 1985

CARMIGNO, JOANNA  
Associate Professor, Education  
Ph.D. University of Colorado-Boulder 1996  
M.A. University of Colorado-Boulder 1990  
B.S. University of Colorado-Boulder 1979

CARLSON, ROSS PETER  
Associate Professor, Chemical & Biological Engineering  
Ph.D. Univ of MN - Minneapolis 2003  
M.S. Univ of MN - Minneapolis 1998  
B.S. Univ of MN - Minneapolis 1996

CARLSTEN, JOHN L  
Professor, Physics  
Ph.D. Harvard University 1974  
M.S. Harvard University 1971  
B.S. Univ of MN - Minneapolis 1969

CARROLL, JESSICA A  
Adjunct Instructor, English  
M.F.A. Univ of Michigan-Ann Arbor 2000  
B.A. Williams College 1996

CARROLL, THOMAS W  
Professor Emeritus of Plant Pathology  
Ph.D. Univ of California-Davis 1965  
M.S. Univ of California-Davis 1962  
B.S. California Polytechnic State Univ-Pomona 1954

CARSON, ROBERT N  
Professor, Education  
Ph.D. U of Illinois at Urbana-Chmpgn 1991  
M.S. U of Illinois at Urbana-Chmpgn 1989  
B.S. U of Illinois at Urbana-Chmpgn 1980

CARTER, JAMES L  
Adjunct Instructor, Health and Human Development  
M.S. Univ of Wisconsin-La Crosse 1980  
B.S. Westfield State College 1979

CARUCCI, LAURENCE M  
Professor, Anthropology  
Ph.D. University of Chicago 1980  
M.A. University of Chicago 1973  
B.A. Colorado State University 1971

CARVELHO, GERARD J  
Adjunct Instructor, Business  
M.B.A. University of Utah 1991  
B.A. University of Utah 1985  
B.S. University of Utah 1985

CASAGRADA, LEROY J  
Assoc. Professor Emeritus of Education

CASH, STEVEN DENNIS  
Professor, Range Science  
Ph.D. Montana State Univ-Bozeman 1982  
M.S. New Mexico State Univ 1978  
B.S. New Mexico State Univ 1977

CATEORA, PATRICIA D  
Associate Professor, Spanish  
Ph.D. University of New Mexico 2004  
M.A. Washington State University 1998  
B.A. University of Idaho 1995

CATON, GARY LYNN  
Associate Professor, Finance  
Ph.D. University of Oklahoma 1996  
B.A. Western State College 1980

CHALENDER, STUART RALPH  
Adjunct Assistant Professor, Geographic Information Science  
M.S.A. Utah State University 1986  
B.A. Utah State University 1985  
B.S. Montana State Univ-Bozeman 1977

CHAMBERLAIN, GLEN ROSS  
Adjunct Instructor, English  
M.F.A. University of Washington 1978  
M.A. University of Wyoming 1974  
B.A. University of Michigan-Flint 1973

CHAVEZ, ELIZABETH R  
Clinical Resource Registered Nurse  
B.S.N. University of Vermont 1980

CHEN, CHENGCI  
Associate Professor, Agronomy, Central Agricultural Research  
Ph.D. Oregon State University 1998  
M.S. Oregon State University 1995  
M.S. Beijing Agricultural Univ 1987  
B.S. Beijing Agricultural Univ 1984

CHERRY, DAVID  
Chair and Professor, History  
Ph.D. University of Ottawa 1985  
M.A. University of Saskatchewan 1981  
B.A. University of Saskatchewan 1979

CHERRY, J. STEVEN  
Associate Professor, Statistics  
Ph.D. Montana State Univ-Bozeman 1994  
M.S. Montana State Univ-Bozeman 1990  
M.S. University of Tennessee 1975  
B.S. North Carolina St Univ-Raleigh 1972

CHRISTENSEN, ANNE  
Professor, Accounting  
Ph.D. University of Utah 1989  
M.B.A. University of Utah 1983  
M.Ed. University of Utah 1974  
B.S. Brigham Young University 1972

CHRISTOPHER, JOHN C  
Professor, Counseling  
Ph.D. Univ of Texas-Austin 1992  
M.Ed. Harvard University 1987  
B.A. Univ of Michigan-Ann Arbor 1984

CHRISTOPHER, SUZANNE E  
Professor, Community Health  
Ph.D. U of N Carolina - Chapel Hill 1995  
M.S. Purdue University 1989  
B.S. Univ of Wisconsin-Stevens Pt 1987

CLARK, DANIEL WEST  
Associate Professor, Extension  
M.S. University of Arizona 1997  
B.S. University of Arizona 1993

CLARK, JASON A  
Associate Professor, Library  
M.L.S. Univ of Wisconsin-Madison 2003  
M.A. University of Vermont 2002  
B.A. Marquette University 1996

CLARKE, ARDYS S  
Professor Emeritus of Education  
Ed.D. Montana State Univ-Bozeman 1985  
M.A. West Virginia University 1968  
B.A. West Virginia Univ Inst Tech 1964

CLAUDIO, DAVID  
Assistant Professor, Mechanical & Industrial Engineering  
Ph.D. Pennsylvania State University 2010  
M.S. Rensselear Polytechnic Inst 2006  
B.S. University of Puerto Rico 2002

CLONINGER, MARY JANE  
Professor, Chemistry & Biochemistry  
Ph.D. Univ of Wisconsin-Madison 1996  
B.S. Texas Christian University 1991

COWD, SARAH  
Associate Professor, Mechanical Engineering  
Ph.D. University of Kent 1996  
B.S. Massey University 1995

COFFEY, JEROME E  
Professor Emeritus of English  
Ph.D. SUNY at Buffalo 1969  
M.A. SUNY at Buffalo 1965  
B.A. Canisius College 1962

COFFIN, ARTHUR  
Professor Emeritus of English  
Ph.D. Univ of Wisconsin-Madison 1965  
M.A. Boston College 1958  
B.A. Univ of New Hampshire 1951

COHENOUR, DAVID WILLIAM  
Director, Welding Program Gallatin College Programs  
B.S. Montana State Univ-Bozeman 1994
<table>
<thead>
<tr>
<th>Name</th>
<th>Degree Details</th>
<th>Current Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLCLOUGH, YOSHIKO YAMASHITA</td>
<td>Associate Professor, Nursing Ph.D. Oregon Health Sciences Univ 2005 M.A.N. Oregon Health Sciences Univ 1994 B.S.N. Washington State University 1992</td>
<td></td>
</tr>
<tr>
<td>COLTON, NANCY J</td>
<td>Assistant Professor, Health Enhancement K-12 M.S. Montana State Univ-Bozeman 1978 B.S. North Central College 1974</td>
<td></td>
</tr>
<tr>
<td>CONE, RUFUS L</td>
<td>Professor, Physics Ph.D. Yale University 1971 M.A. Yale University 1968 B.S. Georgia Institute of Tech 1966</td>
<td></td>
</tr>
<tr>
<td>CONGER, JEFFREY S</td>
<td>Professor, Graphic Design M.F.A. University of Utah 1997 B.A. University of Idaho 1985 B.S. University of Idaho 1985</td>
<td></td>
</tr>
<tr>
<td>COOK, KEVIN ROY</td>
<td>Associate Professor, Mechanical Engineering Technology M.S. Montana State Univ-Bozeman 2003 B.S. Montana State Univ-Bozeman 1984</td>
<td></td>
</tr>
<tr>
<td>COOKSEY, DIANA IRENE</td>
<td>Adjunct Instructor, Land Resources &amp; Environmental Sciences M.S. Montana State Univ-Bozeman 2002 B.S. Colorado State University 1981</td>
<td></td>
</tr>
<tr>
<td>COOKSEY, KEITH E</td>
<td>Research Professor Emeritus, Microbiology Ph.D. University of Birmingham 1959 B.S. University of Birmingham 1956</td>
<td></td>
</tr>
<tr>
<td>COPIE, VALERIE</td>
<td>Professor, Chemistry &amp; Biochemistry Ph.D. Massachusetts Inst of Tech 1990 B.S. Univ of MN - Minneapolis 1983</td>
<td></td>
</tr>
<tr>
<td>CORNSH, NEIL</td>
<td>Professor, Physics Ph.D. University of Toronto 1996 M.A. University of Melbourne 1992 B.S. University of Melbourne 1990</td>
<td></td>
</tr>
<tr>
<td>CORY, JEFFREY M</td>
<td>Adjunct Professor, Medical Science Ph.D. Colorado State University 2003 M.S. Colorado State University 1999 B.A. Stanford University 1995</td>
<td></td>
</tr>
<tr>
<td>COSGRIFF, EVAN PATRICK</td>
<td>Adjunct Instructor, Mechanical Engineering B.S. Montana State Univ-Bozeman 2007</td>
<td></td>
</tr>
<tr>
<td>CRAIG, ALAN</td>
<td>Research Professor, Physics Ph.D. University of Arizona 1984 B.S. Princeton University 1975</td>
<td></td>
</tr>
<tr>
<td>Cramer, Robert A Jr</td>
<td>Assistant Professor, Immunology &amp; Infectious Diseases Ph.D. Colorado State University 2004 M.S. Colorado State University 2001 B.A. Lawrence University 1999</td>
<td></td>
</tr>
<tr>
<td>Creel, Scott R</td>
<td>Professor, Ecology Ph.D. Purdue University 1991 M.S. Purdue University 1986 B.S Bowling Green State University 1983</td>
<td></td>
</tr>
<tr>
<td>Cross, Wyatt F</td>
<td>Assistant Professor, Ecology Ph.D. University of Georgia 2004 M.S. Univ of Alabama-Tuscaloosa 1999 B.A. University of Colorado-Boulder 1994</td>
<td></td>
</tr>
<tr>
<td>Cruzado, Waded</td>
<td>MSU President, Professor-Modern Languages &amp; Literatures Ph.D. Univ of Texas-Arlington 1990 M.A. Univ of Texas-Arlington 1984 B.A. University of Puerto Rico 1982</td>
<td></td>
</tr>
<tr>
<td>Cundy, Vic A</td>
<td>Professor, Mechanical Engineering Ph.D. University of Wyoming 1979 M.S. University of Wyoming 1974 B.S. University of Wyoming 1973</td>
<td></td>
</tr>
<tr>
<td>Cunningham, Alfred B</td>
<td>Professor, Civil Engineering Ph.D. University of Nevada-Reno 1977 M.S. Montana State Univ-Bozeman 1971 B.S. University of Nevada-Reno 1970</td>
<td></td>
</tr>
<tr>
<td>Custer, Stephan G</td>
<td>Associate Professor, Geology Ph.D. University of Montana 1976 M.S. Univ of California-Berkeley 1973 B.A. Lawrence University 1968</td>
<td></td>
</tr>
<tr>
<td>Dahl, rex C</td>
<td>Professor Emeritus of German Ph.D. University of Michigan State University 1971 M.A. Michigan State University 1969 B.A. University of Utah 1966</td>
<td></td>
</tr>
<tr>
<td>Damberger, Kathleen Gail</td>
<td>Adjunct Assistant Professor, Nursing M.S.N. Drexel University 2007 B.S.N. Montana State Univ-Bozeman 1982</td>
<td></td>
</tr>
<tr>
<td>Dana, Susan W</td>
<td>Associate Professor, Business J.D. Stanford University 1989 A.B. Brown University 1985</td>
<td></td>
</tr>
<tr>
<td>Davis, John R</td>
<td>Adjunct Associate Professor, Mechanical Engineering Technology Sc.D. University of New Haven 2003 M.B.A. University of Bridgeport 1993 B.S. Bridgeport Eng Institute 1986</td>
<td></td>
</tr>
<tr>
<td>Davis, Leslie B</td>
<td>Professor Emeritus of Anthropology Ph.D. University of Calgary 1972 M.A. University of Montana 1965 B.A. University of Montana 1959</td>
<td></td>
</tr>
<tr>
<td>Davis, Lisa G</td>
<td>Associate Professor, Mathematics Ph.D. Virginia Polytechnic Institute 1999 M.S. Virginia Polytechnic Institute 1995 B.S. Univ of Virginia-Clinch Valley 1993</td>
<td></td>
</tr>
<tr>
<td>Davis, Nathan Ross</td>
<td>Assistant Professor, Art M.F.A. Calif College of the Arts 2007 B.F.A. Oregon State University 2004</td>
<td></td>
</tr>
<tr>
<td>Davis, Scott E</td>
<td>Associate Professor, Education Ph.D. Texas A&amp;M Univ-College Station 1994 M.S. Montana State Univ-Bozeman 1985 B.A. Montana State Univ-Bozeman 1977</td>
<td></td>
</tr>
<tr>
<td>Deibert, Max C</td>
<td>Professor Emeritus, Chemical &amp; Biological Engineering Sc.D. Massachusetts Inst of Tech 1964 B.S. Cornell University 1960</td>
<td></td>
</tr>
<tr>
<td>Demetriades, Anthony</td>
<td>Professor Emeritus, Mechanical Engineering Ph.D. California Inst of Technology 1958 M.S. Univ of MN - Minneapolis 1953 B.A. Colgate University 1951</td>
<td></td>
</tr>
<tr>
<td>Derwinskl Barbara “Bobbi”</td>
<td>Associate Professor, Nursing M.S.N. University of Pennsylvania 1976 B.S.N. University of Pennsylvania 1970</td>
<td></td>
</tr>
<tr>
<td>Deweese, Joshua</td>
<td>Assistant Professor, Art M.F.A. SUNY Coll of Tech at Alfred 1991 B.F.A. Kansas City Art Institute 1985</td>
<td></td>
</tr>
</tbody>
</table>
DIETRICH, RUDOLF W
Professor Emeritus, Photography
M.S. Montana State Univ 1975
B.S. 1968

DILKIC, MENSUR
Associate Professor, Microbiology
Ph.D. University of Nevada-Reno 1997

DOCKERY, JACK D
Professor, Mathematics
Ph.D. University of Utah 1987
M.S. Montana State Univ-Bozeman 1982
B.S. Montana State Univ-Bozeman 1979

DODD, NANCY G
Associate Professor Emeritus, Business
Ph.D. University of Nebraska-Lincoln 1987
M.A. University of Denver 1973
B.A. U of California-Santa Barbara 1971

DONAHOE, PATRICK M
Director, Counseling & Psych Services; Adjunct Instructor
Ed.D. University of Idaho 1977
M.A. University of Nebraska-Lincoln 1974
M.S. Creighton University 1972
B.A. Creighton University 1970

DONAHUE, TIMOTHY SEAN
Library Faculty, Library
M.S. SUNY at Albany 2005
M.A. St Johns College 1997
B.A. University of Maryland 1990

DORE, JOHN
Assoc Res Professor, Land Resources & Environmental Sciences
Ph.D. University of Hawaii - Manoa 1995
B.S. Univ of California-Berkeley 1987

DOUGHER, TRACY
Associate Professor, Plant Sciences & Plant Pathology
Ph.D. Utah State University 1999
M.S. Purdue University 1994
B.A. Southern Illinois University 1991

DOUGLAS, TREYVOR
Professor, Chemistry & Biochemistry
Ph.D. Cornell University 1991
B.A. Univ of California-San Diego 1986

DOWNEY, JAYNE A
Associate Professor, Education
Ph.D. Univ of Northern Colorado 2002
M.A. Trinity International Univ 1996
B.A. University of Waterloo 1994

DOWNS, DOUGLAS P
Assistant Professor, English
Ph.D. University of Utah 2004
M.A. Emporia State University 1999
B.A. Southeast Missouri State Univ 1999

DRAITZ, EDWARD A
Professor, Chemistry & Biochemistry
Ph.D. Univ of California-Berkeley 1966
B.A. Carleton College 1961

DRENK, DEAN
Associate Professor Emeritus, Finance
B.A. Montana State Univ-Bozeman 1991
Ph.D. Univ of Michigan-Ann Arbor 1974
M.B.A. University of Colorado-Denver 1969
B.S. Univ of Wisconsin-Madison 1967

DROBJIEV, MIKHAIL
Assistant Research Professor, Physics
Ph.D. PN Lebedev Physics Institute 1998
B.S. Moscow Inst of Physics & Tech 1986
M.S. Moscow Inst of Physics & Tech 1986

DRUMHELLER, JOHN E
Professor Emeritus of Physics
Ph.D. University of Colorado-Boulder 1962
M.S. University of Colorado-Boulder 1958
B.S. Washington State University 1953

DUDAS, JOHN G
Adjunct Instructor, Business
M.S. Bentley University 1998

DUFF, GLENN C.
Professor, Animal & Range Sciences
Ph.D. New Mexico State Univ 1991
M.S. University of Arkansas 1988
B.S. Northwest Missouri State Univ 1986

DUNLAP, CATHERINE
Assistant Professor, History
Ph.D. Yale University 2010
M.S. Yale University 2006
M.A. Yale University 2004
A.B. Stanford University 2002

DURHAM, GREGORY ROBERT
Associate Professor, Business
Ph.D. Arizona State University 2002
M.S. Univ of Texas-Austin 1994
B.S. Montana State Univ-Bozeman 1988

DUTKOWSKY, MONIQUE RENEE
Adjunct Instructor, Economics
M.S. Montana State Univ-Bozeman 2009
B.S. Clemson University 2004

DYER, ALAN T
Associate Professor, Plant Sciences & Plant Pathology
Ph.D. Univ of MN - Minneapolis 2002
M.S. Univ of MN - Minneapolis 1999
B.S. Cornell University 1989

DYER, WILLIAM E
Professor, Plant Sciences & Plant Pathology
Ph.D. Purdue University 1988
M.S. Montana State Univ-Bozeman 1983
B.S. Montana State Univ-Bozeman 1981

ECHEVERRI, REBECCA CHLOE
Assistant Clinical Professor, Nursing
M.N. Montana State Univ-Bozeman 2007
B.S.N. Montana State Univ-Bozeman 1992

ECKHOFF, JOYCE L
Professor, Eastern Agricultural Research Center
Ph.D. University of Arizona 1985
M.S. University of Arizona 1982
B.S. University of Delaware 1974

EDENS, MICHAEL Q
Adjunct Associate Professor, Mechanical Engineering
Ph.D. Montana State Univ-Bozeman 1997
M.S. Montana State Univ-Bozeman 1991
M.S. Montana State Univ-Bozeman 1989
B.A. University of Montana 1984

EILERT, ALAN CRAIG
Adjunct Instructor, Business
M.S. Friends University 1996
B.S. Montana State Univ-Bozeman 1976

EIGER, STEVEN M
Associate Professor, Cell Biology & Neuroscience & WWAMI Medical Education Program
Ph.D. Univ of Michigan-Ann Arbor 1984
B.S. University of Miami 1972

EITLE, DAVID J
Associate Professor, Sociology
Ph.D. Indiana University 1996
M.A. Ohio State University 1986
B.A. Ohio State University 1983

EITLE, TAMELA L
Associate Professor, Sociology
Ph.D. Indiana University 1993
B.A. University of Kansas 1990

EKEGREN, LORRAINE M
Adjunct Instructor, Speech Communication
M.Ed. Montana State Univ-Bozeman 1992
B.S. Montana State Univ-Northern 1989
B.S. Montana State Univ-Bozeman 1971

EKEGREN, WOODROW A
Professor Emeritus of Extension
M.S. Montana State Univ-Bozeman 1972
B.S. Montana State Univ-Bozeman 1966

