COURSE DESCRIPTIONS

Listings in this section are grouped according to discipline or rubric, and rubrics are listed alphabetically. 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), you should consult the Schedule of Classes, published prior to preregistration each semester, for the most up-to-date information on course availability.

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.

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
- 500-599 - Graduate Courses (except senior, 5th year courses in the School of Architecture)
- 600-699 - Graduate Courses

Core Courses

Core courses are designated by a letter following the course number (e.g. Engl 121W). the following letters are used to specify the core groups:

- F - Fine Arts
- H - Humanities
- M - Mathematics
- N - Natural Sciences
- S - Social Sciences
- W - Written Communication
- V - Verbal Communication
- G - Global/Multicultural

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.
- TUT - Tutorial: Individualized instruction. Students work one-on-one with the instructor.

Graduate Credit

Courses which may be taken for graduate credit are designated by a 500 or 600 number.

- 280, 480, 580 - Special Topics (group or class project)
- 276, 476, 576 - Internship
- 489, 490 - Undergraduate Scholars Program
- 575 - Graduate Research - Paper (professional paper or professional project)
- 588 - Professional Development
- 589 - Graduate Consultation
- 590 - Master's Thesis
- 689 - Reading and Research
- 690 - Doctoral Thesis

These 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. Some courses such as Special Topics, Individual Problems 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. Credits earned beyond the maximum cannot be applied toward graduation.

Special Topics and Individual Problems Courses

The maximum number of credits allowed toward graduation in 280 plus 480 courses in each rubric is 12, and the maximum number of 470 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 570 credits applicable to a graduate degree depends upon the degree. No 470 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....).

**Undergraduate 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. 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.

**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.

**ACCT 325 ACCOUNTING INFORMATION SYSTEMS**

FS, Su 3 cr. LEC 3

PREREQUISITE: ACCT 327 or consent of instructor.

A study of business documents, document flowcharts, internal controls in both a manual and a computerized accounting information system, fraud, and auditing a computer-based accounting information system. Students will also work with a computerized accounting software program.

**ACCT 327 INTERMEDIATE ACCOUNTING I**

FS 3 cr. LEC 3

PREREQUISITE: ACCT 225.

Financial accounting and reporting as promulgated by the accounting profession. A study of the conceptual framework of accounting and standard-setting process; preparation of financial statements and disclosures; present value measurements and applications; and accounting for current assets; plant assets, natural resources, intangible assets, current and long-term liabilities, and related income and expense elements.

**ACCT 328 INTERMEDIATE ACCOUNTING II**

FS, Su 3 cr. LEC 3

PREREQUISITE: ACCT 327.

Financial accounting and reporting as promulgated by the accounting profession. A study of stockholders' equity, dilutive securities, earnings per share, investments, revenue recognition, income taxes, pensions, leases, accounting changes, error analysis, the statement of cash flows, and full disclosure in financial accounting.

**ACCT 400 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.

**ACCT 421 PRINCIPLES OF AUDITING**

FS 3 cr. LEC 3

PREREQUISITE: ACCT 325 and ACCT 328.

Theory and practice of financial auditing.

**ACCT 425 INCOME TAX ACCOUNTING**

FS 3 cr. LEC 3

PREREQUISITE: ACCT 327 or consent of instructor.

Federal income tax law and its application to individual taxpayers. Analysis of the way in which federal income taxes impact financial decisions. The use of computer technology in tax planning, and in the preparation and filing of federal income tax returns.

**ACCT 432 GOVERNMENTAL ACCOUNTING**

FS 3 cr. LEC 3

PREREQUISITE: ACCT 225 or consent of instructor.

A study of the accounting principles and financial reporting unique to state and local governments.

**ACCT 433 COST/MANAGEMENT ACCOUNTING I**

FS 3 cr. LEC 3

PREREQUISITE: ACCT 327.

Manufacturing accounting, cost-volume-profit analysis, master and flexible budgeting, income effects of alternatives, relevance and pricing decisions, cost allocation, joint costing, process costing, and relevant cost/mangement accounting topics and readings.
Course Descriptions

ACCT 454 COST/MANAGEMENT ACCOUNTING II
On Demand 3 cr. 3 LEC 3
PREREQUISITE: ACCT 453.
Advanced cost/management accounting with a continuation of traditional topics and current readings in cost/management accounting.

ACCT 436 ADVANCED ACCOUNTING
ES 3 cr.  LEC 3
PREREQUISITE: ACCT 328.
Business consolidation, foreign currency transactions and translations, and partnerships, and other advanced accounting topics.

ACCT 470 INDIVIDUAL PROBLEMS
On Demand 1-5 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of Associate Dean.
Directed research and study on an individual basis.

ACCT 476 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.

ACCT 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.

ACCT 489 UNDERGRADUATE RESEARCH/CREATIVIY INSTRUCTION
ES, Su 1 -2 cr. RCT May be be repeated. Max 4 cr.
COREQUISITE: ACCT 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

ACCT 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
ES, 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.

ACCT 500 SEMINAR
ES, Su 1 cr. SEM 1
PREREQUISITE: Admission to the MPAC program or consent of MPAC Advisory Council.
Topics offered at the graduate level which are not covered in regular graduate courses. Students participate in preparing and presenting discussion material.

ACCT 511 ADVANCED AUDITING
S 3 cr. LEC 3
PREREQUISITE: ACCT 421 and admission to MPAC Program or consent of MPAC Advisory Council.
Auditing theory as promulgated by the accounting profession with special emphasis on pronouncements issued by the Auditing Standards Board.

ACCT 548 INTERNATIONAL ACCOUNTING
F 3 cr. LEC 3
PREREQUISITE: ACCT 328 or consent of instructor.
This course introduces students 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 problems of U.S. multinational corporations.

ACCT 525 ACCOUNTING THEORY AND ADVANCED ISSUES IN ACCOUNTING
S 4 cr. LEC 4
PREREQUISITE: Admission to MPAC Program or consent of MPAC Advisory Council.

ACCT 526 CORPORATE/TAX RESEARCH METHODOLOGY
S 3 cr. LEC 3
PREREQUISITE: ACCT 425 and admission to MPAC Program or consent of MPAC Advisory Council.
Introduction to the research methods used to analyze and evaluate tax issues. Federal income taxation of corporations, partnerships, and exempt entities.

ACCT 527 ESTATE & GIFT TAXATION
F 3 cr. LEC 3
PREREQUISITE: ACCT 425.
Study of the federal tax law as it relates to the taxation of gifts and estates. Emphasis is placed on planning techniques for minimizing estate and gift taxes.