ENDECOTT, RACHEL LOUISE
Assistant Professor, Animal & Range Science
Ph.D. New Mexico State Univ 2006
M.S. New Mexico State Univ 2003
B.S. Montana State Univ-Bozeman 2001

ENGEL, RICHARD E
Assoc Professor, Land Resources & Environmental Sciences
Ph.D. Univ of MN - Minneapolis 1983
M.S. North Dakota State University 1978
B.S. University of Maine-Orono 1975

ENGLAND, JESSICA B
Adjunct Instructor, Nursing
B.S.N. Montana State Univ-Bozeman 2008

ERIKSEN, CHARLES GUNNAR
Visiting Professor, Accounting C.M.A.
Ed.D. Montana State Univ-Bozeman 1990
M.A. Western State College 1978
B.S. Colorado State University 1975

ERICKSON, JOANNE L
Associate Professor, Education
Ed.D. Montana State Univ-Bozeman 1989
M.S. Montana State Univ-Northern 1977
B.S. Montana State Univ-Northern 1970

ESTY, WARREN W
Professor, Mathematics
Ph.D. Univ of Wisconsin-Madison 1973
M.A. Univ of Wisconsin-Madison 1967
B.A. Oberlin College 1966

ETTAIEBI, KHALIL
Asst Research Professor, Immunology & Infectious Diseases
Ph.D. Univ Sidi Mohamed Ben Abdellah 2000
M.S. Univ Sidi Mohamed Ben Abdellah 1997
B.S. Univ Sidi Mohamed Ben Abdellah 1992
### FACULTY

<table>
<thead>
<tr>
<th>Name</th>
<th>Title or Degree</th>
<th>Institution(s)</th>
<th>Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everts, Michael P</td>
<td>Associate Professor, Architecture</td>
<td>M.S. Columbia University 1992, B.Arch. Univ of Texas-Austin 1987</td>
<td></td>
</tr>
<tr>
<td>Ewing, Stephanie A</td>
<td>Assistant Professor, Land Resources &amp; Environmental Sciences</td>
<td>Ph.D. Univ of California-Berkeley 2007, M.S. Univ of California-Davis 2000, B.A. Oberlin College 1989</td>
<td></td>
</tr>
<tr>
<td>Fedock, Joseph J</td>
<td>Professor, Civil Engineering</td>
<td>Ph.D. University of New Mexico 1979, M.S. University of Colorado-Boulder 1973, B.S. Arizona State University 1971</td>
<td></td>
</tr>
<tr>
<td>Fields, Matthew W</td>
<td>Associate Professor, Geology</td>
<td>M.A. Santa Paul Seminary 1985, B.A. University of California-Santa Barbara 1985</td>
<td></td>
</tr>
<tr>
<td>Fields, Matthew W</td>
<td>Associate Professor, Microbiology</td>
<td>Ph.D. Cornell University 2001, M.S. Mississippi State University 1995, B.S. Western Kentucky University 1993</td>
<td></td>
</tr>
<tr>
<td>Fischeder, Andreas M</td>
<td>Professor, Plant Sciences &amp; Plant Pathology</td>
<td>Ph.D. University of Bern 1993</td>
<td></td>
</tr>
<tr>
<td>Fisher, John W</td>
<td>Associate Professor, Anthropology</td>
<td>Ph.D. University of California-Berkeley 1987, B.S. Montana State University-Bozeman 1978</td>
<td></td>
</tr>
<tr>
<td>Fisher, Keith</td>
<td>Assistant Professor, Mechanical Engineering</td>
<td>M.S. University of Idaho 1994, B.S. University of Idaho 1985</td>
<td></td>
</tr>
<tr>
<td>Fitzgerald, Timothy</td>
<td>Assistant Professor, Agricultural Economics &amp; Economics</td>
<td>Ph.D. University of Maryland 1999, M.S. University of Maryland 1998, B.A. Bowdoin College 1997</td>
<td></td>
</tr>
<tr>
<td>Flory, Daniel D</td>
<td>Associate Professor, Philosophy</td>
<td>Ph.D. University of Wisconsin-Madison 1995, B.A. Carleton College 1991</td>
<td></td>
</tr>
<tr>
<td>Foreman, Christine Marie</td>
<td>Associate Research Professor, Land Resources &amp; Environmental Sciences</td>
<td>Ph.D. University of California-Berkeley 2007</td>
<td></td>
</tr>
<tr>
<td>Fortin, David</td>
<td>Assistant Professor, School of Architecture</td>
<td>Ph.D. University of Edinburgh 2009, M.Arch. University of California 2001, B.A. University of Saskatchewan 1997</td>
<td></td>
</tr>
<tr>
<td>Foster, Amy Louise</td>
<td>Associate Professor, Libraries</td>
<td>M.S. University of North Texas 1992, B.S. Montana State University 1990</td>
<td></td>
</tr>
<tr>
<td>Foster, Dave E</td>
<td>Adjunct Instructor, Business</td>
<td>M.A. University of California-Los Angeles 1986, B.S. Arizona State University 1989</td>
<td></td>
</tr>
<tr>
<td>Fox, Carl A</td>
<td>Professor, Land Resources &amp; Environmental Sciences</td>
<td>Ph.D. Arizona State University 1980, M.S. University of Minnesota 1975, B.S. University of Washington 1973</td>
<td></td>
</tr>
<tr>
<td>Francis, Gregory E</td>
<td>Professor, Physics</td>
<td>Ph.D. Massachusetts Institute of Technology 1987, B.S. Brigham Young University 1980</td>
<td></td>
</tr>
<tr>
<td>Francoeur, Claire</td>
<td>Adjunct Assistant Professor, Nursing</td>
<td>M.N. Athabasca University 2009, B.Ed. McGill University 2009</td>
<td></td>
</tr>
<tr>
<td>Frank, John W</td>
<td>Associate Professor, Anthropology</td>
<td>Ph.D. University of California-Berkeley 1987, B.S. Montana State University-Bozeman 1978</td>
<td></td>
</tr>
<tr>
<td>Franklin, Kathryn Tuchscherrera</td>
<td>Adjunct Instructor, School Counseling</td>
<td>M.Ed. Montana State University-Bozeman 2005, B.A. University of Montana 2002</td>
<td></td>
</tr>
<tr>
<td>Franklin, Michael J</td>
<td>Associate Professor, Microbiology</td>
<td>Ph.D. University of Tennessee 1991, M.S. University of Georgia 1986, B.S. University of Georgia 1984</td>
<td></td>
</tr>
<tr>
<td>Fretwell, Holly Lin</td>
<td>Adjunct Instructor, Economics</td>
<td>M.S. Montana State University-Bozeman 1992, B.S. Montana State University-Bozeman 1987</td>
<td></td>
</tr>
<tr>
<td>Frick, Martin J</td>
<td>Professor, Agricultural Education</td>
<td>Ph.D. Iowa State University 1990, M.S. University of Missouri-Columbia 1982, B.S. University of Missouri-Columbia 1989</td>
<td></td>
</tr>
<tr>
<td>Funk, Eric</td>
<td>Adjunct Assistant Professor, Music</td>
<td>Ed.D. University of Oregon 1987, M.A. Portland State University 1978, B.A. Portland State University 1972</td>
<td></td>
</tr>
<tr>
<td>Gamble, Geoffrey</td>
<td>President Emeritus &amp; Professor Emeritus, Anthropology</td>
<td>Ph.D. University of California-Berkeley 1975, M.A. California State University-Fresno 1971, B.A. California State University-Fresno 1965</td>
<td></td>
</tr>
<tr>
<td>Gannon, Paul Edward</td>
<td>Assistant Professor, Chemical &amp; Biological Engineering</td>
<td>Ph.D. Montana State University-Bozeman 2007, B.S. Montana State University-Bozeman 1996</td>
<td></td>
</tr>
<tr>
<td>Gao, Hongwei</td>
<td>Associate Professor, Electrical &amp; Computer Engineering</td>
<td>Ph.D. Texas A&amp;M University-College Station 2001, M.S. Tsinghua University 1993, B.S. Tsinghua University 1990</td>
<td></td>
</tr>
<tr>
<td>Garcia Moreno, Veronica</td>
<td>Adjunct Instructor, Spanish</td>
<td>M.A. Universidad de Leon 2010, B.S. Montana State University-Bozeman 1979</td>
<td></td>
</tr>
<tr>
<td>Gardner, Michael Howard</td>
<td>Associate Professor, Geology</td>
<td>Ph.D. Colorado School of Mines 1993, B.S. University of Colorado-Boulder 1986</td>
<td></td>
</tr>
<tr>
<td>Garrett, Robert A</td>
<td>Professor, Ecology</td>
<td>Ph.D. University of Minnesota 1990, M.S. Pennsylvania State University 1980, M.S. University of Montana 1976</td>
<td></td>
</tr>
<tr>
<td>Geedeon, Tomas</td>
<td>Professor, Mathematics</td>
<td>Ph.D. Georgia Institute of Technology 1994, M.S. Comenius University 1989, B.S. Comenius University 1989</td>
<td></td>
</tr>
<tr>
<td>Ghee, Regina</td>
<td>Associate Professor, Art</td>
<td>Ph.D. University of Texas-Austin 2003, M.A. Vanderbilt University 1996, B.A. Vanderbilt University 1989</td>
<td></td>
</tr>
<tr>
<td>Geese, Gill G</td>
<td>Professor, Microbiology</td>
<td>Ph.D. Oregon State University 1975, M.S. Oregon State University 1973, B.A. University of California-San Diego 1970</td>
<td></td>
</tr>
<tr>
<td>George, Alan H</td>
<td>Associate Professor, Mechanical Engineering</td>
<td>Ph.D. Oregon State University 1981, B.S. Oregon State University 1979, B.S. California State University-Chico 1976</td>
<td></td>
</tr>
</tbody>
</table>
GERLACH, ROBIN  
Associate Professor, Chemical & Biological Engineering  
Ph.D. Montana State Univ-Bozeman 2009  
M.S. Montana State University 1996

GOLD, MICHAEL D  
Adjunct Instructor, Business  
B.S. University of Wales - Cardiff 1977

GOLD, SUSAN K  
Adjunct Instructor, Cell Biology & Neuroscience, Medical Sci  
M.S. University of Mississippi 1969  
B.A. University of Mississippi 1966

GUTH, ADAM R  
Associate Professor, Accounting  
Ph.D. University of Illinois 1999  
M.P.A. Brigham Young University 1998  
B.S. Brigham Young University 1986

GUY, MICHELE E  
Adjunct Assistant Professor, Political Science  
B.S. Montana State Univ-Bozeman 1979  
M.S. Montana State Univ-Bozeman 1980

HARDY, MICHELE E  
Professor, Immunology & Infectious Diseases  
Ph.D. Texas A&M Univ-College Station 1993  
B.S. Texas A&M Univ-College Station 1988

HARMS, ALLEN G  
Professor, Immunology & Infectious Diseases  
Ph.D. Iowa State University 1980  
B.S. Univ of Wisconsin-Stevens Pt 1974

HARMS, RICHARD L  
Professor Emeritus of Political Science  
Ph.D. University of Oregon 1966  
M.A. University of Oregon 1963  
A.B. Univ of California-Riverside 1961

HARE, MARY A  
Professor, Libraries  
M.S. University of Arizona 1995  
M.Ed. Montana State Univ-Bozeman 1993  
B.A. Montana State University-Bozeman 1985

HARDY, JOHN W  
Research Scientist, Ecotoxicology  
Ph.D. Montana State Univ-Bozeman 1991

HARGREAVES, MARK J  
Professor Emeritus, Political Science  
Ph.D. Montana State Univ-Bozeman 1980  
M.S. Montana State University 1979

HARRISON, JOHN  
Professor, Accounting  
Ph.D. Montana State University 1980  
M.S. Montana State University 1979

HARRIS, ROBERT W  
Professor Emeritus, Political Science  
Ph.D. University of Oregon 1966  
M.A. University of Oregon 1963

HARRIS, WILLIAM A  
Professor Emeritus, Political Science  
Ph.D. University of Oregon 1966  
M.A. University of Oregon 1963

HARTL, JAMES W  
Professor, Accounting  
Ph.D. Montana State University 1980  
M.S. Montana State University 1979

HATT, JOHN W  
Professor, Accounting  
Ph.D. Montana State University 1980  
M.S. Montana State University 1979

HAYES, JAMES  
Professor, Accounting  
Ph.D. Montana State University 1980  
M.S. Montana State University 1979

HAYES, ROBERT W  
Professor Emeritus, Political Science  
Ph.D. University of Oregon 1966  
M.A. University of Oregon 1963

HEDGES, JAMES P  
Professor, Accounting  
Ph.D. Montana State University 1980  
M.S. Montana State University 1979

HEDGES, RONALD W  
Professor, Accounting  
Ph.D. Montana State University 1980  
M.S. Montana State University 1979

HEDGES, WILLIAM A  
Professor Emeritus, Political Science  
Ph.D. University of Oregon 1966  
M.A. University of Oregon 1963

HEDGES, WILLIAM C  
Professor, Accounting  
Ph.D. Montana State University 1980  
M.S. Montana State University 1979

HEITZ, JAMES  
Professor, Accounting  
Ph.D. Montana State University 1980  
M.S. Montana State University 1979

HEITZ, ROBERT W  
Professor Emeritus, Political Science  
Ph.D. University of Oregon 1966  
M.A. University of Oregon 1963

HEITZ, WILLIAM A  
Professor Emeritus, Political Science  
Ph.D. University of Oregon 1966  
M.A. University of Oregon 1963

HEITZ, WILLIAM C  
Professor, Accounting  
Ph.D. Montana State University 1980  
M.S. Montana State University 1979

HEITZ, WILLIAM W  
Professor Emeritus, Political Science  
Ph.D. University of Oregon 1966  
M.A. University of Oregon 1963

HEITZ, WILHELM A  
Professor Emeritus, Political Science  
Ph.D. University of Oregon 1966  
M.A. University of Oregon 1963

HEITZ, WILLIAM W  
Professor Emeritus, Political Science  
Ph.D. University of Oregon 1966  
M.A. University of Oregon 1963
HARNEY, JON M
Associate Professor, Music
D.M.A. Univ of MN - Minneapolis 2000
M.M. Univ of MN - Minneapolis 1996
B.A. Luther College 1993

HARNEY, KRISTIN L
Adjunct Assistant Professor, Music
M.A. Univ of MN - Minneapolis 1999
B.A. Luther College 1993

HASKINS, RYAN JOSEPH
Director, Workforce Programs Gallatin College Programs
B.S. University of Montana 2002

HATCH, MICHAEL J
Assistant Professor, Art
M.F.A. New York State College of Ceramics at Alfred 2003
B.F.A. Emily Carr Institute of Art & Design 2000

HATFIELD, PATRICK GEORGE
Professor, Animal Science
Ph.D. University of Nebraska-Lincoln 1988
M.S. New Mexico State Univ 1985
B.S. Montana State Univ-Bozeman 1983

HAUHEGY, Lidia DULCINEA
Adjunct Assistant Professor, Education
M.Ed. Montana State Univ-Bozeman 2003
B.S. Montana State Univ-Bozeman 2000

HAUSAUER, JANICE D
Assistant Clinical Professor, Nursing
M.S. University of Nevada-Reno 1990
B.S.N. University of Utah 1979

HAYNES, DEBORAH C
Associate Professor, Family & Consumer Sciences
Ph.D. Cornell University 1996
M.S. University of Nebraska-Lincoln 1976
B.S. University of Montana 1974

HEGGE, JODI F
Asst Research Professor, Immunology & Infectious Diseases
Ph.D. Univ of California-Davis 1999
B.S. University of Washington 1990

HEIL, DANIEL P
Professor, Health and Human Performance
Ph.D. of Massachusetts-Amherst 1997
M.S. Oregon State University 1991
B.S. Oregon State University 1989

HEISER, SHAWNA M
Adjunct Instructor, Psychology
M.S. Montana State Univ-Bozeman 1997
B.S. Montana State Univ-Bozeman 1994

HEISS ARMS, JANET K
Director, Developmental Education Gallatin College Programs
Ph.D. Univ of Wisconsin-Madison 2006
M.S. Univ of Wisconsin-Madison 2002
B.A. University of Puget Sound 1999

HELLINGS, RONALD W
Research Professor, Physics
Ph.D. Montana State Univ-Bozeman 1973
M.S. Univ of California-Los Angeles 1968
B.S. Brigham Young University 1967

HENDERSON, LINDA L
Adjunct Assistant Professor, Nursing
M.N. Montana State Univ-Bozeman 1988
B.S.N. Truman State University 1982

HENDRICKS, JORDY
Assistant Professor, Earth Science
Ph.D. University of Canterbury 2006
B.Sc. Victoria U of Wellington 2001

HENRY, TERESA
Adjunct Assistant Professor, Nursing
M.S. U of California-San Francisco 1981
B.S.N. University of Detroit Mercy 1974

HERBECK, MARY JOYCE
Associate Professor, Education
Ed.D. Univ of Maine-Presque Isle 1990
M.Ed. Washington State University 1978
B.S. University of Dayton 1969

HERIBTER, DOUGLAS L
Professor Emeritus of Education

HERMAN, MATTHEW DALE
Assistant Professor, Native American Studies
Ph.D. SUNY at Stony Brook 2005
M.A. University of Montana 1994
B.A. University of Washington 1990

HERMANSON, JOHN C
Professor Emeritus of Physics
Ph.D. University of Chicago 1966
M.S. University of Chicago 1964
B.S. Massachusetts Inst of Tech 1962

HERRING, MICHAEL T
Adjunct Professor, Medical Science
M.D. Univ of Texas/Austin 1991
B.A. Harvard University 1986

HEYS, JEFFREY JAMES
Assistant Professor, Chemical & Biological Engineering
Ph.D. University of Colorado-Boulder 2001
M.S. University of Colorado-Boulder 1998
B.S. Montana State Univ-Bozeman 1996

HICKMAN, LOWELL C
Professor Emeritus, Music
M.A. University of Iowa 1967
B.S. Minot State University 1962

HICKMAN, PASCALE FRANCOISE
Visiting Assistant Professor, French
Ph.D. University of Colorado Denver 2009
M.A. University of Colorado-Denver 2004
B.A. Colorado State University 2001

HIETALA, ROBERT S
Dean, Gallatin College Programs
B.S. Western Michigan University 1981

HIGGS, MEGAN D
Assistant Professor, Statistics
Ph.D. Colorado State University 2007
M.S. Oregon State University 2005
M.S. University of Nevada-Las Vegas 1998
B.S. Montana State Univ-Bozeman 1996

HILL, WADE G
Associate Professor, Nursing
Ph.D. Oregon State University 2003
M.S. University of Wyoming 1999
B.S. University of Wyoming 1997

HOCH, WILLIAM
Assistant Professor, Plant Sciences & Plant Pathology
Ph.D. Univ of Wisconsin-Madison 2003

HOF, JOAN
Adjunct Professor, History
Ph.D. Univ of California-Berkeley 1966
M.A. Cornell University 1959
B.A. University of Montana 1957

HOLKUP, PATRICIA A
Associate Professor, Nursing
Ph.D. University of Iowa 2003
M.A. University of Montana 1997
B.S.N. College of Saint Teresa 1971