ACCT 528 LEGAL ISSUES FOR ACCOUNTANTS
S 4 cr. LEC 4
PREREQUISITE: BUS 361 and admission to MPAC Program or consent of MPAC Advisory Council.
A survey course to cover legal issues for accounting students including contract and sales law, commercial paper, secured transactions, bankruptcy, property, partnership, corporations, securities regulation, theories of accountants' liability, wills, estates and trusts.

ACCT 529 SURVEY OF RESEARCH IN ACCOUNTING
ES, Su 3 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
This survey course introduces students to research in accounting. Students will develop skills for researching accounting issues in accounting journals and other authoritative sources. Emphasis is placed on issues involving the preparation and use of financial accounting information. Students will develop a framework to enhance their ability to analyze financial accounting issues throughout their careers. Students will also write a research paper based on a review of the accounting literature.

ACCT 532 GOVERNMENTAL AND NONPROFIT ACCOUNTING II
On Demand 3 cr. LEC 3.
PREREQUISITE: ACCT 452.
A more in-depth study of the uniquely different characteristics of accounting and financial reporting for the governmental and nonprofit sectors of the U.S. economy. A continuation of ACCT 452.

ACCT 570 INDIVIDUAL PROBLEMS
On Demand 1-6 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.

ACCT 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.

ACCT 576 INTERNSHIP
On Demand 2 - 12 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.

ACCT 580 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.

AGEC Agricultural Economics
Department of Agricultural Economics and Economics (406) 994-3701

AGEC 280 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.

AGEC 290 UNDERGRADUATE RESEARCH
ES, Su 1-8 IND
PREREQUISITE: ECON 101S and approval of instructor.
Intended for lower division undergraduate research/undergraduate scholars program. The student will work closely with the supervising faculty.

AGEC 300 SEMINAR
ES 1 cr. SEM 1
PREREQUISITE: Junior standing.
Current agricultural problems and writings of people in the profession. Topics vary each semester; check with the department before registering.

AGEC 321 ECONOMICS OF AGRICULTURAL MARKETING
F 3 cr. LEC 3
PREREQUISITE: ECON 201 or ECON 250SG.
Issues in marketing agricultural products and the economic principles that assist in analysis of these issues. Factors affecting market prices, and topics associated with methods of marketing are considered. Emphasis on Montana products.

AGEC 521 ECONOMICS OF AGRICULTURAL MARKETING
F 5 cr. LEC 5
PREREQUISITE: ECON 201 or ECON 250SG.
Issues in marketing agricultural products and the economic principles that assist in analysis of these issues. Factors affecting market prices, and topics associated with methods of marketing are considered. Emphasis on Montana products.
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AGEC 341 FARM & RANCH MANAGEMENT  
F 3 cr. LEC 3  
PREREQUISITE: ECON 201 or ECON 250SG.  
Basic tools of economic decision making useful to farm and ranch managers are examined.

AGEC 345 AGRICULTURAL FINANCE & CREDIT ANALYSIS  
F 3 cr. LEC 3  
PREREQUISITE: ECON 201 or ECON 250SG.  
Alternatives available for 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.

AGEC 421 ADVANCED AGRICULTURAL MARKETING  
S 3 cr. LEC 3  
PREREQUISITE: AGEC 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.

AGEC 441 FARM PLANNING & MANAGEMENT  
F 3 cr. LEC 3  
PREREQUISITE: AGEC 341, MATH 170 or Math 181.  
Intermediate topics in planning and managing farms, ranches, and related businesses are examined. Linear programming models to determine optimal combinations of crop and livestock enterprises are developed for representative farms and ranches in Montana. Optimal asset replacement models are examined.

AGEC 445 AGribUSINESS ADMINISTRATION  
S 3 cr. LEC 3  
PREREQUISITE: ECON 301, STAT 216, and either AGEC 345 or FIN 352.  
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.

AGEC 451C ECONOMICS OF AGRICULTURAL POLICY  
F 3 cr. LEC 3  
PREREQUISITE: ECON 301.  
Senior capstone course. Consideration of the economic problems of American agriculture and of alternative solutions. Rigorous analysis of the causes and consequences of government programs (both past and present) on consumers, producers, and taxpayers.

AGEC 467 QUANTITATIVE METHODS IN ECONOMICS  
F 3 cr. LEC 3  
PREREQUISITE: ECON 301, MATH 221 and approval of instructor.  
Static and dynamic optimization models in economics. Linear programming and its extensions analyzed as economic models. Nonlinear and dynamic programming models are introduced. Emphasis on formulating economic and management problems in terms of quantitative models.

AGEC 470 INDIVIDUAL PROBLEMS  
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.

AGEC 480 SPECIAL TOPICS  
On Demand 1 - 4 cr. LEC 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.

AGEC 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION  
F, Su 1 - 2 cr.RCT May be repeated. Max 4 cr.  
COREQUISITE: AGEC 490.  
Classroom instruction associated with directed undergraduate research/creative activity projects.

AGEC 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY  
F, Su 1 - 8 cr. IND  
PREREQUISITE: ECON 201, junior standing, and approval of instructor.  
Intended for upper division undergraduate research/undergraduate scholars program. The student will work closely with the supervising faculty.

AGEC 514 AGRICULTURAL PRICE ANALYSIS  
S 3 cr. LEC 3  
PREREQUISITE: ECON 561.  
Theoretical and working knowledge of agricultural market prices, demand, and supply. Analysis of commodity models supported by statistical modeling under conventional econometrics and time series analysis, useful for market response and forecasting evaluation.

AGEC 570 INDIVIDUAL PROBLEMS  
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.

AGEC 580 SPECIAL TOPICS  
On Demand 1 - 4 cr. LEC 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.

AGEC 589 GRADUATE CONSULTATION  
F, 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.

AGEC 590 MASTER'S THESIS  
F, Su 1 - 10 cr. IND May be repeated.  
PREREQUISITE: Master's standing.

AGED 105 MICROCOMPUTERS IN AGRICULTURE  
S 3 cr. LEC 1 LAB 2  
Utilizing and selecting microcomputer software for the broad field of agriculture. Decision aid software, spreadsheets, database, telecommunication, financial records, and word processing are emphasized. Application of computers to control, monitor, and calibrate devices in addition to aiding management decisions.

AGED 200 SEMINAR  
On Demand 1 cr. SEM 1 Maximum 4 cr.  
Topics offered at the lower division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

AGED 251V LEADERSHIP DEVELOPMENT FOR AGribUSINESS & INDUSTRY EMPLOYEES  
F 5 cr. LEC 2 LAB 1  
Process of developing and managing individuals by providing leadership and guidance at all levels of personnel development. Self concepts developed through situational leadership and management, principles of people management, goal setting, and belief systems. Collaborative learning and field experience utilized.