HOLLIS, BRETT R
Adjunct Assistant Professor, Nursing
M.N. Montana State Univ-Bozeman 1996
B.S.N. Montana State Univ-Bozeman 1986

HOLMGREN, STEVEN
Adjunct Professor, Chemistry & Biochemistry
Ph.D. Univ of Wisconsin-Madison 1995
B.S. Saint Johns University 1989

HOLZWORTH, LARRY K
Adjunct Instructor, Plant Sciences & Plant Pathology
B.S. Colorado State University 1972

HORNER, JOHN R
Regents Professor of Paleontology
Geology/Paleontology, University of Montana
Honorary Doctorate, University of Montana
Honorary Doctorate, Pennsylvania State University, 2006

HOSTETLER, JEFFREY WILLIAM
Humanities Department Chair, Gallatin College Programs
M.A. Montana State Univ-Bozeman 2006
B.A. University of Oregon 1992

HOWALD, REED
Professor Emeritus, Chemistry & Biochemistry

HUANG, LI
Assistant Professor, Plant Sciences
Ph.D. Kansas State University 2002
M.S. Kansas State University 1998
B.S. Nanjing Agricultural Univ 1984

HUANG, YIKUN
Associate Research Professor, Electrical & Computer Engr
Ph.D. University of Illinois-Chicago 2002
M.S. Chinese Academy of Science 1987
B.S. Peking University 1982

HUDSON, BARBARA KRALL
Adjunct Instructor, Microbiology
M.S. University of North Dakota 2001
B.S. Montana State Univ-Bozeman 1970

HUGHES, THOMAS E
Associate Professor, Cell Biology & Neuroscience, Medical
Ph.D. Duke University 1986
B.S. Tufts University 1981

HUNLEY, MICHELLE
Adjunct Assistant Professor, Nursing
M.S.N. Vanderbilt University 1991
B.S. Vanderbilt University 1990

HUNTS, HOLLY JO
Associate Professor, Family & Consumer Sciences
Ph.D. Cornell University 1994
M.S. Cornell University 1992
B.S. Colorado State University 1987
HUTCHISON, KEITH ALLEN
Associate Professor, Psychology
Ph.D. SUNY at Albany 2001
M.A. California State U-Long Beach 1996
B.A. California State U-Long Beach 1994

HUYETTE, PAGE
Adjunct Assistant Professor, Plant Sciences & Plant Pathology
M.A. Univ of California-Los Angeles 1997

IDZERDA, YVES U
Professor, Physics
Ph.D. University of Maryland 1986
M.S. University of Washington 1983
B.S. Washington University 1981

IGO, CARL G
Associate Professor, Agricultural Education
Ph.D. Oklahoma State University 1998
M.S. Texas Tech University 1984
B.S. Texas Tech University 1983

INGRAM, PATRICIA J
Director, Office of Field Placement & Licensure
Ed.D. Montana State Univ-Bozeman 2002
M.A. Montana State Univ-Bozeman 1990
B.S. Long Island U-C W Post Campus 1971

INSKEEP, WILLIAM P
Professor, Land Resources & Environmental Sciences
Ph.D. Univ of MN - Minneapolis 1986
M.S. Oregon State University 1982
B.S. University of Idaho 1979

JACKSON, FRANCES DREW
Assistant Research Professor, Geology
Ph.D. Harvard University 1992

JACOBSEN, BARRY J
Professor, Plant Sciences & Plant Pathology
Ph.D. Univ of MN - Minneapolis 1973
M.S. Univ of Wisconsin-Madison 1971
B.S. Univ of Wisconsin-Madison 1969

JACOBSEN, JEFFREY S
Professor, Land Resources & Environmental Sciences
Ph.D. Oklahoma State University 1985
M.S. Colorado State University 1982
B.S. Calif Polytechnic State Univ 1979

JACOBSON, MARY ANN
Adjunct Assistant Professor, Music
Ph.D. Texas Tech University 2002
M.M. University of Montana 1997
B.S. Montana State Univ-Billings 1973

JAHNE, JOEL B
Professor, Theatre
M.A. Southern Illinois University 1972
B.A. Benidji State University 1970

JANZEN, GESINE SARA
Associate Professor, Printmaking
M.F.A. University of Iowa 1998
M.A. University of Iowa 1997
B.F.A. University of Kansas 1993

JELINSKI, JACK B
Professor Emeritus of Spanish
Ph.D. Univ of Wisconsin-Madison 1974
M.A. Indiana University 1969
B.A. Univ of Wisconsin-Madison 1967

JENKS, CHRISTOPHER HM
Professor, Mechanical Engineering
Ph.D. Oregon State University 1991
M.S. Oregon State University 1989
B.S. Florida Inst Of Technology 1971

JEPPSON, NATHAN HANS
Adjunct Assistant Professor, Accounting
M.B.A. University of Utah 2004
B.S. University of Utah 2002
Associate of Arts Utah Valley University 2000

JESAITIS, ALGIRDAS J
Professor, Microbiology
Ph.D. California Inst of Technology 1973
B.S. New York University 1967

JESSUP, MINETTE
Adjunct Instructor, Business
B.S. University of North Texas 1986

JOHNS, FERDINAND S
Professor Emeritus, Architecture
M.S. Columbia University 1975
B.A. Hampden-Sydney College 1963

JOHNSON, CAROL A
Adjunct Instructor, Ecology
M.S. Montana State Univ-Bozeman 1985
B.S. Carleton College 1976

JOHNSON, CHRISTIE W
Associate Professor, Accounting
M.B.A. University of Wyoming 1977
B.S. University of Nebraska-Omaha 1973

JOHNSON, GREGORY D
Professor, Entomology
Ph.D. University of Wyoming 1978
M.S. University of Wyoming 1975
B.S. Eastern Mennonite University 1970

JOHNSON, JERRY D
Professor, Political Science
D.A. Idaho State University 1985
M.A. Idaho State University 1982
B.A. Idaho State University 1979

JOHNSON, RALPH D
Professor, Architecture
M.S. Columbia University 1982
B.Arch. University of Kansas 1970

JOHNSON, RYAN K
Adjunct Instructor, Health and Human Performance
Ph.D. University of Colorado-Denver 2007
M.S. University of Colorado-Denver 2005
B.S. Montana State Univ-Bozeman 2002

JOHNSTON, DAVID W
Director, Design Drafting Technologies Gallatin College Programs
Associate of Science LDS Business College 1997
B.F.A. Univ of California-Irvine 1992

JOHNSTON, GLEN R
Professor Emeritus of Music
M.M. Univ of Southern California 1963
B.M.Ed. Univ of Michigan-Ann Arbor 1962

JONES, CLAIN ALAN
Assoc Professor, Land Resources & Environmental Sciences
Ph.D. Montana State Univ-Bozeman 1998
M.S. University of Washington 1988
B.S. Cornell University 1986

JONES, WARREN L
Associate Professor, Civil Engineering
Ph.D. Univ of California-Davis 1986
M.S. Univ of California-Davis 1983
B.S. Univ of California-Davis 1977

JOONSSON, JENNIFER
Professor, Music
M.M. Indiana University 1983

JOYCE, JAMES B
Adjunct Instructor, Film
M.F.A. Northwestern University 2004
B.A. Allegheny College 1997

JUDGE, VAUGHAN
Professor, School of Art
M.Ed. University of Glasgow 2002
M.A. University of Glasgow 1993
Diploma Glasgow C of Build and Print 1979

JUNE, RONALD KENT
Assistant Professor, Mechanical & Industrial Engineering
Ph.D. Univ of California-Davis 2007
B.A. Dartmouth College 2002

JUROSZEK, STEVEN P
Professor, Architecture and Interim Director
M.A. University of Washington 1991
B.Arch. Montana State Univ-Bozeman 1981

JUTILA, MARK A
Professor, Immunology/Infectious Diseases & Medical Science
Ph.D. Washington State University 1986
M.S. Washington State University 1984
B.S. Montana State Univ-Bozeman 1982
KAISER, DONNA COLEEN REGLI
Adjunct Instr, Food & Nutrition & Dir, MT Dietetic Internship
M.S. Montana State Univ-Bozeman 1999
B.S. University of Minnesota 1979

KAISER, TODD J
Associate Professor, Electrical & Computer Engineering
Ph.D. Georgia Institute of Tech 2000
M.S. Oregon State University 1984
B.S. Montana State Univ-Bozeman 1981

KALINOWSKI, STEVEN T
Associate Professor, Ecology
Ph.D. Arizona State University 1999
B.S. Stanford University 1992

KANKELBORG, CHARLES
Associate Professor, Physics
Ph.D. Stanford University 1996
B.S. University of Puget Sound 1989

KARCZEWSKA, ZUZANNA T
Assistant Professor, Architecture
M.S. Cornell University 2003
B.A. New Jersey Inst Of Technology 1998

KARELL, LINDA K
Associate Professor, English
Ph.D. University of Rochester 1994
M.A. University of Rochester 1989
B.A. Montana State Univ-Bozeman 1986

KARSTED, KIMBERLY
Adjunct Assistant Professor, Education
M.A. Azusa Pacific University 2010
B.A. California State U-Fullerton 2005

KEARNS, MARTHA JOH
Adjunct Instructor, Marketing
M.B.A. Lamar University-Beaumont 1994
B.S. Virginia Polytechnic Institute 1979

KEEGER, MARY L
Adjunct Reference Librarian, Libraries
M.A. Univ of Wisconsin-Madison 1988
Certificate University of Colorado-Boulder 1977
B.A. Univ of Wisconsin-Madison 1967

KEELER, GREGORY C
Adjunct Instructor, Civil Engineering
M.S. Montana State Univ-Bozeman 1985

KELTING-GIBSON, LYNN
Assistant Professor, Education
Ed.D. Montana State Univ-Bozeman 2003
M.Ed. Montana State Univ-Bozeman 1991
B.S. Montana State Univ-Bozeman 1989
B.A. Concordia College 1983

KEPFHART, KENNETH D
Professor, Southern Agricultural Research Center
Ph.D. University of Idaho 1984
M.S. Montana State Univ-Bozeman 1980
B.S. Montana State Univ-Bozeman 1976

KERANS, BILLIE L
Associate Professor, Ecology
Ph.D. Ohio State University 1989
M.S. Wright State University 1982
B.S. Wright State University 1980

KERINS, FRANCIS J
Associate Professor, Finance
Ph.D. Arizona State University 1996
M.B.A. University of Washington 1991
M.S. Montana Tech of Univ of Mont 1986
B.S. Columbia University 1982
B.A. Carroll College 1981

KESNER, TODD DOUGLAS
Associate Professor, Extension
M.S. Montana State Univ-Bozeman 1999
M.S. Michigan State University 1987

KEVANE, BRIDGET
Professor, Spanish
Ph.D. Univ of California-Los Angeles 1996
M.A. New York University 1989
B.A. Sarah Lawrence College 1985

KEYES, MARY ANNE
Assistant Professor, Extension
M.S. Montana State Univ-Bozeman 2006

KESELAME, JEANNIE
Adjunct Assistant Professor, Nursing
M.S.N. Gonzaga University 2008
B.S. Montana State Univ-Bozeman 1988

KINION, ELIZABETH S
Campus Director & Professor, Nursing
M.S.N. Kent State University 1981
M.S.Ed. University of Akron 1978
B.S.N. Montana State Univ-Bozeman 1964

KIRCHHOFF, STEVEN R
Adjunct Instructor, General Studies
M.S. Northwestern University 1989
B.S. Montana State Univ-Bozeman 1987

KIRKPATRICK, LARRY D
Professor Emeritus of Physics
Ph.D. Massachusetts Inst of Tech 1968
B.S. Washington State University 1963

KJERSTAD, HEATHER D
Adjunct Professor, Medical Science
M.D. University of South Dakota 1999

KLAPPER, ISAAC
Professor, Mathematics
Ph.D. New York University 1991
A.B. Harvard University 1986

KLASS, JANE K
Adjunct Instructor, Chemistry & Biochemistry
Ph.D. Univ of Wisconsin-Madison 1995
B.A. Carleton College 1989

KLEIN, ROBERTA ANN
Adjunct Instructor, MS Medical Biology
M.S. Montana State Univ-Bozeman 2004
B.S. Central Michigan University 1975

KLEIN, CAROL JEAN
Director, Medical Aest Program Gallatin College Programs
B.S. Montana State Univ-Bozeman 1993

KLUMPAR, DAVID M
Research Professor, Physics
Ph.D. University of New Hampshire 1972
M.S. University of Iowa 1968
B.S. University of Iowa 1965

KNAPP, STUART E
Professor Emeritus, Veterinary Molecular Biology

KNIGHT, JAMES E
Professor, Wildlife Management & Extension Specialist
Ph.D. University of Michigan-Flint 1980
M.S. Michigan State University 1975
B.S. Michigan State University 1973

KNIGHTON, WALTER B
Associate Research Professor, Chemistry & Biochemistry
Ph.D. Montana State Univ-Bozeman 1984
M.S. Montana State Univ-Bozeman 1980
B.S. Montana State Univ-Bozeman 1978

KNOELL, PENNY M
Associate Professor, Civil Engineering
M.S. Arizona State University 1999
B.S. Arizona State University 1995

KOELIN, RANDI E
Adjunct Assistant Professor, Nursing
M.S.N. Fort Hays State University 2010
B.S.N. Newman University 2000

KOHL, JOHN W
Professor Emeritus of Education

KOHLER, BERN
Professor, Chemistry & Biochemistry
Ph.D. Massachusetts Inst of Tech 1990
B.S. Stanford University 1985

KOLLIN, SUSAN E
Professor, English
Ph.D. Univ of MN - Minneapolis 1995
M.A. Univ of MN - Minneapolis 1992
A.B. Univ of Michigan-Ann Arbor 1988

KOLTZ, REBECCA L
Assistant Professor, Counseling
Ph.D. Idaho State University 2009
M.S. Univ of Wisconsin-Stout 2006
B.A. Univ of Wisconsin-Whitewater 1994

KOMMERS, PETER
Professor Emeritus, Architecture
M.Arch. University of Oregon 1972
B.Arch. Montana State Univ-Bozeman 1967

KOTT, RODNEY W
Professor, Animal Science
Ph.D. New Mexico State Univ 1980
M.S. Texas A&M Univ-College Station 1976
B.S. Texas A&M Univ-College Station 1974

KRAMER, BONITA K
Professor, Accounting
Ph.D. Washington State University 1994
M.B.A. University of Montana 1987
B.S. Montana State Univ-Bozeman 1983

KRAUSS, KAROLINE
Adjunct Instructor, German
Ph.D. University of Utah 1992
M.A. University of Utah 1990
B.A. Montana State Univ-Bozeman 1980

KRESS, DON D
Professor Emeritus of Animal & Range Sciences
Ph.D. Univ of Wisconsin-Madison 1970
M.S. Univ of Wisconsin-Madison 1966
B.S. University of Idaho 1964
KROFF, MICHAEL WILLIAM
Assistant Professor, Marketing
Ph.D. Texas A&M Univ-Corpus Christi 2006
M.B.A. Brigham Young University 1998
B.S. Brigham Young University 1992

KROGUE, PAUL ANTHONY
Clinical Resource Registered Nurse
B.S.N. Montana State Univ-Bozeman 2007

KUNTZ, SANDRA W
Associate Professor, Nursing
Ph.D. Walden University 2003
M.S. Texas Woman’s University 1984
B.S.N. California State U-Long Beach 1969

KWAPISZ, AGNIESZKA IZABELA
Visiting Professor, Business
Ph.D. SUNY at Stony Brook 1995
M.S. Warsaw Polytechnic 1991

KWAPISZ, JAROSLAW M
Professor, Mathematics
Ph.D. University of California-Santa Barbara 1994
B.A. San Jose State University 1990

LACHAPELLE, PAUL R
Assistant Professor, Political Science
Ph.D. University of Montana 2006
M.S. University of Montana 2000
B.S. University of Vermont 1994

LAGESON, DAVID R
M.S. University of Montana 2000
Ph.D. University of Montana 2006
Assistant Professor, Political Science

LAMB, CHRISTINE
Assistant Dean, Business
Ed.D. Montana State Univ-Bozeman 1988
M.Ed. Montana State Univ-Bozeman 1984
B.A. Montana State Univ-Bozeman 1974

LAMER, ANNE M
Adjunct Assistant Professor, Nursing
M.S.N. Grand Canyon University 2008
B.S.N. Montana State Univ-Bozeman 1986

LAMERES, BROCK J.
Assistant Professor, Electrical & Computer Engineering
Ph.D. University of Colorado-Boulder 2005
M.S. University of Colorado-Boulder 2001
B.S. Montana State Univ-Bozeman 1998

LANDE, GARY M
Adjunct Instructor, Business
M.D. Yale University 1971
B.A. Brandeis University 1967

LANG, THEODORE E
Professor, Civil Engineering
Ph.D. University of Washington 1969
M.Eng. California Inst of Technology 1961
M.S. California Inst of Technology 1958
B.S. California Inst of Technology 1957

LANSVERK, MARVIN
Professor, English
Ph.D. University of Washington 1988
M.A. Saint David’s University-Wales 1982
B.A. Pacific Lutheran University 1980

LAPERRE, GERALD J
Professor Emeritus of Physics
Ph.D. Univ of Missouri-Columbia 1962
M.S. Univ of Missouri-Columbia 1958
B.S. University of Notre Dame 1956

LARGE, DAVID C
Professor, History
Ph.D. Univ of California-Berkeley 1974
M.A. Univ of California-Berkeley 1969
B.A. University of Washington 1967

LARIMER, RANDAL M
Adjunct Assistant Professor, Electrical & Computer Engr
M.S. Montana State Univ-Bozeman 1982
B.S. University of Illinois at Urbana-Champaign 1980
Associate of Science Black Hawk College 1978

LARKIN, TODD
Associate Professor, Art History
Ph.D. U of California-Santa Barbara 2000
M.A. U of California-Santa Barbara 1994
B.A. San Jose State University 1990

LARSEN, RONALD W
Associate Professor, Chemical & Biological Engineering
Ph.D. Pennsylvania State University 1987
B.S. Montana State Univ-Bozeman 1979

LARSON, ROBB E
Associate Professor, Mechanical Engineering Technology
M.S. Montana State Univ-Bozeman 1992
B.S. Montana State Univ-Bozeman 1982

LARSON, RONALD A
Manager, Plant Sciences
B.S. Montana State Univ-Bozeman 1974

LARSON, WAYNE L
Professor Emeritus of Sociology

LARSSON, ANDERS K
Adjunct Assistant Professor, Civil Engineering
M.S. Montana State Univ-Bozeman 1992
B.S. Montana State Univ-Bozeman 1990

LARSSON, LAURA STONE
Assistant Professor, Nursing
Ph.D. Oregon Health Sciences Univ 2008
M.P.H. Oregon Health Sciences Univ 2005
B.S. University of Montana 2001
B.S. Lewis and Clark College 1993

LAVIN, MATTHEW T
Professor, Plant Sciences & Plant Pathology
Ph.D. Univ of Texas-Austin 1986
M.S. University of Nevada-Reno 1981
B.S. University of Nevada-Reno 1978

LAWRENCE, C. MARTIN
Associate Professor, Chemistry & Biochemistry
Ph.D. Purdue University 1993
B.A. Univ of California-San Diego 1985