AGED 253 AGRICULTURAL EDUCATION IN PUBLIC SCHOOLS  
S 3 cr. LEC 3  
Establish a philosophy of agricultural education at the secondary, middle school, and elementary level. Instructional content in agriculture science, mechanics, and leadership will be identified. Principles needed in developing agricultural experiences associated with agricultural education will be presented.

AGED 280 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.

AGED 299 PHILoSOPhy AND PROGRAmS IN EXTENSION  
S alternate years, to be offered 1999 3 cr. LEC 3  
PREREQUISITE: ED CI 209.  
Designed to introduce prospective county extension educators the fundamental philosophy, activities, and educational and planning methods underlying the Cooperative Extension Service. Identification of educational and program needs and providing instructional programs for rural and urban youth and adults.

AGED 514 POWER SYSTEMS OPERATION & CONTROL  
F 4 cr. LEC 2 LAB 2  
A study of the internal combustion engine systems and the electronic control of these systems. Emphasis on power source, fuel, electrical, ignition, and emission systems utilized on modern engines. Lab activities include testing, adjusting, and servicing the various systems.

AGED 516 AGRICULTURAL TRANSMISSION SYSTEMS  
S 4 cr. LEC 2 LAB 2  
PREREQUISITE: AGED 314.  
The application of belts, chains, gears, hydraulics and electricity and electronic sensing devices used in agriculture to transfer and control energy. Major emphasis will be on hydraulics and farmstead electrification.

AGED 555 CONSTRUCTION TECHNOLOGY  
F 5 cr. LEC 1 LAB 2  
Various construction systems that are used to
construct structures on site. Includes all aspects of the construction industry including basic planning, materials, estimating, building techniques, managing, and the actual construction of building projects.

AGED 355 COOPERATIVE BUSINESS
PRINCIPLES AND PRACTICES
F 3 cr. LEC 1
The course is to 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 355 TEACHING PRACTICES
F 1 cr. LAB 1
Corequisite: To be taken concurrently with EDS 352
Provides additional experience in planning, teaching, and evaluating lessons in agriculture education.

AGED 400 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.

AGED 417C CRITICAL THINKING FOR THE FOOD AND FIBER SYSTEM
S 3 cr. LEC 1 LAB 2
Prerequisite: Senior standing in AGED or AOT.
Senior capstone course. Following an overview of current food and fiber system issues related to Montana, teams of students will select a problem to analyze, and will propose solutions to solve the problem. Application of prior knowledge, communication skills, and higher order thinking skills will be required.

AGED 472 INDIVIDUAL PROBLEMS
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 476 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.

AGED 478 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 489 UNDERGRADUATE RESEARCH/CREATIVITY ACTIVITY INSTRUCTION
ES,Su 1 - 2 cr. RCT may be repeated. Max 4 cr.
Classroom instruction associated with directed undergraduate research/creative activity projects.

AGED 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
ES,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.

AGED 500 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 506 RESEARCH METHODS
On Demand 3 cr. LEC 3
Prerequisite: Graduate standing, STAT 216, or concurrent enrollment in EDG 492.
Principles and techniques of research appropriate for planning, conducting, and reporting agricultural or technology education research.

AGED 507 PROGRAM PLANNING & EVALUATION
S, Su 3 cr. LEC 3
Prerequisite: Graduate standing.
A study of the literature on specific facets of program planning and evaluation applicable to agricultural and technology education and extension education. Application of program planning and evaluation concepts through individual and class projects.

AGED 510 AGRICULTURAL LITERACY IN MONTANA SCHOOLS
On Demand 1 cr. LEC 1 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.

ANTH Anthropology
Department of Sociology and Anthropology
(406) 994-4201

ANTH 101SG INTRO TO ANTHROPOLOGY
ES 3 cr. LEC 3
Survey of the subfields of anthropology: archaeological, biological anthropology, linguistics, and cultural anthropology.

ANTH 201SG HUMAN PREHISTORY
F 3 cr. LEC 3
Prerequisite: ANTH 101
An introduction to human evolution and world prehistory.

ANTH 304SG CULTURE & SOCIETY
F 3 cr. LEC 3
Prerequisite: ANTH 101
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.

ANTH 280 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.

ANTH 503 BIOLOGICAL ANTHROPOLOGY
S 3 cr. LEC 3
Prerequisite: Junior standing, ANTH 201

Human evolution and biology from an anthropological perspective: the fossil record, nonhuman primates, osteology, biological variation, and basic techniques of physical anthropology.

ANTH 510 NATIVE NORTH AMERICA
S 3 cr. LEC 3
Prerequisite: Junior standing, ANTH 204
Prehistory, ethnography and cultural ecology of Indians in North America; analysis and comparison of representative cultures by culture areas.

ANTH 529SG ARCHAEOLOGY OF NORTH AMERICA
F 3 cr. LEC 3
Prerequisite: Junior standing, ANTH 201.
Prehistoric cultural adaptations and developments in North America from the earliest archaeological evidence through historic times; basic archaeological methods and theory.

ANTH 588SG LANGUAGE & CULTURE
Fall alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: Junior standing, ANTH 204.
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.

ANTH 540 ARCHAEOLOGY FIELD SCHOOL
Su on demand 1-9 cr. LEC 1
Prerequisite: ANTH 101.
A summer of archaeological field work at a location away from the University; training in excavation and laboratory methods. (Offered when funding available.)

ANTH 550 OLD WORLD PREHISTORY
S alternate years, to be offered 2002 3 cr. LEC 3
Prerequisite: Junior standing, ANTH 201.
Cultures of Europe, Africa, and Asia from human beginnings through the origins of civilizations.

ANTH 560 PEOPLES AND PREHISTORY
On demand 3 cr. LEC 3
Prerequisite: Junior standing, ANTH 204.
The prehistory and culture ecology of a culture area.

ANTH 570 MEDICAL ANTHROPOLOGY
On demand 3 cr. LEC 3
Prerequisite: Junior standing, ANTH 201, ANTH 204.
Anthropological data, principles and theory applied to aspects of health maintenance in a transcultural context. Native practices and the analysis of health problems associated with periods of accelerated cultural change.