LAWRENCE, RICK LESLIE
Professor, Land Resources & Environmental Sciences
Ph.D. Oregon State University 1998
M.S. Oregon State University 1995
J.D. Columbia University 1979
B.A. Clarenmont McKenna College 1976

LEAMON, ROBERT
Assistant Research Professor, Physics
Ph.D. University of Delaware 2000
B.S. Imperial College U - London 1994

LEARY, MYLEEN M
Assistant Professor, Business
Ph.D. Univ of Wisconsin-Madison 2003
M.S. Glendale Community College 1998
B.A. Providence College 1992

LEGAIN, TIMOTHY J
Associate Professor, History & Philosophy
Ph.D. University of Delaware 1998
M.A. Montana State Univ-Bozeman 1991
B.A. Montana State Univ-Bozeman 1989

LECLAIR, CHRENE
Adjunct Assistant Professor, Architecture
M.Arch. University of Pennsylvania 1995
B.Arch. Montana State Univ-Bozeman 1991

LEE, ILSEMAR
Professor, Music
M.A. University of Arizona 1989
M.A. U of Illinois at Urbana-Champaign 1986
B.A. University of Wisconsin 1983

LECH, ALAN B
Professor Emeritus, Music
M.M. University of Cincinnati 1968
B.M.Ed. University of Cincinnati 1966

LEFORT, FRANCES B
Professor, Cell Biology & Neuroscience, Medical Science
Ph.D. Univ of California-Berkeley 1988
A.B. Smith College 1982

LEHMAN, MARK TIMOTHY
Adjunct Instructor, Spanish
B.A. Montana State Univ-Bozeman 2008

LEHNHOFF, ERIK A.
Asst Res Professor, Land Resources & Environmental Sciences
Ph.D. Montana State Univ-Bozeman 2008
M.S. Tennessee Tech University 1994
B.S. Clemson University 1993

LEI, BENFANG
Associate Professor, Immunology & Infectious Diseases
Ph.D. University of Houston 1993
M.S. Univ of Texas El Paso 1989
B.S. Wuhan University 1982

LEONARD, MARY J
Assistant Professor, Education
Ph.D. Univ of Wisconsin-Madison 2006
M.S. Univ of Wisconsin-Madison 2001
B.A. University of Montana 1985
B.S. University of Montana 1985

LELETIEQ, BETHANY
Associate Professor, Community Health
Ph.D. University of Maryland 1999
M.S. University of Maryland 1995
B.A. University of Rhode Island 1991

LEVY, SANFORD S
Associate Professor, Philosophy
Ph.D. Univ of Michigan-Ann Arbor 1982
M.A. Univ of Michigan-Ann Arbor 1976
B.A. U of Illinois at Urbana-Champaign 1975
LEWANDOWSKI, ZBIIGNIEW  
Professor, Civil Engineering  
Ph.D. Polish Academy of Science 1976  
M.S. Technical Univ of Gzibice 1969

LI, HUA  
Assistant Professor, Chinese  
Ph.D. University of British Columbia 2007  
M.A. University of British Columbia 2002  
B.A. Harbin Engineering University 1991

LIN, JAMES W  
Professor, Finance  
Ph.D. University of Arizona 1987  
M.B.A. SUNY at Buffalo 1984

LINDAMAN, BRIAN J  
Assistant Professor, Mathematics Education  
Ph.D. University of Kansas 2007  
M.A. University of Kansas 2003  
B.S. Northwest Missouri State Univ 1998  
B.Ed. Northwest Missouri State Univ 1998

LINK, BENNETT  
Professor, Physics  
Ph.D. U. of Illinois at Urbana-Champaign 1991  
M.S. U. of Illinois at Urbana-Champaign 1987  
B.S. Univ of Missouri-Rolla 1984

LINNEROOTH, SHERRY LYNN  
Adjunct Assistant Professor, Music  
B.A. Concordia College 1981

LIPPERT, THEODORE WRIGHT  
Associate Professor, Film  
M.F.A. Hunter College 1989  
B.A. Hampshire College 1984

LITT, ANDREA  
Assistant Professor, Ecology  
Ph.D. University of Arizona 2007  
M.S. University of Florida 1999  
B.S. Univ of Wisconsin-Madison 1995

LITTLEFIELD, JEFFREY  
Research Scientist, Land Resources & Environmental Sciences  
Ph.D. University of Wyoming 1986  
M.S. University of Idaho 1980  
B.S. University of New Hampshire 1975

LIU, JIAN-YI  
Associate Professor, Geography  
Ph.D. Univ of MN - Minneapolis 1992  
M.A. Univ of Sci & Tech of China 1981  
B.A. Guizhou Normal University 1978

LIVINGHOUSE, THOMAS S  
Professor, Chemistry & Biochemistry  
Ph.D. Rice University 1980  
M.S. Univ of California-Los Angeles 1977  
B.S. Univ of California-Los Angeles 1976

LIVINGSTON, CHRISTOPHER  
Associate Professor, Architecture  
M.Arch. Univ of Texas-Austin 1994  
B.Arch. Montana State Univ-Bozeman 1985

LLEWELLYN, CLARKE E  
Professor Emeritus, Architecture  
M.Arch. Harvard University 1973  
B.Arch. Washington State University 1972

LLOYD, HUNTER S  
Adjunct Professor, Computer Science  
M.S. Montana State Univ-Bozeman 1999  
B.B.A. New Mexico State Univ 1992

LOCKE, WILLIAM W  
Professor Emeritus, Geology  
Ph.D. University of Colorado-Boulder 1980  
M.S. University of Colorado-Boulder 1976  
B.A. Dartmouth College 1970

LOCKHART, MARILYN  
Associate Professor, Education  
Ed.D. University of Virginia 1998  
M.Ed. Arizona State University 1975  
B.A. Bridgewater College 1973

LONG, JONATHAN  
Adjunct Instructor, Photography  
M.F.A. Southern Illinois University 2003  
B.F.A. University of Utah 2000

LONG, JOSEPH G  
Adjunct Instructor, Business  
M.S. University of Utah 1990  
B.S. College of Idaho 1986

LONGCOPE, DANA  
Professor, Physics  
Ph.D. Cornell University 1993  
B.S. Cornell University 1986

LU, CHAOFU  
Assistant Professor, Plant Sciences & Plant Pathology  
Ph.D. Chinese Academy of Science 1998  
B.S. Beijing Univ of Agriculture 1998  
M.S. Beijing Univ of Agriculture 1993

LUEBECK, JENNIFER L  
Associate Professor, Mathematics Education  
M.S. Montana State Univ-Bozeman 1989  
B.A. University of Sioux Falls 1982  
B.S. University of Sioux Falls 1982

LUND, JOHN R  
Professor, Mathematics  
Ph.D. University of Utah 1978  
M.S. University of Utah 1973  
B.S. University of Tennessee 1971

LUND, PRISCILLA A  
Associate Professor, Education  
Ph.D. University of Iowa 1991  
M.A. University of Iowa 1977  
B.A. Bowling Green State University 1970

LUO, FENQJEN  
Assistant Professor, Education  
Ph.D. Univ of Texas-Austin 2000  
M.A. Univ of Texas-Austin 1996  
B.A. Taipei Muni Teachers Coll 1993

LUPARELLI, SUSAN S  
Associate Professor, Nursing  
Ph.D. University of Nebraska-Lincoln 2003  
M.S.N. Medical College Of Georgia 1992  
B.S.N. Bradley University 1985

LUTEY, WHITNEY ANN  
Assistant Professor, Civil Engineering  
M. Montana State Univ-Bozeman 1997  
B.S. Montana State Univ-Bozeman 1996

LUTZ, PAULA MARCELLUS  
Professor, Cell Biology & Neuroscience  
Ph.D. Duke University 1981  
B.S. Univ of Missouri-Rolla 1976

LUX, CHRISTINE  
Director, Child Development Center  
M.Ed. Boston University 2000  
B.A. Boston College 1995

LUX, NICHOLAS JAMES  
Assistant Professor, Education  
Ed.D. Boston University 2010  
M.Ed. Boston University 2000  
B.A. Pepperdine University 1998

LYNCH, WESLEY C  
Professor, Psychology  
Ph.D. University of New Mexico 1972  
M.A. Hollins University 1968  
B.A. University of Hawaii - Manoa 1967

MACK, CAROLYN R  
Assistant Clinical Professor, Nursing  
M.S.N. Calif State U-Dominguez Hills 2003  
B.S.N. California State U-Fullerton 1989  
Associate of Science Long Beach City College 1983

MAHER, ROBERT C  
Professor, Electrical & Computer Engineering  
Ph.D. U. of Illinois at Urbana-Champaign 1989  
M.S. Univ of Wisconsin-Madison 1985  
B.S. Washington University 1984

MAHONEY, NANCY M  
Adjunct Instructor, Sociology  
M.A. George Washington University 1994  
B.A. Emory University 1990

MALOVYCHKO, GALYNA I  
Associate Professor, Physics  
Ph.D. Inst for Prob of Mat Sci 1987

MANCEL, JOHN F  
Professor Emeritus, Chemistry & Chemical Engineering  
Ph.D. University of New Mexico 1982  
M.S. Oklahoma State University 1970  
B.S. Northwestern Oklahoma State U 1954

MARCH, DANIEL N  
Professor Emeritus, Electrical & Computer Engineering  
Ph.D. Montana State Univ-Bozeman 2004  
M.S. Montana State Univ-Bozeman 1997  
B.S. Iowa State University 1994

MANN, HENRIETTA  
Professor Emeritus, Native American Studies  
Ph.D. University of New Mexico 1982  
M.S. Oklahoma State University 1970  
B.S. Northwestern Oklahoma State U 1954

MARLEY, ROBERT J  
Dean, Engineering & Professor of Industrial Engineering  
Ph.D. Wichita State University 1990  
M.S. Wichita State University 1987  
B.S. Wichita State University 1983

MARLOW, CLAYTON B  
Professor, Range Science  
Ph.D. University of Wyoming 1978  
M.S. Washington State University 1976  
B.S. University of Wyoming 1974
<table>
<thead>
<tr>
<th>Name</th>
<th>Title/Position</th>
<th>Degree Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARSHALL, LUCY</td>
<td>Asst Professor, Land Resources &amp; Environmental Sciences</td>
<td>Ph.D. University of New South Wales 2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of New South Wales 2001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.E. University of New South Wales 2001</td>
</tr>
<tr>
<td>MARTENS, PETRUS CORNELIS HENDRIK</td>
<td>Research Professor, Physics</td>
<td>Ph.D. University of Utrecht 1983</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Utrecht 1979</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of Utrecht 1977</td>
</tr>
<tr>
<td>MARTIN, DALE</td>
<td>Adjunct Instructor, History</td>
<td>M.A. Washington State University 1984</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Washington State University 1975</td>
</tr>
<tr>
<td>MARTIN, JAMES W</td>
<td>Assistant Professor, Spanish</td>
<td>Ph.D. University of New Mexico 2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.A. Washington State University 1998</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. University of Idaho 1995</td>
</tr>
<tr>
<td>MARTIN, JOHN M</td>
<td>Professor, Plant Sciences &amp; Plant Pathology</td>
<td>Ph.D. Iowa State University 1978</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Iowa State University 1979</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Iowa State University 1971</td>
</tr>
<tr>
<td>MARTZ, JILL</td>
<td>4H Director</td>
<td>Ph.D. University of Tennessee 2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.Ed. Middle Tennessee State Univ 1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Bowling Green State University 1975</td>
</tr>
<tr>
<td>MARX, LAURA E</td>
<td>Adjunct Assistant Professor, Nursing</td>
<td>M.S.N. Case Western Reserve Univ 2001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S.N. Florida State University 1975</td>
</tr>
<tr>
<td>MASSEY, LAURA J</td>
<td>Associate Professor, Early Childhood Education</td>
<td>Ed.D. Montana State Univ-Bozeman 1991</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.Ed. University of Maine-Orono 1982</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of Maine-Orono 1973</td>
</tr>
<tr>
<td>MAST, SARA B</td>
<td>Associate Professor, Art</td>
<td>M.F.A. Queens College 1983</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. University of Iowa 1980</td>
</tr>
<tr>
<td>MATTIX, REBECCA J</td>
<td>Adjunct Asst Professor, Immunology &amp; Infectious Diseases</td>
<td>Ph.D. University of Iowa 1980</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D.V.M. Washington State University 1985</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Montana State Univ-Bozeman 1981</td>
</tr>
<tr>
<td>MATYE, SHEILA Y</td>
<td>Associate Clinical Professor, Nursing</td>
<td>M.S.N. Gonzaga University 2006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S.N. Gonzaga University 2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Associate Degree in Nursing Montana State Univ-Northern 1992</td>
</tr>
<tr>
<td>MAXWELL, BRUCE D</td>
<td>Professor, Land Resources and Environmental Sciences</td>
<td>Ph.D. Oregon State University 1990</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Montana State Univ-Bozeman 1984</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Montana State Univ-Bozeman 1977</td>
</tr>
<tr>
<td>MAYER, DOROTHY “DALE”</td>
<td>Assistant Professor, Nursing</td>
<td>Ph.D. Oregon Health Sciences Univ 2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. U of California-San Francisco 1986</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Univ of Mary Hardin-Baylor 1980</td>
</tr>
<tr>
<td>MCCI, GEORGE S</td>
<td>Professor Emeritus of Architecture</td>
<td>Ph.D. University of Colorado-Boulder 1968</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Univ of California-Berkeley 1964</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of Colorado-Boulder 1957</td>
</tr>
<tr>
<td>MCCI, MARCELLA A</td>
<td>Professor, Microbiology</td>
<td>Ph.D. Washington University 1984</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Univ of California-San Diego 1976</td>
</tr>
<tr>
<td>MCCOY, ELIZABETH M</td>
<td>Professor Emeritus of Ext. 4H Youth Development</td>
<td>M.S. Montana State Univ-Bozeman 1972</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of Montana State Univ 1967</td>
</tr>
<tr>
<td>MCCOY, THOMAS J</td>
<td>Professor, Plant Sciences</td>
<td>Ph.D. Univ of MN - Minneapolis 1980</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Univ of Wisconsin-Madison 1984</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Univ of Wisconsin-Madison 1973</td>
</tr>
<tr>
<td>MCDERMOTT, TIMOTHY R</td>
<td>Professor, Land Resources &amp; Environmental Sciences</td>
<td>Ph.D. Univ of MN - Minneapolis 1989</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Univ of MN - Minneapolis 1985</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of Nebraska-Lincoln 1982</td>
</tr>
<tr>
<td>MCGLYNN, BRIAN L</td>
<td>Assoc Professor, Land Resources &amp; Environmental Sciences</td>
<td>Ph.D. SUNY Coll of Env Sci/Forestry 2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. SUNY Coll of Env Sci/Forestry 1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Gettysburg College 1993</td>
</tr>
<tr>
<td>MCGLYNN, PATRICIA A</td>
<td>Assistant Professor, Extension</td>
<td>Ph.D. Cornell University 2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Cornell University 2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. SUNY Coll Ag/techn Cohlake 2001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Associate of Applied Science SUNY Coll Ag/techn Cohlake 2001</td>
</tr>
<tr>
<td>MCGOWEN, PATRICK TRACY</td>
<td>Assistant Professor, Civil Engineering</td>
<td>Ph.D. Univ of California-Irvine 2006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Montana State Univ-Bozeman 1996</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Montana State Univ-Bozeman 1994</td>
</tr>
<tr>
<td>MCGUIRE, CHARLES F</td>
<td>Professor Emeritus of Plant/Soil/Env. Science</td>
<td>Ph.D. University of Iowa 1980</td>
</tr>
<tr>
<td>MCKENZIE, DAVID E</td>
<td>Associate Research Professor, Physics</td>
<td>Ph.D. University of Delaware 1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Delaware 1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Christian Brothers University 1989</td>
</tr>
<tr>
<td>MCKITTRICK, LADEAN R</td>
<td>Adjunct Instructor, Research Engineer, Civil Engineering</td>
<td>Ph.D. Montana State Univ-Bozeman 1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Montana State Univ-Bozeman 1990</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Purdue University 1985</td>
</tr>
<tr>
<td>MCLAUGHLIN, CHARLES W</td>
<td>Adjunct Professor, Chemistry &amp; Biochemistry</td>
<td>Ph.D. University of Nebraska-Lincoln 1984</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Kansas State University 1976</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Northwest Missouri State Univ 1969</td>
</tr>
<tr>
<td>MCLAUGHLIN, DAVID C</td>
<td>Adjunct Instructor, Speech Communication</td>
<td>M.A. Webster University 1977</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. United States Military Academy 1972</td>
</tr>
<tr>
<td>MCLAUSD, BRUCE R</td>
<td>Professor Emeritus, Electrical &amp; Computer Engineering</td>
<td>Ph.D. University of Colorado-Boulder 1968</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Colorado-Boulder 1967</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Colorado State University 1961</td>
</tr>
<tr>
<td>MCMANON, THOMAS E</td>
<td>Professor, Wildlife Management</td>
<td>Ph.D. University of Arizona 1984</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Arizona 1978</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. U of California-Santa Barbara 1975</td>
</tr>
<tr>
<td>MCMILLAN, JAMES A</td>
<td>Professor Emeritus of Cell Biology/Neuroscience</td>
<td>Ph.D. Univ of California-Davis 1972</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Univ of California-Davis 1970</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Univ of California-Davis 1965</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Univ of California-Davis 1963</td>
</tr>
<tr>
<td>MCNAB, THOMAS E</td>
<td>Adjunct Assistant Professor, Architecture</td>
<td>B.Arch. University of Oregon 1975</td>
</tr>
<tr>
<td>MCVAY, KENT ALAN</td>
<td>Assistant Professor, Southern Ag Research Center</td>
<td>Ph.D. University of Georgia 1999</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Georgia 1988</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Kansas State University 1986</td>
</tr>
<tr>
<td>MEADE, MICHELLE L</td>
<td>Assistant Professor, Psychology</td>
<td>Ph.D. Washington University 2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.A. Washington University 2000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Grinnell College 1996</td>
</tr>
<tr>
<td>MEISSLER, NATASCHA N</td>
<td>Asst Research Professor, Immunology &amp; Infectious Diseases</td>
<td>Ph.D. University of Wisconsin 1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.D. University of Wisconsin 1984</td>
</tr>
<tr>
<td>MELLAND, HELEN</td>
<td>Dean &amp; Professor, Nursing</td>
<td>Ph.D. University of Minnesota 1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Portland 1980</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Pacific Lutheran University 1972</td>
</tr>
<tr>
<td>MELLAND, HELEN</td>
<td>Dean &amp; Professor, Nursing</td>
<td>Ph.D. University of Wisconsin 1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.A. Washington University 2000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Grinnell College 1996</td>
</tr>
<tr>
<td>MENALLED, FABIAN DANIEL</td>
<td>Assoc Professor, Land Resources &amp; Environmental Sciences</td>
<td>Ph.D. U of Massachusetts-Amherst 1996</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Universidad de Buenos Aires 1985</td>
</tr>
<tr>
<td>MEZERDORE, CHRISTA</td>
<td>Associate Professor, Cell Biology &amp; Neuroscience</td>
<td>Ph.D. Harvard University 1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of California-Davis 1985</td>
</tr>
<tr>
<td>MEYER, JAMES</td>
<td>Assistant Professor, History &amp; Philosophy</td>
<td>Ph.D. Brown University 2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.A. Brown University 2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.A. Princeton University 2001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. McGill University 1991</td>
</tr>
<tr>
<td>MIAN, ASM AHSAN</td>
<td>Associate Professor, Mechanical Engineering</td>
<td>Ph.D. Auburn University 2000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Tuskegee University 1996</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Bangladesh Univ Engr&amp;Tech 1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Bangladesh Univ Engr&amp;Tech 1988</td>
</tr>
</tbody>
</table>
MIEITTINEN-GRANGER, HEINI M
Associate Research Professor, Microbiology
Ph.D. Yale University 1991
M.A. Abo Akademi University 1984
B.S. Abo Akademi University 1983