ANTH 400 SEMINAR
On Demand 2 cr. SEM 2 Maximum 4 cr.
Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ANTH 405SG MYTH, MAGIC, & RELIGION
F 3 cr. LEC 3
Prerequisite: None required but some may be determined necessary by each offering department.
Forms of religious representation and practice in cultural and historical context; from liminality and symbolic innovation to mythic charters and social transformations, cosmological scenarios and ritual forms are explored in this course.
ANTH 425C ANTHROPOLOGICAL THEORY
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: Junior standing, ANTH 204.
Senior capstone course. An analysis of theories of anthropological science within their social context of development; exploration and critique of representative classics.

ANTH 426C SOCIAL ORGANIZATION
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: Junior standing, ANTH 204.
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.

ANTH 435C CONTEMPORARY PACIFIC SOCIETIES
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: Junior standing, ANTH 101 and ANTH 204.
Current ethnological and theoretical considerations of creative cultural processes in relation to classical adaptations and world views of Pacific Island peoples.

ANTH 438C LITHIC TECHNOLOGY
On Demand 5 cr. LEC 2 LAB 1
PREREQUISITE: Junior standing, ANTH 201
Hands-on approach to analysis of prehistoric manufacturing techniques. Typically focuses on a single technology (stone, bone, ceramics, etc.). Students attempt to replicate prehistoric implements.

ANTH 470 INDIVIDUAL PROBLEMS
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.

ANTH 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.

ANTH 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: ANTH 490.
Course instruction associated with directed undergraduate research/creative activity projects.

ANTH 490 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.

ARCH Architecture
School of Architecture
(406) 994-4255

ARCH 121F INTRODUCTION TO DESIGN
FSu 1 cr. LEC 2 RCT 1
PREREQUISITE: Course prerequisites as determined for each offering.
Introduction to the design process and critical creative process through the study of design and allied professions. The course will explore the evolution, formation, interaction of cultural values as expressed through design, and the creative process in Europe, North America, and Asia. Ethical, economic and political forces which have been manifested in design will be investigated. Individual projects where students apply and explore critical issues with a creative process are required.

ARCH 152 DESIGN FUNDAMENTALS II
FSu 4 cr. RCT 2 STU 2
PREREQUISITE: Course prerequisites as determined for each offering.
Introduction to the architectural theories advocated by groups and individuals during the 2nd half of the 20th century. Emphasis is placed on comparing modern and post-modern philosophies of European, Asian, and American architects.

ARCH 225 INTRODUCTION TO ARCHITECTURAL THEORY
FS 2 cr. LEC 2
Introduction to the architectural theories advocated by groups and individuals during the 2nd half of the 20th century. Emphasis is placed on comparing modern and post-modern philosophies of European, Asian, and American architects.
ARCH 242 BASIC ARCHITECTURAL STRUCTURES  
S 4 cr. LEC  
PREREQUISITE: MATH 160 and PHYS 205.  
Condensed introduction to structural design/analysis as applied to architectural works; basic statics and mechanics of rigid bodies and architectural forms; strength and serviceability concepts using stress and strain assessments; application of analytical and intuitive structural concepts in a design context. Notebook computer required.

ARCH 253 ARCHITECTURAL DESIGN I  
F 5 cr. LEC/RCT 3 STU 5  
PREREQUISITE: ARCH 152. Admission into the environmental design program.  
COREQUISITE: ARCH 261.  
Small-scale architectural design projects requiring integration of basic spatial and visual concepts into design solutions emphasizing fundamental principles of order and unity, architectural notation, constituents of form, openings and light, structural awareness, nature of materials, and architectural composition. Integrated special topics include architectural graphics and design drawing conventions.

ARCH 254 ARCHITECTURAL DESIGN II  
S 5 cr. LEC 1 RCT 1 STU 5  
PREREQUISITE: ARCH 253.  
Continuation of ARCH 253 using small- to medium-size projects extending the development of the design process to basic site and adjacency analysis, diagramming, and integration of fundamental concepts of context. Integrated special topics are architectural graphics including the perspective and fundamental computer applications for information access, introductory 2D drawing, and 3D modeling. Notebook computer required. Field trip possible.

ARCH 261 ARCHITECTURAL GRAPHICS I  
F 5 cr. LEC 1 STU 2  
COREQUISITE: ARCH 253.  
Basic techniques in architectural graphic expression. Course emphasizes an observation drawing studio supplemented by design drawing lecture/demonstration sessions. Topics include free-hand, multi-view, paraline, and shade and shadow drawing techniques. Integrated topics relate to the ARCH 253 studio.

ARCH 262 ARCHITECTURAL GRAPHICS II  
S 5 cr. LEC 1 STU 2  
PREREQUISITE: ARCH 261.  
COREQUISITE: ARCH 254 and ARCH 268.  
Basic techniques in architectural graphic expression. Course emphasizes an observation drawing studio supplemented by design drawing lecture/demonstration sessions. Topics include free-hand, perspective, and shade and shadow drawing techniques. Integrated topics relate to ARCH 254 studio and ARCH 265 computer applications.

ARCH 263 ARCHITECTURAL GRAPHICS III  
S 2 cr. LEC 1 STU 1  
PREREQUISITE: ARCH 261.  
COREQUISITE: ARCH 254 and ARCH 262.  
Principles of current computer-aided design applications in architectural practice, including introductions to two-dimensional computer-aided drafting and threedimensional computer-aided design and delineation, desktop publishing, web page development, networking, and digital presentations. Topics provide foundation for computer applications in ARCH 254 design studio and ARCH 262 graphics studio. Notebook computer required.

ARCH 270 INDIVIDUAL PROBLEMS  
On Demand 1 - 3 cr. IND  
Maximum 6 cr.  
PREREQUISITE: Consent of instructor and approval of department head.  
Directed study and research on an individual basis.

ARCH 280 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.

ARCH 322F ARCHITECTURAL HISTORY, WORLD ARCHITECTURE I  
F 5 cr. LEC 3  
PREREQUISITE: Junior standing, ENGL 121W.  
A survey of world architectural history from primitive developments through the Gothic era.

ARCH 323F ARCHITECTURAL HISTORY, WORLD ARCHITECTURE II  
S 3 cr. LEC 3  
PREREQUISITE: Junior standing, ENGL 121W.  
A survey of world architectural history from the Renaissance to the present.

ARCH 351 ENVIRONMENTAL CONTROLS I  
F 4 cr. LEC 3 RCT 1  
PREREQUISITE: MATH 160 and PHYS 206.  
Architectural and site responses to climate at a regional, community, and small building scale including passive solar energy and heat flow fundamentals. Analysis and design of the heating, ventilating, and air-conditioning systems used in architecture. Analysis and design of water supply and sanitation systems. Notebook computer required.

ARCH 352 ENVIRONMENTAL CONTROLS II  
S 4 cr. LEC 3 RCT 1  
PREREQUISITE: MATH 160, PHYS 206, ARCH 351.  
Analysis and design of lighting systems, electrical systems, fire safety systems, and acoustical systems. Issues of visual and perceptual comfort and daylighting are developed. Notebook computer required.

ARCH 343 ARCHITECTURAL STRUCTURES I  
F 4 cr. LEC 4  
PREREQUISITE: ARCH 242.  
Environmental loads, case development, and load path for structures; structural design philosophies; working stress, LRFD, and limit states; analysis of structural systems and systems planning; analysis and design of wood structures; intro to structural wood design software tools. Complete structural design/drawings for a light wood frame building as a group project. Notebook computer required.

ARCH 344 ARCHITECTURAL STRUCTURES II  
S 4 cr. LEC 4  
PREREQUISITE: ARCH 343.  
Continuous structural systems for larger buildings. Design of structural elements in steel, reinforced concrete, masonry, and prestressed concrete; connections, foundations, and building systems; structural engineer-architect communications; intro to structural steel/concrete/masonry design software tools. Complete structural designs/drawings for a small commercial building as a group project. Notebook computer required.

ARCH 355 ARCHITECTURAL DESIGN III  
F 5 cr. LEC/RCT 2 STU 5  
PREREQUISITE: ARCH 254.  
Architectural design integrating building, landscape, and context using projects of medium scale and complexity. Emphasis on the integration of light, space, structure, and skin, using sectional design and architectural technology, introducing the potential of technical theory and "archi-tectonics" as poetic stimulants to creative endeavor. "Creative programming," behavioral issues affecting design, and relevant environment issues are introduced. Integrated special topics include the form- and space-generating elements of structure, environmental control systems, and regional- and site-specific context. Field trip required. Notebook computer required.

ARCH 356 ARCHITECTURAL DESIGN IV  
S 5 cr. LEC/RCT 2 STU 3  
PREREQUISITE: ARCH 355.  
Continuation of ARCH 355 with further exploration of the behavioral issues affecting design, and emphasis on the architect's responsibility to society, including design for life safety and special user groups. The basic issues of quality housing will be explored through the research of domestic and international housing projects as well as a series of individual projects ranging in scale and emphasis from an individual room to a dwelling unit to the multi-family urban complex. Integrated special topics will include the form- and space-generating elements of tectonics, structure, and environmental control systems. Notebook computer required.

ARCH 400 SEMINAR  
F,S,Su 1-2 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.

ARCH 412 CONSTRUCTION DRAWINGS & SPECIFICATIONS  
F 5 cr. LEC 1 STU 2  
PREREQUISITE: ARCH 241.  
COREQUISITE: ARCH 413 and ARCH 457.  
The theory and practice of drawings and specifications as contract documents for building projects using procedures similar to those found in a professional architect's office and incorporating the use of computer-aided drawing. Notebook computer required.

ARCH 413 PROFESSIONAL PRACTICE  
F 5 cr. LEC 3  
COREQUISITE: ARCH 412 and ARCH 457.  
Architect's relationship to society, clients, the profession, consultants, and contractors in design and construction. Topics include marketing, fee structures, contracts and agreements, cost estimating, project management, professional liability, building economics, and project feasibility. Study of building codes. Notebook computer required.

ARCH 414G ARCHITECTURAL STUDY ABROAD  
F,S 9 cr. LEC 6 IND 3  
PREREQUISITE: ARCH 356.  
Structured study of 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. Notebook computer required.

ARCH 424 CONTEMPORARY ARCHITECTURAL HISTORY AND THEORY  
S 3 cr. LEC 3  
COREQUISITE: ARCH 242.
Course Descriptions

PREREQUISITE: ARCH 322 and ARCH 323. Critique and discussion of architectural projects built and ideology presented in settings, drawings, and models since the turn of the century, including the simultaneous social and technical context, in order to examine the architectural issues of today.

ARCH 425 WESTERN ARCHITECTURAL HISTORY
On Demand 3 cr. SEM 2 Max. 4 cr.
PREREQUISITE: ARCH 322 and 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 2 cr. LEC 2 Max. 4 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 2 cr. SEM 2 Max. 4 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
ES 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 and on-site visits documented in a written report.

ARCH 444 Computational Design for Structures
On Demand 3 cr. LEC 2 STU 1.
PREREQUISITE: ARCH 242 and ARCH 263.
Introduction to spreadsheets and blackboard computational programming and blackboard 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 6 cr. LEC 1 STU 5.
PREREQUISITE: ARCH 356.
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. Can substitute for one semester of ARCH 458.

ARCH 451 Design for the Community
On Demand 2 cr. IND 2 Max. 4 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 457C Architectural Design V
ES 6 cr. LEC 1 STU 5.
PREREQUISITE: ARCH 356.
COREQUISITE: ARCH 412 and ARCH 413.
A senior capstone course. 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
S 6 cr. LEC 1 STU 5.
PREREQUISITE: ARCH 457.
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 2 cr. RCT 1 STU 1.
PREREQUISITE: ARCH 263 or ARCH 464.
The investigation of two-dimensional computer-aided design and drawing as applied to architectural practice. Lectures and projects will explore the use of two-dimensional CAD programs to create design drawings and construction documents.

ARCH 465 Advanced Computer Applications
On Demand 2 cr. RCT 1 LAB 1.
PREREQUISITE: ARCH 263 or ARCH 464.
The investigation and application of advanced two-dimensional and three-dimensional computer-aided design, modeling, and presentation techniques for architectural practice. Lectures and projects may include topics of three-dimensional modeling, animation, delineation, or CNC milling. Notebook computer required.

ARCH 470 Individual Problems
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.

ARCH 471 Directed Research/ Creative Activity
FS, Sa 1-6 cr. IND May be repeated.
PREREQUISITE: Course prerequisites as determined by instructor, and approval of department head.

ARCH 476 Internship
S, Su 3-9 cr. IND Max. 18 cr.
PREREQUISITE: ARCH 412, ARCH 413, ARCH 457, and all other architectural courses through the third year.

ARCH 480 Special Topics
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined by 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.

ARCH 489 Undergraduate Research/ Creative Activity Instruction
FS, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: ARCH 490.
Classroom instruction associated with directed undergraduate research/creative activity projects. Will not count toward graduate credit.

ARCH 490 Undergraduate Research/ Creative Activity
FS, 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.

ARCH 500 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.