MILES, MARY P
Associate Professor, Health & Human Performance
Ph.D. U. of Massachusetts-Amherst 1996
M.S. University of Kansas 1990
B.S. University of Kansas 1987

MILLER, DANIEL AUGUST
Associate Professor, Civil Engineering
Ph.D. Montana State Univ-Bozeman 2002
M.S. Air Force Institute of Technology 1993
B.S. Montana State Univ-Bozeman 1987

MILLER, DAVID A
Assistant Professor, Mechanical Engineering
Ph.D. Texas A&M Univ-College Station 2000
M.S. Texas A&M Univ-College Station 1995
B.S. Texas A&M Univ-College Station 1992

MILLER, ERIC T
Associate Professor, Extension
M.S. Montana State Univ-Bozeman 1998
B.S. California State U - Chico 1994

MILLER, JOHN P
Professor, Cell Biology & Neuroscience
Ph.D. Univ of California-San Diego 1990
B.A. Univ of California-Berkeley 1972

MILLER, PERRY RAY
Professor, Land Resources & Environmental Sciences
Ph.D. Univ of MN - Minneapolis 1992
M.S. University of Guelph 1989
B.S. University of Saskatchewan 1984

MILLER, TAMARA JANE
Professor, Library
M.S. University of Kentucky 1972
B.A. University of Utah 1969

MINTON, GRETCEN
Associate Professor, English
Ph.D. University of British Columbia 1999
M.A. University of British Columbia 1995
B.A. University of Washington 1992

MINTON, TIMOTHY K
Professor, Chemistry & Biochemistry
Ph.D. Univ of California-Berkeley 1986
B.S. U of Illinois at Urbana-Champaign 1980

Miyagi, Lowell
Adjunct Assistant Professor, Earth Sciences
Ph.D. Univ of California-Berkeley 2009
B.A. Oberlin College 2004

Mokg, David W
Professor, Geology
Ph.D. University of Washington 1984
M.S. University of Washington 1978
B.S. University of Michigan-Flint 1975

Mokwa, Robert
Associate Professor, Civil Engineering
Ph.D. Virginia Polytechnic Institute 1999
M.S. Purdue University 1985
B.S. Virginia Polytechnic Institute 1984

Monahan, Susanne C
Associate Professor, Sociology
Ph.D. Stanford University 1993
A.M. Stanford University 1988
B.A. Swarthmore College 1987

Montagne, Clifford
Professor Emeritus, Land Resources & Environmental Sciences
Ph.D. Montana State Univ-Bozeman 1976
M.S. Montana State Univ-Bozeman 1971
B.A. Dartmouth College 1969

Mooney, Edward L
Associate Professor Emeritus, Industrial Engineering
Ph.D. Purdue University 1991
M.S. Purdue University 1975
B.S. Montana State Univ-Bozeman 1973

Moore-Gough, Cheryl
Adjunct Assistant Professor, Plant Sciences & Plant Pathology
M.S. Montana State Univ 2003

Moore, Colleen
Professor, Psychology
Ph.D. U of Illinois-Urbana 1978
M.A. U of Illinois-Urbana 1975
B.A. Pomona College 1972

Moore, Robert E
Professor Emeritus, Ecology
Ph.D. Univ of Texas-Austin 1982
M.S. Oregon State University 1959
B.A. University of North Texas 1952

Moreaux, Shannon J
Assistant Professor, Animal Science
D.V.M. Oklahoma State University 1998

Morgan, Gwendolyn A
Professor, English
Ph.D. University of South Florida 1989
M.A. University of South Florida 1986
B.A. McGill University 1977

Morrical, Stephen C
Adjunct Instructor, Civil Engineering
B.S. Montana State Univ-Bozeman 1984
B.S. Pennsylvania State University 1976

Morrell, Wendell L
Professor Emeritus, Land Resources & Environmental Sciences
Ph.D. University of Florida 1971
M.S. South Dakota State University 1968
B.S. South Dakota State University 1967

Morris, Brigitte
Adjunct Instructor, French
M.A. University of Montpellier 1983
B.A. University of Montpellier 1981

Morrisson, Robert W
Assoc. Professor Emeritus of English

Morrisson, Wendy Bianchi
Adjunct Instructor, Health and Human Development
M.S. Montana State Univ-Bozeman 2001
B.A. Univ of California-Berkeley 1995

Mosley, Jeffrey C
Professor, Range Science
Ph.D. Texas Tech University 1987
M.S. University of Idaho 1985
B.S. Montana State Univ-Bozeman 1981

Mueller, Marc James
Assistant Professor, German
Ph.D. University of Illinois-Chicago 2008
M.A. University of Freiburg 2001

Mumey, Brendan Marshall
Associate Professor, Computer Science
Ph.D. University of Washington 1997
M.S. University of British Columbia 1992
B.S. University of Alberta 1990

Murphy, Mary
Professor, History
Ph.D. U of N Carolina - Charlotte 1990
M.A. U of N Carolina - Charlotte 1985
B.A. U of Massachusetts-Boston 1977

Musket, Christine L
Adjunct Assistant Professor, Nursing
M.S.N. University of Cincinnati 1989
B.S.N. Montana State Univ-Bozeman 1983

Myers, Carrie Bradley
Assistant Professor, Education
Ph.D. Washington State University 2003
M.S. Iowa State University 2000
B.S. Pennsylvania State University 1997
B.S. University of Tennessee 1992

Myers, Michael J
Professor Emeritus, German
Ph.D. Univ of Wisconsin-Madison 1988
M.A. Univ of Wisconsin-Madison 1978
B.A. Univ of Wisconsin-Madison 1975

Myers, Scott M
Associate Professor, Sociology
Ph.D. Pennsylvania State University 1997
M.A. University of Tennessee 1995
B.A. Vanderbilt University 1988

Nakagawa, Wataru
Assistant Professor, Electrical & Computer Engineering
Ph.D. Univ of California-San Diego 2002
M.S. Univ of California-San Diego 1999
B.S. Stanford University 1996

Neeley, Michael P
Associate Professor, Anthropology
Ph.D. Arizona State University 1997
M.A. Arizona State University 1989
B.A. Grinnell College 1984

Neef, William A
Emeritus Professor, Film
Ph.D. Univ of Denver 1977
M.A. Univ of Denver 1972
B.A. Hofstra Univ 1952

Nehirir, M Hashem
Professor, Electrical & Computer Engineering
Ph.D. Oregon State University 1978
M.S. Oregon State University 1971
B.S. Oregon State University 1969

Nelson, Mark D
Professor, Counseling
Ed.D. University of Nevada-Reno 1994
M.A. University of Nevada-Reno 1988
M.S. University of Idaho 1984
B.S. Mesa State College 1980

Neumeier, John
Professor, Physics
Ph.D. Univ of California-San Diego 1990
M.S. Univ of California-San Diego 1986
B.S. Richard Stockton Coll of NJ 1984
<table>
<thead>
<tr>
<th>Name</th>
<th>Field</th>
<th>Degree Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEWHOUSE, META</td>
<td>Assistant Professor, Art</td>
<td>M.F.A. University of North Texas 2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Vanderbilt University 1988</td>
</tr>
<tr>
<td>NEWMAN, ROSEMARY K</td>
<td>Professor Emeritus of Plant, Soil &amp; Env.  Sc.</td>
<td>Ph.D. Rutgers, 1977</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Rutgers, 1961</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. College of Saint Elizabeth 1950</td>
</tr>
<tr>
<td>NEWMAN, STEPHANIE</td>
<td>Professor, Graphic Design</td>
<td>M.F.A. Univ of Wisconsin-Madison 1982</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. University of Virginia 1976</td>
</tr>
<tr>
<td>NEWTON, BARRY</td>
<td>Adjunct Professor</td>
<td>Diploma Thames Polytechnic 1972</td>
</tr>
<tr>
<td>OMOHUNDRO, LUKE W</td>
<td>Adjunct Professor, Medical Science</td>
<td>M.D. University of Utah 1997</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Georgetown University 1992</td>
</tr>
<tr>
<td>OSBORNE, SANDRA S</td>
<td>Associate Professor, Family and Consumer Sciences</td>
<td>Ph.D. University of Tennessee 1986</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.A. Washington State University 1980</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Lewis and Clark College 1972</td>
</tr>
<tr>
<td>OWENS, LYNN</td>
<td>Associate Professor, Health Enhancement K-12</td>
<td>Ph.D. University of Maryland 2000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.A. University of Maryland 1984</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of Maryland 1978</td>
</tr>
<tr>
<td>PADEN, CHARLES M</td>
<td>Professor, Cell Biology &amp; Neuroscience, Medical Science</td>
<td>Ph.D. University of Colorado-Denver 1978</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.A. University of Colorado-Denver 1975</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Harvard University 1969</td>
</tr>
<tr>
<td>PALMER, BETSY</td>
<td>Associate Professor, Education</td>
<td>Ph.D. Pennsylvania State University 1999</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.Ed. Washington University 1983</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Whitman College 1982</td>
</tr>
<tr>
<td>PANNWITZ, SUSANNE</td>
<td>Adjunct Instructor, German</td>
<td>Master of Education Martin-Luther University 2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.Ed. University Burg Giebichenstein 2001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. University Burg Giebichenstein 1996</td>
</tr>
<tr>
<td>PARKER, DAVID C</td>
<td>Assistant Professor, Political Science</td>
<td>Ph.D. Univ of Wisconsin-Madison 2004</td>
</tr>
<tr>
<td>PARKER, DOMINIC PAUL</td>
<td>Assistant Professor, Economics</td>
<td>Ph.D. U of California-Santa Barbara 2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Montana State Univ-Bozeman 2001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Northern Michigan University 1996</td>
</tr>
<tr>
<td>PARSONS, HENRY L</td>
<td>Professor Emeritus of Education</td>
<td>Ph.D. University of California-Berkeley 1985</td>
</tr>
<tr>
<td>PASCUAL, DAVID W</td>
<td>Professor, Immunology &amp; Infectious Diseases</td>
<td>Ph.D. University of Nebraska-Lincoln 1979</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Utah State University 1976</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Western New Mexico University 1973</td>
</tr>
<tr>
<td>PATTERN, DUNCAN T</td>
<td>Res Professor, Land Resources &amp; Environmental Sciences</td>
<td>Ph.D. Duke University 1962</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. of Massachusetts-Amherst 1959</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Amherst College 1956</td>
</tr>
<tr>
<td>PAUL, LYNN</td>
<td>Professor, Food &amp; Nutrition</td>
<td>Ph.D. Montana State Univ-Bozeman 1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Tennessee 1979</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Pennsylvania State University 1978</td>
</tr>
<tr>
<td>PAXTON, JOHN T</td>
<td>Professor, Computer Science</td>
<td>Ph.D. Univ of Michigan-Ann Arbor 1990</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. Univ of Michigan-Ann Arbor 1987</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Ohio State University 1985</td>
</tr>
<tr>
<td>PEARCY, JASON</td>
<td>Assistant Professor, Economics</td>
<td>Ph.D. University of Colorado-Boulder 2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.A. University of Colorado-Boulder 2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Purdue University 2001</td>
</tr>
<tr>
<td>PEASE, GERALD E</td>
<td>Adjunct Assistant Professor, Education</td>
<td>M.S. Southern Illinois University 1984</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Southern Illinois University 1972</td>
</tr>
<tr>
<td>PERKINS, STEVEN W</td>
<td>Professor, Civil Engineering</td>
<td>M.S. University of Colorado-Denver 1991</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Colorado-Denver 1985</td>
</tr>
<tr>
<td>RERNAROWSKI, MARK C</td>
<td>Associate Professor, Mathematics</td>
<td>Ph.D. University of Washington 1990</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Washington 1986</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of British Columbia 1983</td>
</tr>
<tr>
<td>PETERS, JOHN W</td>
<td>Professor, Chemistry &amp; Biochemistry</td>
<td>Ph.D. Virginia Polytechnic Institute 1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of Oklahoma 1989</td>
</tr>
<tr>
<td>PETERS, BRYAN</td>
<td>Adjunct Assistant Professor, Art</td>
<td>M.F.A. East Carolina Univ 2001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. Montana State Univ 1998</td>
</tr>
<tr>
<td>PETERSON, DEAN JOHN</td>
<td>Adjunct Instructor, Civil Engineering</td>
<td>M.S. Colorado State University 1989</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. North Dakota State University 1974</td>
</tr>
<tr>
<td>PETERSON, DEBBIE F</td>
<td>Adjunct Assistant Professor, Nursing</td>
<td>M.S. University of Maryland 1991</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Montanta State Univ-Bozeman 1998</td>
</tr>
<tr>
<td>PETERSON, JAMES N</td>
<td>Professor Emeritus, Electrical &amp; Computer Engineering</td>
<td>Ph.D. Iowa State University 1980</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Idaho 1967</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of Idaho 1965</td>
</tr>
<tr>
<td>PETERSON, KIMBERLY K</td>
<td>Adjunct Assistant Professor, Nursing</td>
<td>M.N. Montanta State Univ-Bozeman 2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Montanta State Univ-Bozeman 1998</td>
</tr>
<tr>
<td>PETERSON, ROBERT K</td>
<td>Professor, Land Resources &amp; Environmental Sciences</td>
<td>Ph.D. University of Nebraska-Lincoln 1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.S. University of Nebraska-Lincoln 1991</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. Iowa State University 1987</td>
</tr>
<tr>
<td>PETRONE, ROBERT A</td>
<td>Assistant Professor, English</td>
<td>Ph.D. Michigan State University 2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M.A. Northern Arizona University 2002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.A. SUNY College at Geneseo 1996</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. University of Florida 1986</td>
</tr>
<tr>
<td>PHILLIPPI, MEGHAN J</td>
<td>Assistant Professor, Extension</td>
<td>M.Ed. North Dakota State University 2006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B.S. North Dakota State University 2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Associate of Science Bismanck State College 2002</td>
</tr>
</tbody>
</table>
POTVIN, MARTHA A  
Adjunct Instructor, English  
B.S. Montana State Univ-Bozeman 1959  
M.S. Montana State Univ-Bozeman 1964  
Ph.D. Montana State Univ-Bozeman 1966

PORTER, HELEN H  
B.S. Cornell University 1987  
M.S. Utah State University 1990  
Ph.D. University of Montana 2000  
Asst Professor, Land Resources & Environmental Sciences

PIERRE, DONALD A  
Professor Emeritus, Electrical/Computer Engineering  
Ph.D. Univ of Wisconsin-Madison 1962  
M.S. Univ of Southern California 1960  
B.S. U of Illinois at Urbana-Champaign 1958

PIKE, ALEXIS  
Assistant Professor, Photography  
M.F.A. University of Iowa 1995  
M.A. Boise State University 1992

PILGERAM, ALICE L  
Asst Research Professor, Plant Sciences & Plant Pathology  
Ph.D. Montana State Univ-Bozeman 1991  
B.S. Montana State Univ-Bozeman 1983

PISK, AMBER SUZANNE  
Clinical Resource Registered Nurse  
B.A. Carroll College 2005

PITCHER, ROZAN D  
Instructor, Health Enhancement K-12  
B.S. Utah State University 1969

PITTINGRIGH, ADELE L  
Adjunct Instructor, English  
M.A. University of Chicago 1969  
B.A. University of Chicago 1967

POLACEK, KELLY M  
Assistant Professor, Library  
M.A. Indiana University 2007  
M.S. Calif Polytechnic State Univ 2000

POOLE, GEOFFREY  
Asst Professor, Land Resources & Environmental Sciences  
Ph.D. University of Montana 2000  
M.S. Utah State University 1990  
B.S. Cornell University 1987

PORTER, HELEN H  
Adjunct Instructor, English  
M.Ed. Montana State Univ-Bozeman 1986  
B.A. Montana State Univ-Bozeman 1985

POTVIN, MARTHA A  
MSU Provost and Vice President for Academic Affairs  
Professor of Ecology  
Ph.D. University of Nebraska-Lincoln 1984  
M.S. Michigan State University 1980  
B.S. University of Connecticut 1976

POWELL, SCOTT LAEL  
Asst Res Professor, Land Resources & Environmental Sciences  
Ph.D. Montana State Univ-Bozeman 2004  
M.S. Duke University 1997  
B.A. Macalester College 1993

PRAWDZIENSKI, MARYANN  
Assistant Professor, Nursing  
M.Ed. Teachers College-Columbia Univ 1970  
B.S. Long Island Univ-Brooklyn Camp 1967

PREScott, BARBARA ELLEN  
Associate Clinical Professor, Nursing  
Doctor of Nursing Practice Rush University 1992  
M.A. San Diego State University 1976  
B.S. Northeastern Illinois Univ 1969

PRISCU, JOHN C  
Professor, Land Resources & Environmental Sciences  
Ph.D. Univ of California-Davis 1982  
M.S. University of Nevada-Las Vegas 1978  
B.S. University of Nevada-Las Vegas 1975

PROFOTA, TERRY L  
Adjunct Instructor, Business  
M.A. Regis University 2005  
B.B.A. Texas Technical University 1975

PULLEN, JULIE M  
Associate Clinical Professor Nursing  
M.N. Montana State Univ-Bozeman 2004  
B.S.N. Union University 1996  
M.S. Chamade University Of Honolulu 1987

PYLE, BARRY H  
Associate Research Professor, Microbiology  
Ph.D. Lincoln College - Canterbury 1985  
B.S. Montclair University 1974  
M.S. Montclair University 1971

QUI, JONG  
Associate Professor, Physics  
Ph.D. Nanjing U of Sci & Tech 1998  
B.S. Nanjing U of Sci & Tech 1995

QUARLES, SUSAN L  
Adjunct Instructor, Business  
J.D. New York Law School - NY 1990  
B.A. SUNY College at Purchase 1984

QUINN, MARK T  
Professor, Immunology & Infectious Diseases  
Ph.D. Univ of California-San Diego 1987  
B.A. Point Loma Nazarene Univ 1982

RAINEY, TREVOR JAMES  
Assistant Professor, Chemistry & Biochemistry  
Ph.D. Univ of Texas-Austin 2006  
B.S. Univ of Texas-Austin 2001

RAPH, SUSAN JEAN WALLACE  
Campus Director & Associate Clinical Professor, Nursing  
M.N. Montana State Univ-Bozeman 2001  
B.S.N. Montana State Univ-Bozeman 1982

REBANE, ALEKSANDER  
Professor, Physics  
Ph.D. Institute of Physics 1984  
M.S. Tartu State University 1981

REHBURGER, RICHARD J  
Professor, Developmental Math Gull LAI College Programs  
M.S. Montana State Univ-Bozeman 1998  
B.S. Gonzaga University 1996

REIDY, MICHAEL S  
Professor, Marketing  
Ph.D. University of Minnesota 1999  
M.B.A. Pennsylvania State University 1976  
B.A. University of Notre Dame 1991