ARCH 515 Inspection Field Trip
S, Su 4 cr. IND 4 Maximum 8 cr.
PREREQUISITE: Admittance to the graduate program or seniors by petition, completion of ARCH 412, ARCH 413, ARCH 457 and all other architectural courses through the third year.
COREQUISITE: ARCH 476 or ARCH 576.
An on-site study of social, cultural, and historical influences and their manifestation in architecture and urban design within a particular community. Research, documentation, paper and graphic presentation are required.

ARCH 521 Architectural Theory
On Demand 2 cr. LEC 2 Maximum 6 cr.
PREREQUISITE: Graduate standing or seniors by petition.
Specific architectural, urban, planning and preservation theories, their application and context within contemporary practice will be investigated through the study of essays, drawings, models and built projects.

ARCH 522 Historical Issues in Architecture and Urban Design
On Demand 2 cr. LEC 2 Maximum 6 cr.
PREREQUISITE: ARCH 322, ARCH 323, Graduate standing or seniors by petition.
Close examination of historic periods and individuals. Emphasis upon in-depth studies of particular personalities and the social, cultural, artistic and scientific developments that influenced the progress of architecture, urban design and city planning.

ARCH 523 Issues in City Planning
On Demand 2 cr. LEC 2.
PREREQUISITE: Graduate standing or seniors by petition.
Problems and issues, processes and regulations in planning, urban design, and historic preservation. Field trip possible.

ARCH 524 Design Competition
On Demand 2 cr. LEC 2 Maximum 4 cr.
PREREQUISITE: ARCH 355 or 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 project in response to a design competition.

ARCH 525 Special Design Topic
On Demand 2 cr. LEC 2 Maximum 4 cr.
PREREQUISITE: ARCH 355 and consent of...
Course Descriptions

ARCH 554 ADVANCED ENVIRONMENTAL CONTROL SYSTEMS
On Demand 2 cr. SEM 2.
PREREQUISITE: ARCH 533 and ARCH 382.
Admission to the graduate program or seniors by petition.
Advanced work is developed around the integrat-ed nature of architecture and environmental technology. Course topics will range from computer energy simulation and analysis, physical modeling of the luminescent environment, appropriate technology, sustainable design methods to case study assessment of historic and existing building performance.

ARCH 545 ADVANCED APPLIED DESIGN AND CONSTRUCTION
On Demand 2 cr. STU 2 Max 4 cr.
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 stu-dents as an exploration of the opportunities and limitations of materials, technology, economics, and construction methods.

ARCH 545 ADVANCED STRUCTURES
On Demand 3 cr. LEC 2 STU 1
PREREQUISITE: ARCH 544 and graduate standing or seniors by petition.
Advanced structural topics, load path, perform-ance design, structural system planning, connec-tion design, computer software for structural analy-sis/design, structural restoration; complete design/analysis/structural issues for a medium sized multi-use building (class project). Notebook com-puter required.

ARCH 551 ADVANCED ARCHITECTURAL STUDIO
FS 3 cr. STU 3.
PREREQUISITE: ARCH 457 and graduate standing.
COREQUISITE: ARCH 552 and ARCH 553.
Building design projects which explore a specific theoretical position with regard to contemporary architectural or historic preservation issues. Notebook computer required, field trip required.

ARCH 552 ARCHITECTURAL STUDIO RESEARCH
FS 3 cr. LEC 1 RCT 2
PREREQUISITE: ARCH 457 and graduate standing.
COREQUISITE: ARCH 551 and ARCH 553.
Graduate research and analysis of a major theoretical position advocated through the writings, draw-ings and models of architectural theorists. Notebook computer required, field trip required.

ARCH 553 ARCHITECTURAL STUDIO-THEORETICAL APPLICATION
FS 3 cr. LEC 1 RCT 2
PREREQUISITE: ARCH 457 and graduate standing.
COREQUISITE: ARCH 551 and ARCH 553.
Graduate research and analysis of the formal manifestations of the specific theoretical positions advo-cated and illustrated through the design work of sig-nificant architectural practitioners. Notebook com-puter required, field trip required.

ARCH 554 URBAN DESIGN STUDIO
FS,Su 3 cr. STU 3.
PREREQUISITE: ARCH 457 and graduate standing.

ARCH 555 URBAN DESIGN RESEARCH
FS 5 cr. LEC 1 RCT 2
PREREQUISITE: ARCH 457 and graduate standing.
COREQUISITE: ARCH 554 and ARCH 556.
Urban design projects that develop an understand-ing of public planning goals and constraints, urban infrastructure, formal urban fabric, historic preservation, and socio-cultural issues. Notebook computer required. Field trip required.

ARCH 556 URBAN DESIGN THEORY
FS 3 cr. LEC 1 RCT 2
PREREQUISITE: ARCH 457 and graduate standing.
COREQUISITE: ARCH 554 and ARCH 556.
Graduate research and analysis of contemporary and historic design theory. Notebook computer required. Field trip required.

ARCH 559 URBAN DESIGN
FS,Su 5 cr. LEC 2 STU 3
PREREQUISITE: ARCH 457 and all tabulated archi-tectural courses through third year. Course available for Bachelor of Architecture only.
Advanced architectural and urban design theory and projects that develop an understanding of public planning goals and constraints, urban infrastructure, formal urban fabric, socio-cultural issues, pro-jects cost and financing. Field trip required.

ARCH 560C ARCHITECTURAL THESIS
FS 4 cr. LEC 2 RCT 2
PREREQUISITE: ARCH 559 and all tabulated archi-tectural courses through third year. Course available for Bachelor of Architecture only. Last time offered will be Fall 2001.
COREQUISITE: ARCH 561
Senior capstone course. An architectural design project chosen by the student and subject to approval by thesis advisor and coordinator. Advanced study and development of the graphic and three dimensional materials required to illustrate the design process and project solution. Passing grade must be C or better.

ARCH 561 INDEPENDENT THESIS
FS 4 cr. IND 4
COREQUISITE: ARCH 560
Independent study and development of the graphic and three dimensional materials required to illustrate the thesis design process and project solution. Passing grade must be C or better.

ARCH 564 ADVANCED ARCHITECTURAL GRAPHICS
FS 2 cr. STU 2. Maximum 4 credits.
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
FS 2 cr. RCT 1 LAB 1
PREREQUISITE: ARCH 265 or ARCH 464.
Computer-aided design and theory for architecture. Lectures and projects may include topics of three-dimensional modeling, animation, delineation or CNC milling. Notebook computer required.

ARCH 570 INDIVIDUAL PROBLEMS
On Demand 1-4 cr. IND 8 cr.
PREREQUISITE: Admission to graduate program. Directed graduate research and study of architec-tural, urban design or historic preservation issues on an individual basis.

ARCH 576 ARCHITECTURAL PRACTICE INTERNSHIP
FS 2 cr. STU 2. Maximum 12 cr.
PREREQUISITE: Master's 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 accept-ability and demand before requesting a regular course number.

ARCH 580 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: Graduate standing or seniors by petition. Course prerequisites as determined for each offering.

ARCH 589 GRADUATE CONSULTATION
FS,Su 3 cr. TUT 3
PREREQUISITE: ARCH 591.
COREQUISITE: ARCH 592 and ARCH 593.
Independent research and design supporting ARCH 592.

ARCH 591 THESIS RESEARCH METHODS AND PROGRAMMING
FS 2 cr. LEC 1 SEM 1
PREREQUISITE: Graduate standing.
Directed research and analysis of historic, formal, and functional precedents in preparation for a the-sis design, ARCH 592.

ARCH 592 MASTER'S THESIS IN ARCHITECTURE
FS 5 cr. LEC 3 RCT 2
PREREQUISITE: ARCH 591.
COREQUISITE: ARCH 590 and ARCH 593.
An architectural design or historic preservation project chosen by the student and subject to approval by the student's thesis advisor and gradu-ate coordinator.

ARCH 593 THESIS PRESENTATION TECHNIQUES
FS 2 cr. RCT 2
PREREQUISITE: ARCH 591.
COREQUISITE: ARCH 592.
Advanced study and development of the graphic and three-dimensional materials required to illus-trate the design process and project solution.
ARNR
Animal and Range Sciences
Department of Animal and Range Sciences
(406) 994-3721

ARNR 100 INTRODUCTION TO ANIMAL SCIENCE
S 3 cr. LEC 3
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.

ARNR 101 PRINCIPLES OF RANGELAND MANAGEMENT
F 3 cr. LEC 3
Description of the rangelands of the world, historical, present, and potential use. Explanation of how uses affect the nutrient, biological, and hydrologic cycles of rangelands and how the ecosystem responds to changes. Concepts of ecological condition, land potential, and ecological trend are introduced.

ARNR 102 PRINCIPLES OF RANGELAND MANAGEMENT LAB
F 1 cr. LAB 1
COREQUISITE: ARNR 101
The laboratory exercises are designed to complement the lectures of ARNR 101. Rangeland inventory and classification methods will be reviewed. Sixty common native and introduced plants will be identified in the field and the classroom.

ARNR 110 WESTERN EQUITATION
F,S 2 cr. LAB 2
Western equitation techniques including introductory training techniques.

ARNR 200 TODAY'S LIVESTOCK INDUSTRY
F 1 cr. SEM 1
Introduction to today's modern livestock industry and the many complex issues the livestock industry faces. This course will explore various career paths for students and how they may better prepare themselves for jobs in the livestock industry of today and tomorrow.

ARNR 201G WORLD FOOD
S 3 cr. LEC 3
PREREQUISITE: Sophomore standing.
Factors affecting adequacy and availability of world food supply, human population trends, and overview of food production systems.

ARNR 205 INTERMEDIATE WESTERN EQUITATION
F,S 2 cr. LEC 2
PREREQUISITE: ARNR 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.

ARNR 211 COLT BREAKING AND TRAINING
F 2 cr. LAB 2
PREREQUISITE: ARNR 208.
Principles and techniques of breaking and training young horses.

ARNR 212 ANIMAL PACKING, MANAGEMENT & USE IN BACK COUNTRY
Su 2 cr. LEC 1 LAB 1
The management and use of horses in the mountains, and ecological considerations of back country use. Labs include equitation, restraint of grazing horses, and packing.

ARNR 215 SPECIALIZED HORSE TRAINING
S 1 cr. LAB 1
PREREQUISITE: ARNR 208.
Advanced techniques and training for either rein, cutting, or working cowhorses. For experienced riders.

ARNR 230 RANGE LIVESTOCK PRODUCTION
S 3 cr. LEC 3
PREREQUISITE: ARNR 100, ARNR 101.
Principles of beef and sheep production in rangeland environments. Breeding, reproduction, nutrition, marketing, and distribution.

ARNR 231 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-SWINE
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Husbandry techniques associated with management of swine.

ARNR 232 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-SHEEP
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Management practices associated with farm flock and range sheep enterprises.

ARNR 233 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-HORSES
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Laboratory designed to familiarize students with approved management practices for horse enterprises.

ARNR 234 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-BEEF CATTLE
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Hands-on laboratories to familiarize students with the principles of beef cattle handling and management.

ARNR 235 RANGE AND PASTURE MONITORING
F 1 cr. LAB 1
PREREQUISITE: ARNR 100, ARNR 101, ARNR 102.
Methods which can be used by private operators as well as state and federal land managers to identify site potential, evaluate range and pasture condition, estimate stocking rates, measure forage utilization, and inventory forage resources.

ARNR 240 PRINCIPLES OF NATURAL RESOURCE ECOLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: ARNR 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.

ARNR 245 SPECIAL TOPICS
F,S 1 cr. LAB 1
PREREQUISITE: ARNR 101 and Sophomore standing.
Application of ecological principles to integrated management of rangeland resources. One weekend field trip.

ARNR 250 ANIMAL NUTRITION
F 4 cr. LEC 4
PREREQUISITE: ARNR 250 and BCHM 122 and CHEM 121.
The meat industry within North America and beyond will be discussed. Live animal evaluation and 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.

ARNR 251 PHYSIOLOGY OF REPRODUCTION
F 4 cr. LEC 3 RCT 1
PREREQUISITE: VTMB 271.
Reproductive physiology in farm animals and application of current and developing techniques in improving reproductive performance in domestic animals.

ARNR 252 PRINCIPLES OF ANIMAL BREEDING
S 3 cr. LEC 3
PREREQUISITE: BIOL 102, and either STAT 216 or STAT 332 or PSES 318.
Genetic improvement of farm animals through performance testing, methods of selection, and application of mating systems such as crossbreeding.

ARNR 316 MEAT SCIENCE
S 4 cr. LEC 5 LAB 1
PREREQUISITE: ARNR 100 and BIOL 102 and CHEM 121.
The meat industry within North America and beyond will be discussed. Live animal evaluation and 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.

ARNR 320 RANGE LIVESTOCK PRODUCTION
S 1 cr. LAB 1
PREREQUISITE: ARNR 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.