REILLY, MICHAEL D  
Associate Professor, Electrical & Computer Engineering  
Ph.D. Montana State Univ-Bozeman 1996  
M.S. Montana State Univ-Bozeman 1992  
B.S. Youngstown State University 1988

REW, LISA  
Asst Professor, Land Resources & Environmental Sciences  
Ph.D. University of Reading 1993  
B.Sc. (Hons) University of South Hampton 1988

RICCIARDELLI, LUCIA  
Assistant Professor, School of Film & Photography  
Ph.D. U of California-Santa Barbara 2007  
M.F.A. Academy of Fine Arts-Bologna 1997  
B.S. University of Bologna 1990

RICHARDS, ABIGAIL MARIE  
Assistant Professor, Chemical & Biological Engineering  
Ph.D. Washington State University 2007  
M.S. Washington State University 2002  
B.S. Washington State University 1999

RICHMAN, ADAM D  
Associate Professor, Plant Sciences & Plant Pathology  
Ph.D. Univ of Nebraska-Lincoln 1991  
B.S. Univ of California-San Diego 1985

RICHMAN, TRACY LYN  
Adjunct Assistant Professor, Nursing  
M.S.N. University of Wyoming 2007  
B.S.N. Montana State Univ-Bozeman 2002

RIEDE, DENISE CARTER  
Adjunct Assistant Professor, Art  
M.F.A. Montana State University 2000  
B.A. Humboldt State Univ 1982

RIEDEL, CARLA MARIE  
Adjunct Professor, Physics  
Ph.D. University of Minnesota 1996  
B.S. Univ of Wisconsin-Madison 1988

RILES, JOHN H  
Professor Emeritus, Plant Sciences & Plant Pathology  
Ph.D. University of Nebraska-Lincoln 1979  
M.S. University of Nebraska-Lincoln 1972  
B.S. Colorado State University 1967

RIFS, FATHI A  
Professor, Architecture  
Ph.D. U of N Carolina - Chapel Hill 1998  
M.Arch. University of Oregon 1985  
B.Arch. American University of Beirut 1978
RILEY, JULIE A  
Adjoint Assistant Professor, Extension  
M.S. University of Montana 1986  
B.S. Montana State Univ-Billings 1982

RINK, ELIZABETH  
Assistant Professor, Community Health  
Ph.D. Oregon State University 2006  
M.S. University of Washington 1994  
B.A. University of Rochester 1987

ROBERTS, DAVID W  
Professor and Department Head, Ecology  
Ph.D. Univ of Wisconsin-Madison 1984  
M.S. University of Montana 1980  
B.S. University of Montana 1977

ROBINSON-COX, JAMES F  
Associate Professor, Statistics  
Ph.D. Iowa State University 1991  
M.A. University of Montana 1988  
B.S. Montana State Univ-Bozeman 1984

ROLL, THOMAS E  
Professor Emeritus of Anthropology  
Ph.D. Washington State University 1974  
M.A. University of Nebraska-Lincoln 1967  
B.A. University of Minnesota 1962

ROSS, ROCKFORD J  
Professor, Computer Science  
Ph.D. Washington State University 1978  
B.A. Washington State University 1970

ROSSMANN, BRIAN  
Associate Professor, Libraries  
M.L.I.S. University of Western Ontario 1994  
M.A. University of Western Ontario 1992  
B.A. University of Calgary 1990

ROSSMANN, DORALYN  
Assistant Professor, Library  
M.P.A. Montana State Univ-Bozeman 2008  
M.S. U of N Carolina - Chapel Hill 1994  
B.A. U of N Carolina - Chapel Hill 1992

ROSSO, BRENT D  
Assistant Professor, College of Business  
Ph.D. Univ of Michigan-Detroit Site 2011  
M.S. Univ of Michigan-Detroit Site 2007  
B.A. St Olaf College 2000

ROTELLA, JAY J  
Professor, Ecology  
Ph.D. University of Idaho 1990  
M.S. Washington State University 1985  
B.S. University of Vermont 1982

RUBICAM, PETER RITTENHOUSE  
Adjunct Instructor, Business  
M.B.A. Bentley University 1991  
B.S. Union College 1980

RUCKER, RANDAL R  
Professor, Agricultural Economics & Economics  
Ph.D. University of Washington 1984  
M.S. Montana State Univ-Bozeman 1980  
B.S. Montana State Univ-Bozeman 1977

RUFF, JULIE ALEXANDER  
Adjunct Assistant Professor, Nursing  
M.S.N. U of Texas HSC-San Antonio 1998  
B.S.N. Catholic University of America 1986  
B.S. University of Oklahoma 1982

RUFF, WILLIAM G  
Associate Professor, Education  
Ed.D. Univ of Texas-San Antonio 2002  
M.A. Univ of Texas-San Antonio 2000  
M.S. Webster University 1995  
B.S. Colorado State University 1978

RUNNING, ALICE  
Professor, Nursing  
Ph.D. University of Colorado-Denver 1992  
M.S.N. University of Portland 1985  
B.S.N. Minot State University 1978

RUPP, GRETCHEN  
Specialist, Civil Engineering  
M.S. Utah State University 1981  
B.A. Carleton College 1976

RUPPEL, KRISTIN T  
Associate Professor, Native American Studies  
Ph.D. Columbia University 2004  
M.A. Idaho State University 1995  
B.A. Montana Tech of Univ of Mont 1988

RUSHING, SARA L  
Assistant Professor, Political Science  
Ph.D. Univ of California-Berkeley 2006  
M.S. Univ of California-Berkeley 1996  
B.A. Mount Holyoke College 1994

RUTHERFORD, AMANDA CUNDY  
Adjunct Instructor, Mechanical Engineering  
M.S. Virginia Tech - Blacksburg 1999  
B.S. Montana State Univ-Bozeman 1997

RUTHERFORD, STEVEN  
Adjunct Associate Professor, Mechanical & Industrial Engr  
Ph.D. Univ of Queensland 1993  
Bachelor Univ of Queensland 1993

RYDELL, CAROL H  
Adjunct Instructor, English  
M.A. Montana State Univ-Bozeman 1993  
M.A. University of Maryland 1984  
M.P.A. Montana State Univ-Bozeman 1982  
B.S. Northern Michigan University 1975

RYDELL, ROBERT W  
Professor, History  
Ph.D. Univ of California-Los Angeles 1980  
M.A. Univ of California-Los Angeles 1975  
A.B. Univ of California-Berkeley 1974

SAMBORSKY, DANIEL DAVID  
Research Engineer, Chemical & Biological Engineering  
M.S. Montana State Univ-Bozeman 1999  
B.S. Montana State Univ-Bozeman 1992

SANCHEZ, SALLY K  
Adjunct Instructor, Spanish  
B.S. Montana State Univ-Bozeman 1978

SANDS, DAVID C  
Professor, Plant Sciences & Plant Pathology  
Ph.D. Univ of California-Berkeley 1969  
A.B. Pomona College 1963

SARE, MICHELE  
Adjunct Assistant Professor, Nursing  
M.S.N. University of Phoenix 2005  
B.S.N. Montana State Univ-Bozeman 1977  
Associate Degree in Nursing Santa Barbara City College 1975

SAVAGE, JOHN CONWELL  
Instructor, Developmental Math Gallatin College Programs  
M.S. Montana State Univ-Bozeman 2005  
M.B.A. University of Chicago 1986  
M.S. Polytechnic University 1971  
B.S. Bucknell University 1967

SAVOE, GIANNA M  
Adjunct Instructor, Film  
M.S. Antioch University New England 1997  
B.S. Long Island Univ-Southampton 1991

SAX, KARRIN W  
Adjunct Assistant Professor, Nursing  
M.S.N. Univ of Texas-Austin 1994  
B.S.N. Minnesota State Univ, Mankato 1981

SCARRAH, WARREN P  
Professor Emeritus of Chemical Engineering  
Ph.D. Univ of Missouri-St Louis 2001  
M.S.N. Albany State University 1996  
B.S. Univ of Michigan-Ann Arbor 1986

SCHAEFFER, JURGEN R  
Professor Emeritus of Plant & Soil Science  
Ph.D. Montana State Univ-Bozeman 1976  
B.S. Montana State Univ-Bozeman 1976

SCHAPLOW, TERRY  
Adjunct Instructor, Agricultural Economics  
J.D. University of Oregon 1982

SCHAREN, ALBERT  
Research Professor Emeritus of Plant Pathology  
Ph.D. University of Montana 1987  
B.S. Montana State Univ-Bozeman 1987

SCHARFF, JANE  
Campus Director & Associate Clinical Professor, Nursing  
M.A. Montana State Univ-Bozeman 1987  
B.S.N. Montana State Univ-Bozeman 1976

SCHELL, WILLIAM JOSEPH  
Adjunct Assistant Professor, Industrial Engineering  
Ph.D. Univ of Alabama-Huntsville 2010  
B.S. Montana State Univ-Bozeman 1999  
B.S. Montana State Univ-Bozeman 1997

SCHMALZBAUER, LEAH  
Associate Professor, Sociology  
Ph.D. Boston College 2004  
M.S. London School of Economics 1996  
B.A. University of New Hampshire 1992

SCHMIDT, EDWARD E  
Associate Professor, Immunology & Infectious Diseases  
Ph.D. Oregon State University 1990  
B.A. University of Montana 1985  
B.S. University of Montana 1985

SCHMIDT, V HUGO  
Professor Emeritus of Physics  
Ph.D. University of Washington 1961  
B.S. Washington State University 1951

SCHMITT, JAMES G  
Professor, Geology  
Ph.D. University of Wyoming 1982  
M.S. University of Wyoming 1979  
B.S. Univ of Michigan-Ann Arbor 1977

SCOTT, JOSHUA BARTON  
Assistant Professor, Religious Studies  
Ph.D. Duke University 2009  
M.A. Duke University 2006  
B.A. Swarthmore College 2001
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Degree Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scott, Kim A</td>
<td>Professor, Libraries</td>
<td>M.L.S. Univ of Texas/Austin 1990&lt;sup&gt;*&lt;/sup&gt; M.A. Univ of Arkansas/Little Rock 1986 B.S. Northern Arizona University 1977</td>
</tr>
<tr>
<td>Seifert, Christine E</td>
<td>Adjunct Instructor, Early Childhood Education</td>
<td>M.S. Idaho State Univ-Bozeman 1996 B.S. Concordia College 1975</td>
</tr>
<tr>
<td>Seifert, John</td>
<td>Associate Professor, Health and Human</td>
<td>M.S. Idaho State Univ-Bozeman 1996 B.S. Boise State University 1984</td>
</tr>
<tr>
<td>Seright, Teresa J</td>
<td>Assistant Professor, Nursing</td>
<td>Ph.D. University of North Dakota 2010 M.S.N. University of North Dakota 2006 B.S.N. Minot State University 2002 Associate Degree in Nursing Dickinson State University 1986</td>
</tr>
<tr>
<td>Seymour, Joseph D</td>
<td>Professor, Chemical &amp; Biological Engineering</td>
<td>Ph.D. Univ of California-Davis 1994 B.S. Florida State University 1990</td>
</tr>
<tr>
<td>Shaffer, Daniel L</td>
<td>Professor Emeritus, Chemical &amp; Biological Engineering</td>
<td>Ph.D. Pennsylvania State University 1971 M.S. Pennsylvania State University 1968 B.S. University of Delaware 1966</td>
</tr>
<tr>
<td>Shanahan, Elizabeth A</td>
<td>Associate Professor, Political Science</td>
<td>B.A. Idaho State University 2004 M.S. Idaho State University 1994 B.A. Dartmouth College 1986</td>
</tr>
<tr>
<td>Sharpe, Tia L</td>
<td>Adjunct Assistant Professor, Electrical &amp; Computer Engineering</td>
<td>M.S. Montana State Univ-Bozeman 1992 B.S. Montana State Univ-Bozeman 1986</td>
</tr>
<tr>
<td>Shaw, Colin A</td>
<td>Asst Res Professor, Geology/Dir, Undergrad Scholars Program</td>
<td>Ph.D. University of New Mexico 2001 M.S. University of Colorado-Boulder 1995 B.A. Macalester College 1985</td>
</tr>
<tr>
<td>Shaw, Michael</td>
<td>Adjunct Instructor, Business</td>
<td>M.A. Webster University 1979 B.A. University of Montana 1976</td>
</tr>
<tr>
<td>Shehryar, Omar</td>
<td>Associate Professor, Marketing</td>
<td>Ph.D. Univ of Missouri-Columbia 2005 M.B.A. 1996 B.S. 1993</td>
</tr>
<tr>
<td>Sheldhammer, Clinton V</td>
<td>Professor Emeritus of Agricultural Education</td>
<td>Ph.D. Colorado State University 1982 M.S. Montana State Univ-Bozeman 1979 B.S. Montana State Univ-Bozeman 1967</td>
</tr>
<tr>
<td>Sheppard, John W</td>
<td>Associate Professor, Computer Science</td>
<td>Ph.D. Johns Hopkins University 1997 M.S. Johns Hopkins University 1990 Ph.D. Southern Methodist University 1983</td>
</tr>
<tr>
<td>Sherman, Jamie</td>
<td>Assistant Research Professor, Plant Sciences &amp; Plant Pathology</td>
<td>Ph.D. Colorado State Univ 1994</td>
</tr>
<tr>
<td>Sherwood, John E</td>
<td>Professor, Plant Sciences and Plant Pathology</td>
<td>Ph.D. Michigan State University 1984 M.S. Colorado State University 1979 B.S. University of Vermont 1973</td>
</tr>
<tr>
<td>Sherwood, Linda M</td>
<td>Adjunct Professor, Microbiology</td>
<td>Ph.D. Michigan State University 1985 M.S. Univ of Alabama-Tuscaloosa 1978 B.S. Western Illinois University 1975</td>
</tr>
<tr>
<td>Ship, Clifford M</td>
<td>Professor Emeritus of Music</td>
<td></td>
</tr>
<tr>
<td>Shreffler-Grant, M Jean</td>
<td>Professor, Nursing</td>
<td>Ph.D. University of Washington 1996 M.S.N. University of Cincinnati 1978 B.S.N. University of Cincinnati 1971</td>
</tr>
<tr>
<td>Siewoff, Christina</td>
<td>Associate Professor, Nursing</td>
<td>Ph.D. Wayne State University 1996 M.A.S. Wayne State University 1977 B.S.N. Wayne State University 1973</td>
</tr>
<tr>
<td>Simpson, Patricia Anne</td>
<td>Associate Professor, German</td>
<td>Ph.D. Yale University 1988 M.S. Yale University 1985 M.A. Yale University 1984 A.B. Smith College 1980</td>
</tr>
<tr>
<td>Sindelar, Susan L</td>
<td>Adjunct Instructor, Medical Science</td>
<td>M.S. Montana State Univ-Bozeman 1978 B.S. Montana State Univ-Bozeman 1966</td>
</tr>
<tr>
<td>Singel, David J</td>
<td>Associate Provost and Professor, Chemistry &amp; Biochemistry</td>
<td>Ph.D. University of Chicago 1981 B.S. Pennsylvania State University 1977</td>
</tr>
<tr>
<td>Sisk, Carol K</td>
<td>Adjunct Assistant Professor, Nursing</td>
<td>M.N. Montana State Univ-Bozeman 2011 B.B.S. Montana State Univ-Bozeman 1977</td>
</tr>
<tr>
<td>Skoglund, Linnea</td>
<td>Assistant Professor, Plant Sciences &amp; Plant Pathology</td>
<td>Ph.D. Colorado State Univ</td>
</tr>
<tr>
<td>Skidmore, Mark Leslie</td>
<td>Associate Professor, Geology</td>
<td>Ph.D. University of Alberta 2001 M.S. University of Alberta 1995 B.A. Cambridge University 1992</td>
</tr>
<tr>
<td>Smith, Adina J</td>
<td>Associate Professor, Counseling</td>
<td>Ph.D. University of Georgia 1998 M.S. University of Georgia 1995 B.A. Emory University 1989</td>
</tr>
<tr>
<td>Smith, Bruce A</td>
<td>Associate Professor, Extension</td>
<td>M.B.A. Calif Polytechnic State Univ 1987 B.S. Montana State Univ-Bozeman 1979 B.S. Montana State Univ-Bozeman 1977</td>
</tr>
<tr>
<td>Smith, Douglas Edward</td>
<td>Adjunct Instructor, Civil Engineering</td>
<td>M.S. University of Maine-Orono 1995 B.S. Montana State Univ-Bozeman 1993</td>
</tr>
<tr>
<td>Smith, Janet L</td>
<td>Adjunct Instructor, Nursing</td>
<td>B.S.N. Univ of Northern Colorado 1983</td>
</tr>
<tr>
<td>Smith, Jessi Lyn</td>
<td>Associate Professor, Psychology</td>
<td>Ph.D. University of Utah 1992 M.S. University of Utah 2000 B.A. Univ of Colorado-Colo Springs 1997</td>
</tr>
<tr>
<td>Smith, John R</td>
<td>Adjunct Professor, Architecture</td>
<td>Ph.D. University of Hawaii - Manoa 2006</td>
</tr>
</tbody>
</table>
SWENSON, ROBERT J
Professor Emeritus of Physics
Ph.D. Lehigh University 1961
M.S. Lehigh University 1958
B.S. Montana State Univ-Bozeman 1956

SWINFORD, STEVEN
Associate Professor, Sociology
Ph.D. Bowling Green State University 1996
M.A. Bowling Green State University 1994
B.A. Marian College 1991

SZILAGYI, ROBERT
Associate Professor, Chemistry & Biochemistry
Ph.D. University of Veszprem 1998
M.S. University of Veszprem 1995
B.S. University of Veszprem 1993

TALBERT, LUTHER E
Professor, Plant Sciences & Plant Pathology
Ph.D. Univ of Wisconsin-Madison 1985
M.S. North Carolina St Univ-Raleigh 1982
B.S. North Carolina St Univ-Raleigh 1979

TARABOCHIA, DAWN S
Assistant Professor, Community Health
Ph.D. University of Utah 2008
M.S. University of Idaho 1998
B.S. University of Idaho 1997

TAYLOR, CARSON G
Adjunct Instructor, Business
J.D. Duke University 1970
B.A. Amherst College 1967

TAYLOR, DEBORAH COOPER
Adjunct Assistant Professor, Art
M.A. Montana State Univ 2000
B.A. Montana State Univ 1997

TAYLOR, SHANNON V
Associate Professor, Management
Ph.D. University of Colorado-Boulder 1976
M.A. University of Colorado-Boulder 1973
B.A. Colorado College 1971

TEINZTE, MARTIN
Associate Professor, Chemistry/Biochemistry, Medical Science
Ph.D. Univ of California-San Diego 1981
B.S. California Inst of Technology 1976

TESAR, EMILY J
Adjunct Assistant Professor, Nursing
M.S.N. University of Phoenix 2006
B.S.N. University of Illinois-Chicago 1999

TESS, MICHAEL W
Professor Emeritus, Animal Science
Ph.D. University of Nebraska-Lincoln 1981
M.S. Montana State Univ-Bozeman 1978
B.S. Calif Polytechnic State Univ 1971

THOMAS, AMY
Associate Professor, English
Ph.D. Duke University 1992
M.S. University of Maryland 1985
B.A. Randolph-Macon College 1981

THOMPSON, JOHN PATRICK
Associate Professor, Spanish
Ph.D. Univ of Michigan-Ann Arbor 2003
B.A. Universidade de Santiago de Santiago 1995

THULL, JAMES JOHN
Associate Professor, Libraries
M.L.I.S. Univ of Wisconsin-Milwaukee 2004
M.A. Univ of Wisconsin-Milwaukee 2001
B.S. Univ of Wisconsin-La Crosse 1998

TILLACK, PETER B
Assistant Professor, Japanese
Ph.D. University of Oregon 2006
M.A. University of Oregon 1997
B.A. University of Arizona 1987

TOBIAS, RONALD
Professor, Film
M.F.A. Bowling Green State University 1971
B.A. Kansas State University 1969

TOMA, LINDA ANN
Assistant Professor
Ph.D. Oregon Health Sciences Univ 2010
M.S.N. University of New Mexico 1992
B.A. University of Montana 1987

TRIPET, BRIAN
Assistant Research Professor, Chemistry & Biochemistry
B.S. University of Alberta 1999
Ph.D. University of Alberta 1988
B.S. Brock University 1988

TROUT, PAULA
Professor Emeritus, English
Ph.D. University of British Columbia 1975
M.A. Univ of MN - Minneapolis 1968
B.A. Roosevelt University 1966

TSURUTA, SACHIKO
Professor, Physics
Ph.D. Columbia Univ Sc of Eng&AppSci 1964
M.A. Columbia Univ Sc of Eng&AppSci 1959
B.A. University of Washington 1956

UCHIDA, MASAKI
Assistant Research Professor, Chemistry & Biochemistry
Ph.D. Kyoto University 2002
B.S. Kyoto University 1999

UTZINGER, ROBERT C
Professor Emeritus of Architecture
M.Arch. Univ of Michigan-Ann Arbor 1969
B.Arch. University of Colorado-Denver 1961

VALERIANO, GREGORY EDWARD
Adjunct Instructor, Philosophy
M.A. Princeton Theological Seminary 1997
B.A. Wheaton College 1994
B.A. Wheaton College 1990

VAN COLLER, JAN D
Assistant Professor, Photography
M.F.A. University of New Mexico 2003
B.F.A. Arizona State University 1995

VAN LUCHENE, ROBERT D
Professor, Civil Engineering
Ph.D. Purdue University 1985
M.S. Montana State Univ-Bozeman 1979
B.S. Montana State Univ-Bozeman 1978

VAN WIJREN, REBEKAH
Assistant Professor, Plant Sciences & Plant Pathology
M.L.A. Univ of Michigan 2009
M.S. Univ of Michigan 2009
B.A. St. Olaf College 2001

VARRICCHIO, DAVID J
Associate Professor, Geology
Ph.D. Montana State Univ-Bozeman 1995
M.S. University of Georgia 1989
B.S. Cornell University 1984

VERBANAC, JOSEF S
Adjunct Instructor, English
M.A. Bowling Green State University 1997
B.A. Montana State Univ-Bozeman 1992

VERSVAEL, STEPHEN
Assistant Professor, Music
M.M. University of Kansas 2003
B.M.Ed. South Dakota State University 1999

VIDEO, MICHAEL J
Adjunct Instructor, Music
M.A. Univ of MN - Minneapolis 1996
B.A. Montana State Univ-Bozeman 1992

VINCENT, KAREN LYNN
Professor Emerita, Management

VORONTsov, ANTON
Assistant Professor, Physics
Ph.D. Northwestern University 2004
M.S. Nizhny Novgorod State Univ 1998
B.S. Nizhny Novgorod State Univ 1996

VOYICH, JOVANKA M
Adjunct Professor, Immunology/Infectious Disease & Medical Science
Ph.D. Montana State Univ-Bozeman 2001
B.S. Montana State Univ-Bozeman 1994

WADEWORTH, SUSAN I
Adjunct Instructor, Music
M.M. Boston University 1974
B.M. New England Conservatory of Music 1969

WALKER, BRETT L
Regents Professor, History
Ph.D. University of Oregon 1997
M.A. Portland State University 1993
B.A. College of Idaho 1989

WALKER, ROBERT A
Professor, Chemistry & Biochemistry
Ph.D. Univ of Wisconsin-Madison 1995
B.A. Dartmouth College 1990

WALKER, RUSSELL B
Professor, Mathematics
Ph.D. Univ of California-Berkeley 1977
M.A. Univ of California-Berkeley 1974
B.A. Univ of California-Berkeley 1972

WALLER, SARA
Associate Professor, History & Philosophy
Ph.D. Loyola University of Chicago 1999
M.A. Loyola University of Chicago 1993
B.A. U of Massachusetts-Dartmouth 1989

WALSH, OLGA
Assistant Professor, Research Center
Ph.D. Oklahoma State University 2009
M.S. Oklahoma State University 2006
B.S. St Petersburg State Univ 1997

WAMBOLT, CARL L
Professor Emeritus, Range Science
Ph.D. University of Wyoming 1970
M.S. University of Wyoming 1968
B.S. University of Idaho 1967

FACULTY
YARNELL, ALLEN L
Vice President, Student Affairs
Ph.D. University of Washington 1969
M.A. SUNY at Binghamton 1966
B.A. SUNY at Binghamton 1964

YELLOWTAIL, WILLIAM
Professor Emeritus, Native American Studies
B.S. Dartmouth College 1971

YOPP, DAVID A
Associate Professor, Mathematics Education
D.A. Idaho State University 1998
Ph.D. Idaho State University 1998
M.A. Indiana University 1994
M.S. Arkansas State University 1991
B.S. Arkansas State University 1990

YOST, LAUREL E
Associate Professor, Music
M.M. Colorado State University 1985
B.A. Colorado Womens College 1981

YOUNG, GREGORY D
Professor, Music
Ph.D. Univ of Michigan-Ann Arbor 1987
M.M. Univ of Michigan-Ann Arbor 1983
B.S. University of Western Ontario 1982

YOUNG, LINDA M
Associate Professor, Political Science
Ph.D. Univ of California-Davis 1987
B.A. Univ of California-Berkeley 1980

YOUNG, MARK J
Professor, Plant Sciences & Plant Pathology
Ph.D. Univ of California-Davis 1987
B.A. Univ of California-Berkeley 1980

YOUNKIN, KAY ROUB
Assistant Professor, Extension
M.Ed. Montana State Univ-Billings 2006
B.S. Montana State Univ-Bozeman 1986

YUNES, NICOLAS
Assistant Professor, Physics
Ph.D. Pennsylvania State University 2008
B.S. Washington University 2003

ZABINSKI, CATHERINE A
Assoc Professor, Land Resources & Environmental Sciences
Ph.D. Univ of MN - Minneapolis 1991
B.S. College of Saint Benedict 1983

ZAJDEL, MELODY M
Associate Professor, English
Ph.D. Michigan State University 1979
M.A. Michigan State University 1972
B.A. Baldwin-Wallace College 1971

ZALE, ALEXANDER V
Unit Leader, Montana Cooperative Fishery Research Unit
Doctor of Philosophy University of Florida 1984
M.S. Virginia Polytechnic Institute 1980
B.S. U of Massachusetts-Amherst 1978

ZAUHA, JANELLE M
Professor, Libraries
M.L.S. University of Iowa 1993
M.A. Clark University 1989
B.A. Boise State University 1984

ZHANG, TIANYU
Assistant Professor, Mathematics
Ph.D. Univ of MN - Minneapolis 2006
M.S. Univ of Hong Kong 2000
B.S. Peking University 1998

ZHU, BINGHAI
Professor, Computer Science
Ph.D. McGill University 1994
M.S. York University 1991
B.S. Shandong Normal Univ Jinan 1986

ZIDACK, NINA K
Assistant Research Professor, Plant Sciences & Plant Pathology
Ph.D. Auburn University 1993
M.S. Montana State Univ-Bozeman 1989
B.S. Montana State Univ-Bozeman 1987

ZULKOWSKI, KAREN M
Associate Professor, Nursing
D.N.S. SUNY at Buffalo 1998
M.S.N. Kent State University 1989
B.S.N. University of Akron 1972
INDEX

For the most up-to-date catalog information:
www.montana.edu/wwwcat
<table>
<thead>
<tr>
<th>INDEX</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grading Standards........................................................................54</td>
</tr>
<tr>
<td>Humanities.................................................................53</td>
</tr>
<tr>
<td>Inquiry............................................................................53</td>
</tr>
<tr>
<td>Math Accommodations..................................................55</td>
</tr>
<tr>
<td>Natural Sciences................................................................53</td>
</tr>
<tr>
<td>Purpose...........................................................................51</td>
</tr>
<tr>
<td>Quantitative Reasoning.................................................52</td>
</tr>
<tr>
<td>Research and Creative Experience..................................55</td>
</tr>
<tr>
<td>Social Sciences..................................................................53</td>
</tr>
<tr>
<td>Substitutions.....................................................................54</td>
</tr>
<tr>
<td>Ways of Knowing Courses............................................53</td>
</tr>
<tr>
<td>Core Equivalency Review Board, CERC..........................18</td>
</tr>
<tr>
<td>Counseling, Psychological Services...............................38</td>
</tr>
<tr>
<td>Course Description ..................................................301-452</td>
</tr>
<tr>
<td>Classification...................................................................501</td>
</tr>
<tr>
<td>Independent Study....................................................501</td>
</tr>
<tr>
<td>Numbering System......................................................501</td>
</tr>
<tr>
<td>Prequisites......................................................................502</td>
</tr>
<tr>
<td>Special Topics...................................................................501</td>
</tr>
<tr>
<td>Uniform Course Numbers........................................501</td>
</tr>
<tr>
<td>Credits, Transferred..................................................12</td>
</tr>
<tr>
<td>Crime, Campus.............................................................43</td>
</tr>
<tr>
<td>Crop Science Option..................................................88</td>
</tr>
<tr>
<td>Curricular Requirements, General...............................51-57</td>
</tr>
<tr>
<td>Appeals, Graduation Requirements..................................57</td>
</tr>
<tr>
<td>Catalog in Effect..............................................................51</td>
</tr>
<tr>
<td>Catalog Limitation Policy..............................................51</td>
</tr>
<tr>
<td>Core 2.0..........................................................................51</td>
</tr>
<tr>
<td>Curriculum Change..............................................................51</td>
</tr>
<tr>
<td>Degree Completion, Credits.......................................55</td>
</tr>
<tr>
<td>Graduation Requirements, Baccalaureate........................55</td>
</tr>
<tr>
<td>Honors, Graduation with.............................................57</td>
</tr>
<tr>
<td>Non-Transferable................................................................56</td>
</tr>
<tr>
<td>OnLine Catalog..............................................................51</td>
</tr>
<tr>
<td>Second Majors, Degrees..................................................55</td>
</tr>
<tr>
<td>Curriculum, Change of....................................................51</td>
</tr>
<tr>
<td>Day Care Center..............................................................35</td>
</tr>
<tr>
<td>Dean of College’s Office..............................................37</td>
</tr>
<tr>
<td>Dean’s and President’s List..........................................65</td>
</tr>
<tr>
<td>Degree Completion..............................................................51</td>
</tr>
<tr>
<td>Application for Baccalaureate Degree Form..................56</td>
</tr>
<tr>
<td>Credits..............................................................................55</td>
</tr>
<tr>
<td>Grade Point Average, Graduation....................................56</td>
</tr>
<tr>
<td>Required Registration....................................................55</td>
</tr>
<tr>
<td>With Honors.................................................................57</td>
</tr>
<tr>
<td>Degrees, Undergraduate...............................................76-72</td>
</tr>
<tr>
<td>Dental Hygiene...............................................................41</td>
</tr>
<tr>
<td>Design Projects, College of Engineering........................133</td>
</tr>
<tr>
<td>Dietetics Option...............................................................126</td>
</tr>
<tr>
<td>Dietitian, Registered, Health and.................................65</td>
</tr>
<tr>
<td>Human Development......................................................123</td>
</tr>
<tr>
<td>Directory...........................................................................51</td>
</tr>
<tr>
<td>Administrative Offices..................................................51</td>
</tr>
<tr>
<td>Board of Regents of Higher Education..............................51</td>
</tr>
<tr>
<td>Central Administration....................................................51</td>
</tr>
<tr>
<td>Colleges..........................................................................51</td>
</tr>
<tr>
<td>Disabilities, Accommodation...........................................46</td>
</tr>
<tr>
<td>Disability, Re-entry, and Veterans........................................46</td>
</tr>
<tr>
<td>Services.................................................................iv, v, 9, 41</td>
</tr>
<tr>
<td>Distance Degree...............................................................7, 20</td>
</tr>
<tr>
<td>Diversity, Core 2.0..........................................................52</td>
</tr>
<tr>
<td>Graduate School..............................................................209-299</td>
</tr>
<tr>
<td>Division of Health Sciences..........................................20</td>
</tr>
<tr>
<td>Health Professions Advising..........................................20, 26</td>
</tr>
<tr>
<td>Montana Area Health Education Center........................21</td>
</tr>
<tr>
<td>Montana Office of Rural Health..................................22</td>
</tr>
<tr>
<td>WWAMI Medical Program...........................................20, 21, 274</td>
</tr>
<tr>
<td>Donations.................................................................iv, v, 8</td>
</tr>
<tr>
<td>Drinking Policy, Alcohol............................................43</td>
</tr>
<tr>
<td>Drop/Add Courses..........................................................64</td>
</tr>
<tr>
<td>Drug Policy.................................................................43</td>
</tr>
<tr>
<td>Early Admission.............................................................43</td>
</tr>
<tr>
<td>Academic Eligibility....................................................16</td>
</tr>
<tr>
<td>Application Procedure..................................................16</td>
</tr>
<tr>
<td>Early Childhood Education and Child Services..............124</td>
</tr>
<tr>
<td>Early Childhood Education Option..................................116</td>
</tr>
<tr>
<td>Earth Sciences, Dept. of.............................................165</td>
</tr>
<tr>
<td>Ecology and Evolution Option.....................................157</td>
</tr>
<tr>
<td>Biological Sciences......................................................157</td>
</tr>
<tr>
<td>Ecology, Department of.............................................155</td>
</tr>
<tr>
<td>Economics.................................................................168</td>
</tr>
<tr>
<td>Economics Minor.........................................................168</td>
</tr>
<tr>
<td>Education, Department of.........................................114</td>
</tr>
<tr>
<td>Education, Health and Human Development, College of.....111</td>
</tr>
<tr>
<td>Academic Advising.......................................................123</td>
</tr>
<tr>
<td>Admission, Teacher Education Program........................112, 113</td>
</tr>
<tr>
<td>Coaching Certification...................................................122</td>
</tr>
<tr>
<td>Coaching Minor.............................................................128</td>
</tr>
<tr>
<td>College Distance Programs..........................................7, 20</td>
</tr>
<tr>
<td>College Preparatory Courses...............................117, 117, 205</td>
</tr>
<tr>
<td>College Preparatory Curriculum...................................11, 16</td>
</tr>
<tr>
<td>College Probability.............................................................67</td>
</tr>
<tr>
<td>College Writing, Core 2.0....................................................52</td>
</tr>
<tr>
<td>Colleger.................................................................52, 1, 28</td>
</tr>
<tr>
<td>Computer Engineering, Electrical.................................143</td>
</tr>
<tr>
<td>Computer Engineering, Electrical and Computer Engineering.................143</td>
</tr>
<tr>
<td>Computer Engineering, Electrical and Computer Engineering.................142</td>
</tr>
<tr>
<td>Computer Facilities.........................................................7</td>
</tr>
<tr>
<td>Computer Science, Dept. of........................................141</td>
</tr>
<tr>
<td>Consensual Relationships...............................................46</td>
</tr>
<tr>
<td>Construction Engineering Technology..........................139</td>
</tr>
<tr>
<td>Contemporary Issues in Science, Core 2.0..........................52</td>
</tr>
<tr>
<td>Contents............................................................................ii</td>
</tr>
<tr>
<td>Continuing College Probation.........................................67</td>
</tr>
<tr>
<td>Continuing Education...................................................7, 20, 277</td>
</tr>
<tr>
<td>Cooperative Education, Electrical and Computer Engineering.................142</td>
</tr>
<tr>
<td>Cooperative Education/Internship..................................134</td>
</tr>
<tr>
<td>Core 2.0 ...........................................................................52-55</td>
</tr>
<tr>
<td>Additional Research and Creative Experience Courses.................54</td>
</tr>
<tr>
<td>Appeals......................................................................55, 55</td>
</tr>
<tr>
<td>Arts.................................................................................53</td>
</tr>
<tr>
<td>College Writing.............................................................52</td>
</tr>
<tr>
<td>Continental Issues in Science........................................52</td>
</tr>
<tr>
<td>Credit Policies..............................................................54</td>
</tr>
<tr>
<td>Diversity.........................................................................52</td>
</tr>
<tr>
<td>Foundation Courses.......................................................52</td>
</tr>
<tr>
<td>Gallatin College Programs...........................................205</td>
</tr>
<tr>
<td>College of Agriculture..................................................74</td>
</tr>
<tr>
<td>College of Arts and Architecture.......................................92</td>
</tr>
<tr>
<td>College of Business.........................................................104</td>
</tr>
<tr>
<td>College of Education, Health and Human Development........111-131</td>
</tr>
<tr>
<td>College of Engineering..........................................................131</td>
</tr>
<tr>
<td>College of Letters and Science......................................152-197</td>
</tr>
<tr>
<td>College of Nursing.........................................................197-202</td>
</tr>
<tr>
<td>College of Technology, Great Falls..................................117, 117, 216</td>
</tr>
<tr>
<td>College Preparatory Courses, Gallatin College Programs............205</td>
</tr>
<tr>
<td>College Preparatory Curriculum.................................11, 16</td>
</tr>
<tr>
<td>College Probability.............................................................67</td>
</tr>
<tr>
<td>College Writing, Core 2.0....................................................52</td>
</tr>
<tr>
<td>Colleger.................................................................52, 1, 28</td>
</tr>
<tr>
<td>Computer Engineering, Electrical and Computer Engineering.................143</td>
</tr>
<tr>
<td>Computer Engineering, Electrical and Computer Engineering.................142</td>
</tr>
<tr>
<td>Computer Facilities.........................................................7</td>
</tr>
<tr>
<td>Computer Science, Dept. of........................................141</td>
</tr>
<tr>
<td>Consensual Relationships...............................................46</td>
</tr>
<tr>
<td>Construction Engineering Technology..........................139</td>
</tr>
<tr>
<td>Contemporary Issues in Science, Core 2.0..........................52</td>
</tr>
<tr>
<td>Contents............................................................................ii</td>
</tr>
<tr>
<td>Continuing College Probation.........................................67</td>
</tr>
<tr>
<td>Continuing Education...................................................7, 20, 277</td>
</tr>
<tr>
<td>Cooperative Education, Electrical and Computer Engineering.................142</td>
</tr>
<tr>
<td>Cooperative Education/Internship..................................134</td>
</tr>
<tr>
<td>Core 2.0 ...........................................................................52-55</td>
</tr>
<tr>
<td>Additional Research and Creative Experience Courses.................54</td>
</tr>
<tr>
<td>Appeals......................................................................55, 55</td>
</tr>
<tr>
<td>Arts.................................................................................53</td>
</tr>
<tr>
<td>College Writing.............................................................52</td>
</tr>
<tr>
<td>Continental Issues in Science........................................52</td>
</tr>
<tr>
<td>Credit Policies..............................................................54</td>
</tr>
<tr>
<td>Diversity.........................................................................52</td>
</tr>
<tr>
<td>Foundation Courses.......................................................52</td>
</tr>
<tr>
<td>TechLink Center, MSU.........................................................6</td>
</tr>
<tr>
<td>Thermal Biology Institute..................................................6, 254</td>
</tr>
<tr>
<td>Western Transportation Institute........................................6</td>
</tr>
<tr>
<td>Women in Research and Teaching ........................................6</td>
</tr>
<tr>
<td>Centers and Programs, Research, see also Service and Support...........2-7</td>
</tr>
<tr>
<td>CERC, Core Equivalency Review Board..........................18</td>
</tr>
<tr>
<td>Certificate Programs, Gallatin Coll. Programs.......................205</td>
</tr>
<tr>
<td>Certifications, Licensures, Health and Human Development..............122</td>
</tr>
<tr>
<td>Chemical Analysis, Laboratory........................................4</td>
</tr>
<tr>
<td>Chemical and Biological Engineering, Department of ......................154</td>
</tr>
<tr>
<td>Chemical Engineering.......................................................134</td>
</tr>
<tr>
<td>Chemistry and Biochemistry, Dept. of................................161</td>
</tr>
<tr>
<td>Chemistry Minor, Chemistry and Biochemistry......................163</td>
</tr>
<tr>
<td>Chemistry, Professional, Option, Chemistry and Biochemistry..............161</td>
</tr>
<tr>
<td>Civil Engineering, Dept. of..................................................136</td>
</tr>
<tr>
<td>Civil Engineering Option..................................................137</td>
</tr>
<tr>
<td>Class Size, Average.............................................................1</td>
</tr>
<tr>
<td>Classification of Students.......................................................65</td>
</tr>
<tr>
<td>Classification, Course..........................................................501</td>
</tr>
<tr>
<td>CLEP College Level Exam. Prog., 15, 42, 54, 60, 61...........Coaching Certification, Health and Human Development........122</td>
</tr>
<tr>
<td>Coaching Minor.............................................................128</td>
</tr>
<tr>
<td>College Distance Programs..........................................7, 20</td>
</tr>
<tr>
<td>College Preparatory Courses...............................117, 117, 205</td>
</tr>
<tr>
<td>College Preparatory Curriculum.................................11, 16</td>
</tr>
<tr>
<td>College Probability.............................................................67</td>
</tr>
<tr>
<td>College Writing, Core 2.0....................................................52</td>
</tr>
<tr>
<td>Colleger.................................................................52, 1, 28</td>
</tr>
<tr>
<td>Computer Engineering, Electrical and Computer Engineering.................143</td>
</tr>
<tr>
<td>Computer Engineering, Electrical and Computer Engineering.................142</td>
</tr>
<tr>
<td>Computer Facilities.........................................................7</td>
</tr>
<tr>
<td>Computer Science, Dept. of........................................141</td>
</tr>
<tr>
<td>Consensual Relationships...............................................46</td>
</tr>
<tr>
<td>Construction Engineering Technology..........................139</td>
</tr>
<tr>
<td>Contemporary Issues in Science, Core 2.0..........................52</td>
</tr>
<tr>
<td>Contents............................................................................ii</td>
</tr>
<tr>
<td>Continuing College Probation.........................................67</td>
</tr>
<tr>
<td>Continuing Education...................................................7, 20, 277</td>
</tr>
<tr>
<td>Cooperative Education, Electrical and Computer Engineering.................142</td>
</tr>
<tr>
<td>Cooperative Education/Internship..................................134</td>
</tr>
<tr>
<td>Core 2.0 ...........................................................................52-55</td>
</tr>
<tr>
<td>Additional Research and Creative Experience Courses.................54</td>
</tr>
<tr>
<td>Appeals......................................................................55, 55</td>
</tr>
<tr>
<td>Arts.................................................................................53</td>
</tr>
<tr>
<td>College Writing.............................................................52</td>
</tr>
<tr>
<td>Continental Issues in Science........................................52</td>
</tr>
<tr>
<td>Credit Policies..............................................................54</td>
</tr>
<tr>
<td>Diversity.........................................................................52</td>
</tr>
<tr>
<td>Foundation Courses.......................................................52</td>
</tr>
</tbody>
</table>
INDEX

481

Women’s and Gender Studies Minor ........................................... 197
Writing English Minor ......................................................... 170
Liberal Arts Studio Option .................................................. 96
Liberal Studies ..................................................................... 176
Libraries, MSU .................................................................. 7
Library and Information Resources ........................................... 7
Computer Facilities ................................................................ 7
Libraries, MSU .................................................................. 7
Montana Public Television, KUSM .......................................... 5, 8
Licensure, Teacher Education ................................................ 113
Literature English Minor ....................................................... 170
Literature Option, English .................................................... 169
Livestock Management and Industry Option ......................... 77
Living Options ..................................................................... 31
Majors, Undergraduate ......................................................... 1, 70-73
Management of Information
Technology Minor .................................................................. 111
Management Option ................................................................ 108
Manufacturing, Montana Extension Center .............................. 5, 6
Marketing Option .................................................................. 110
Math Accommodations, Core 2.0 .......................................... 55
Mathematical Sciences, Dept. of ............................................ 178
Mathematics Minor ................................................................ 180
Mathematics Option, Mathematics ......................................... 178
Mathematics Option, Elementary Education ......................... 116
Mathematics Teaching Option ............................................... 179
Meal Plans ............................................................................. 32
Mechanical & Industrial Engineering
Department of .................................................................... 146
Mechanical Engineering ......................................................... 147
Mechanical Engineering Technology ...................................... 149
Medical College Admission Test, MCAT .............................. 42
Medical Laboratory Science Option ........................................ 183
Microbiology ........................................................................ 481
Microbial Systems Option, Biotechnology ............................... 81
Microbiology, Dept. of ......................................................... 181
Microbiology Minor ................................................................ 184
Microbiology Option ............................................................. 182
MidYear Retention Intervention ............................................. 40
Military Experience ................................................................ 13
Military Science .................................................................... 151
Military Studies Minor .......................................................... 152
Minors, Undergraduate ........................................................ 72
Non-Teaching ....................................................................... 72
Teaching .......................................................... 72, 118
Modern Languages and Literatures, Dept. of ......................... 184
Montana Army Health Education Center ................................. 5, 6
Montana Campus Compact ................................................... 27
Montana Cooperative Fishery Research Unit ......................... 4
Montana INBRE (IDeA Network of Biomedical Research Excellence) ......................................................... 5
Montana Manufacturing Extension Center .............................. 5, 6
Montana Office of Rural Health ................................................ 4, 20, 22
Montana Public Television, KUSM ........................................... 5, 8
Montana Space Grant Consortium .......................................... 5, 24
Montana State University Billings .......................... ii, v, 187
Montana State University Great Falls .................................... 87
College of Technology .......................................................... 87
Montana State University Northern ....................................... ii, v
Montana Water Center .......................................................... 5, 5
MSU Foundation, Inc ............................................................ 8
MSU Fridays ...................................................................... 10
MSU History ........................................................................ 1
MSU Leadership Fellows Certificate ....................................... 292
MSU Statistics .................................................................... 1
Museum of the Rockies .......................................................... 8
Museum Studies .................................................................... 8, 175
Museum Studies Minor .......................................................... 175
Music, Dept. of .................................................................... 101
Music Education .................................................................. 102
Music Minor ......................................................................... 104
Music Technology .................................................................. 105
N Grade ............................................................................. 65
Name Change ....................................................................... 60
Nanomaterials, Center for Bio-Inspired ................................ 197
NASC .......................................................... 3, 5, 104, 108
Native Health Partnerships, Center for ......................... 3, 187, 188
National Honor Society, Golden Key .................................... 34
National Student Exchange ........................................... 7, 23, 292
Native American Studies Minor .............................................. 196
Native American Studies, Department of ................................ 25, 196
Natural Resources and Rangeland Ecology ................................ 86
Natural Resources and Rangeland Ecology Minor .................. 87
Natural Sciences, Core 2.0 .................................................... 53
Newspaper, Student, Exponent ............................................ 35
Non-Degree Students, International ...................................... 15
Non-Degree Undergraduate Students
Applications, Structure .......................................................... 17
Attendance Parameters ....................................................... 17
Northern, Montana State University .................................. ii, v
NSF Experimental Program to Stimulate Competitive Research, EPSciO ......................................................... 4
Numbering System, Course .................................................. 901
Nursing, College of ......................................................... 197
Admission to the Nursing Major ........................................... 199
Admission to the Pre-Nursing Major ..................................... 199
Application for Nursing Major .............................................. 199
Curriculum ........................................................................ 201
Expenses ........................................................................... 201
Nursing Vision, Mission, Philosophy .................................... 197
Objectives, Nursing Program .............................................. 198
Programs .......................................................... 198, 199
Progression Through Nursing Curriculum ........................... 199
Requirements .......................................................... 201
Standards of Nursing Profession ........................................... 200
Transfer Students .......................................................... 200
Nutrition Science Option ..................................................... 126
Offices, Administrative ........................................................ 81
Optical Technology Center, OptTec ........................................ 5, 28, 254
Organizational Biology Option .............................................. 138
Biological Sciences .............................................................. 138
Organization ........................................................................ 35
Orientation Office .............................................................. 10
Orientation, New Student .................................................... 9, 10, 38
Outdoor Recreation Center .................................................. 35
Out-of-State Fees ............................................................... 47-48
Paleontology, Museum of the Rockies ................................... 8
Paleontology Option ............................................................. 164
Parent Handbook .............................................................. 8
Parent/Family Association, MSU ............................................ 8
Parent/Family Fall Weekend .................................................. 8
Pass/Fail Elective Courses .................................................... 63
Pass/Fail Grading ............................................................... 63
Personal Trainer/Strength Coach, Certified, ......................... 63
Health and Human Development ......................................... 122
Phi Kappa Phi .................................................................... 34
Philosophy ........................................................................... 188
Philosophy and Religion Option ........................................... 188
Philosophy Minor ................................................................ 188
Philosophy Option ............................................................. 188
Photography Option ........................................................... 190
Physics, Dept. of ................................................................. 189
Physics Minor ..................................................................... 190
Planetarium, Taylor .............................................................. 8
Plant Biology Option ........................................................... 88
Plant Growth Center ............................................................ 5
Plant Science ........................................................................ 87
Plant Sciences and Plant Pathology, Department of ........................... 80, 81-82, 87-88
Plant Systems Options, Biotechnology ................................... 80
Politics, University .............................................................. iii, 42-46
Policy, Teacher Education ................................................... 113
Political Institutions Option, Political Science ......................... 192
Political Theory Option, Political Science ............................... 192
Political Science, Dept. of .................................................... 191
Post Baccaleaurate Fees ....................................................... 47
Post Office, Campus ............................................................ 42
Pre-Core, Business ............................................................. 106
Pre-Dental .......................................................... 26, 208
Pre-Law ........................................................................... 26
Pre-Medical ....................................................................... 20, 26
Premedicine, Predentistry, Preoptometry ............................... 20, 26
Prerequisites, Course .......................................................... 592
President’s Office ............................................................... 32
Preveterinary Program ......................................................... 27, 88
PRIDE, Code of Excellence ................................................ 106
Probation, College .............................................................. 67
Probation, Continuing College ............................................ 67
Probation, Scholastic .......................................................... 66
Probation, University .......................................................... 67
Professional Counselor or Clinical
Professional Counselor, Licensed, Health and Human Development ......................................................... 123
Professional Option, Computer Science ................................ 141
Professional Option, Physics ............................................... 189
Proficiency Examination Program, PEP ................................ 42
Programs of Instruction ....................................................... 69, 70
Alphabetical Listing ............................................................. 70
Property, Personal ............................................................. 33, 43
Psychology, Dept. of ........................................................... 192
Psychological Science Option, Psychology ................................ 192
Psychology Minor ............................................................. 193
Public Relations, AMSU .................................................... 56
Public Television, Montana .................................................. 5, 8
Quantitative Reasoning, Core 2.0 ......................................... 52
Quantum Options, Liberal Studies ......................................... 178
Radio Station, KGLT .......................................................... 35
Rangeland Ecology and Management Option ....................... 87
Rape, Support Services ....................................................... 42
Ratio, Faculty/Student ......................................................... 1
Recreation, Outdoor ............................................................ 35
Recreational Sports and Fitness ............................................. 35
Refund Drop/add .............................................................. 49
Room and Board ............................................................... 33
University Withdrawal ......................................................... 49
Regulation
Classification of Students .................................................. 65
Dropping and Adding .......................................................... 64
Examinations .................................................................... 65
Fresh Start .......................................................................... 65
Probation, Scholastic .......................................................... 66
Suspension, Scholastic ......................................................... 66
University Withdrawal ......................................................... 65
Reinstatement .................................................................. 66
Religious Studies Option, History ......................................... 174
Research and Creative Activities ........................................... 24
Research and Creative Experience, Core 2.0 ......................... 53
Research, Experimental Program to Stimulate Competitive Research ......................................................... 4
Research, see also Centers and Programs .............................. 24
Residence Hall Association, RHA ......................................... 31
Residence Halls
Application for Housing ..................................................... 31
Exemptions ........................................................................ 31
Facilities ............................................................................. 31
Laundry ............................................................................. 33
Living Options ............................................................... 31
Meal Plans .......................................................................... 32
Payment of Charges ........................................................... 32
Prepayment ........................................................................ 31
Property, Personal ............................................................. 33
Refund, Room and Board .................................................... 33
Residence Hall Association, RHA ......................................... 31
Residence Hall Visitaton Policy ............................................... 32
ResNet .......................................................... 32, 33, 34, 35
Room Furnishings .............................................................. 32
Semaner Charges .............................................................. 32
Residence
Appraisals ....................................................................... 18
InState Requirements ......................................................... 59
Residency Requirements, Teacher Education ....................... 113
ResNet .......................................................... 32, 33, 34, 35
Retention Intervention, Mid-Year ......................................... 40
Retention Requirements, College of Engineering ................. 132

481
### INDEX

**ROTC**  
Air Force ........................................ 151, 410  
Army ........................................ 151  
Four-Year Program ................................ 151  
Army ROTC Scholarships and Financial Assistance........ 151  
Two-Year Program ................................ 151

**Scholarships**  
Scholarship, University ................................ 66

**Education**  
Elementary Education ................................ 116  
Science, The Environment, Technology, and Society, History .... 172  
Second Majors, Degrees .................................. 55  
Secondary Education .................................. 117  
Secondary Education Minors ........................................ 117  
Semester Dates .................................. inside front cover  
Seminars .................................. 34

**Service and Outreach**  
Agricultural Experiment Station  
Research Centers .................................. 4, 6  
Engineering Experiment Station ............... 6  
Extended University ........................................ 7, 20  
Extension ........................................ 6  
Montana Manufacturing Extension Center 5, 6  
Service Learning ........................................ 27  
Service Organizations .................................. 34  
Armed Air Society .................................. 34  
Circle K ........................................ 34

**SETs** ........................................ 34

**Sextual Harassment**  
Assault Policy ........................................ 43  
Harassment, Intimidation ........................................ 45  
Shannon Weatherly Lecture ........................................ 38

**Sibele Dinosaur Complex**  
Museum of the Rockies ........................................ 8

**Smoking Policy** ........................................ 43

**Social Sciences**  
Core 20 ........................................ 53  
Social Sciences ........................................ 118  
Sociology ........................................ 195  
Sociology Minor ........................................ 195  
Soil and Water Science Option .................. 85-84  
Soil Science Minor ........................................ 85  
Sororities .......................................... 54  
Space Grant Consortium, Montana  
Space Grant Consortium, Montana .......................... 5, 24  
Space Science and Engineering Laboratory, SSEL ........................................ 25

**Spanish**  
K-12 Teaching Option, Modern Languages ............... 186  
SPEAK Exam ........................................ 19  
Spanish K-12 Teaching Option, Modern Languages ............... 186

**Special Education**  
Elementary Education ........................................ 116  
Special Topics, Courses ........................................ 301  
Special University Attendance .................................. 17  
Spectrum Lab, The ........................................ 6, 27, 268  
Sports, Varsity ........................................ 1, 36  
Statistics Minor ........................................ 181  
Statistics Option ........................................ 179

**Strand University Building** ........................................ 38  
Streamline Transit ........................................ 34

**Student Activities**  
Student Activities, Office .................................. 33  
Student Affairs ........................................ 37, 40  
Student Exchange, National .................................. 7, 23, 202  
Student Government, ASMSU .................................. 34-36

**Student Sports**  
Recreational Sports and Fitness .................................. 35

**Technology, Optical Center**  
Laboratory, SSEL ........................................ 254

**Testing**  
ACT ........................................ 42  
College Level Examination Program, CLEP .................. 15, 42, 54, 60, 61  
General Education Development Program, GED ............... 42  
Graduate Management Admission Test, GMAT .................. 42  
Graduate Record Examination, GRE .................. 42  
Law School Admission Test, LSAT .................. 42  
Medical College Admission Test, MCAT .................. 42  
Proficiency Examination Program, PEP .................. 42  
SPEAK ........................................ 19  
TOEFL ........................................ 19

**Textbooks**  
Testing Fees ........................................ 48  
Testing Service ........................................ 42  
Toffee ........................................ 37  
Thermal Biology Institute ........................................ 6, 254  
TOEFL ........................................ 19  
Transcripts ........................................ 40  
Transfer Credits ........................................ 12  
Transfer Credits, Evaluation of .................................. 12  
Transfer Students ........................................ 12

**Transportation**  
Streamline Bus ........................................ 34  
Tribal Colleges ........................................ 19  
Tutorial Program, Smartycats .................................. 49  
Undergraduate Scholars Program .................................. 28, 292  
Undergraduate Scholars Program, USP .......... 28, 292  
University Honors Program .................................. 28, 195, 203  
University of Washington School of Medicine .......... 20, 21, 274

**University Policies**  
Policies, Accommodation for Persons with Disabilities .............. 46  
Consensual Relationships ........................................ 46  
Equal Opportunity/Affirmative Action Policy .............. iii, 44  
Sexual Harassment and Sexual Intimidation .................... iv, 45  
Sexually Explicit Material in the Workplace ................... iv, 46  
University Compliance, Office of .................................. 46

**University Regulations**  
inside front cover, 42-46  
Academic Conduct Guidelines  
Affirmative Action, Nondiscrimination .................................. iii, 44  
Alcohol/Drug/Tobacco Policy ........................................ 45  
Appeals ........................................ 43  
Compliance Officer, University .................................. 46  
Consensual Relationships ........................................ 46  
Crime, Campus ........................................ 43  
Disabilities, Accommodation .................................. 46  
FERPA, Family Education Rights and Privacy Act ............. 59

**University Studies**  
Program ........................................ 29, 195  
System ........................................ ii  
University Withdrawal ........................................ 65  
University, Extended ........................................ 7, 20  
Vehicles .......................................... 1, 36

**Wildlife**  
Habitat Ecology and Management Option .................. 87  
Wildlife Center for Bison and Wildlife Health .................. 3

**WWAMI Medical Program** .................................. 20, 21, 274
Parking areas indicated by grey shading.