ARNR 321 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-SWINE
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Principles of swine production and the swine production industry will be discussed. Topics include management of swine herds, nutrition, reproduction, economics, breeding, and health related to efficient swine production; pork quality; U.S. and world markets; "environmentally compatible production."

ARNR 325 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-BEEF CATTLE
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Principles of beef and sheep production in rangeland environments. Breeding, reproduction, nutrition, marketing, and distribution.

ARNR 330 RANGE LIVESTOCK PRODUCTION
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Laboratory designed to familiarize students with approved management practices for horse enterprises.

ARNR 331 SWINE PRODUCTION
F, S alternate years, to be offered 2002, 3 cr. LEC 3.
PREREQUISITE: BIOL 102 and either STAT 216 or STAT 332 or PSES 318.
Genetic improvement of farm animals through performance testing, methods of selection, and application of mating systems such as crossbreeding.

ARNR 334 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-SHEEP
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Principles of sheep production in rangeland environments. Breeding, reproduction, nutrition, marketing, and distribution.

ARNR 335 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-HORSES
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Hands-on laboratories to familiarize students with the principles of beef cattle handling and management.

ARNR 336 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-BEEF CATTLE
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Principles of beef and sheep production in rangeland environments. Breeding, reproduction, nutrition, marketing, and distribution.

ARNR 340 RANGE LIVESTOCK PRODUCTION
S 1 cr. LAB 1
PREREQUISITE: ARNR 100.
Laboratory designed to familiarize students with approved management practices for horse enterprises.

ARNR 345 RIPARIAN ECOLOGY AND MANAGEMENT
S 3 cr. LEC 3
PREREQUISITE: BIOL 102, and either STAT 216 or STAT 332 or PSES 318.
Genetic improvement of farm animals through performance testing, methods of selection, and application of mating systems such as crossbreeding.

ARNR 350 LIVESTOCK INDUSTRY STUDY TRIP
S 1 cr. LAB 1
PREREQUISITE: ARNR 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.

ARNR 351 SWINE PRODUCTION
S 3 cr. LEC 3
PREREQUISITE: ARNR 100.
Principles of swine production and the swine industry will be discussed. Topics include management of the swine herd, nutrition, reproduction, economics, breeding, and health related to efficient swine production; pork quality; U.S. and world Markets; "environmentally compatible production."

ARNR 355 RIPARIAN ECOLOGY AND MANAGEMENT
S 3 cr. LEC 3
PREREQUISITE: ARNR 100.
Principles of swine production and the swine industry will be discussed. Topics include management of the swine herd, nutrition, reproduction, economics, breeding, and health related to efficient swine production; pork quality; U.S. and world Markets; "environmentally compatible production."
laboratory will provide experience in biological and physical monitoring methodologies.

**ARNR 350 RANGE VEGETATION**
5 S cr. LEC 2 LAB 1
**PREREQUISITE:** ARNR 240, BIOL 230.
**COREQUISITE:** ARNR 351.
Identification of commonly occurring plants of western North America biomes. Important ecological and management relationships of the plants will be emphasized.

**ARNR 351 RANGE BIOMES**
5 S cr. LEC 2
**PREREQUISITE:** ARNR 240, BIOL 230.
**COREQUISITE:** ARNR 350.
Climatic, physical, and biological interactions of natural biomes. The structure of western North America biomes will be considered in detail.

**ARNR 400 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.

**ARNR 401C PLANNING & PROGRAM**
**ANALYSIS I**
F 1 cr. LEC 1
**PREREQUISITE:** ARNR 230, ARNR 240, completion of Social Science Core and consent of department head.
Senior capstone course. Integration of knowledge and skills in livestock enterprise, range and natural resource management, and decision matrices to evaluate short- and long-term gains/losses from a proposed project. Case studies and team projects. Making inventories of resources and identifying problems.

**ARNR 402C PLANNING & PROGRAM**
**ANALYSIS II**
S 1 cr LEC 1
**PREREQUISITE:** ARNR 401.
Senior capstone course. Integration of knowledge and skills in livestock enterprise, range and natural resource management and decision matrices to evaluate short- and long-term gains/losses from a proposed project. Case studies and team projects. Solving problems and presenting solutions.

**ARNR 421 ASSISTED REPRODUCTIVE TECHNOLOGIES**
F 4 cr. LEC 2 LAB 2
**PREREQUISITE:** ARNR 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.

**ARNR 422 TOPICS IN BEEF CATTLE NUTRITION**
S 2 cr. LEC 2
**PREREQUISITE:** ARNR 320 and Junior standing.
Critical evaluation of current issues and related scientific literature in beef cattle nutrition; application to decision making and problem solving.

**ARNR 430 HORSE SCIENCE**
S 4 cr. LEC 3 LAB 1
**PREREQUISITE:** ARNR 320, ARNR 321, ARNR 322, VTMB 271.
Horse management and problems with emphasis on behavior, anatomy and physiology, conformation, biomechanics, nutrition, and reproduction.

**ARNR 432 SHEEP MANAGEMENT**
S 5 cr. LEC 2 LAB 1
**PREREQUISITE:** ARNR 230 or ARNR 320.
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.

**ARNR 434 BEEF CATTLE MANAGEMENT**
F 4 cr. LEC 3 LAB 1
**PREREQUISITE:** ARNR 230, ARNR 240, ARNR 320, ARNR 321, ARNR 322 and AGEC 341.
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.

**ARNR 435 FEEDLOT MANAGEMENT**
S alternate years, to be offered 2001 2 cr. LEC 2
**PREREQUISITE:** ARNR 230, ARNR 320.
Application of techniques in nutrition and management dealing with feedlot cattle using live animals and computer models. Receiving ration balancing and functionality, mill systems, cattle type performance expectations, and marketing methods are explored. Hands-on computer simulation with public domain software.

**ARNR 437 GRAZING MANAGEMENT & IMPROVEMENTS**
F 4 cr. LEC 3 LAB 1
**PREREQUISITE:** ARNR 101 and ARNR 240 or BIOL 303.
Individual plant and plant community response to grazing livestock. Animal response to grazing systems and ecological consequences of grazing systems. Developments and improvements of rangelands using fire, grazing, and mechanical treatments.

**ARNR 438 RANGE-WILDLIFE RELATIONSHIPS**
S 5 cr. LEC 3
**PREREQUISITE:** F&WL 301, and either ARNR 240 or BIOL 303 or senior standing.
Principles of habitat importance and management. Habitat requirements within wildlife population constraints will be emphasized with consideration of other natural resource demands.

**ARNR 450 RANGELAND RESOURCE MEASUREMENTS**
F 5 cr. LEC 2 LAB 1
**PREREQUISITE:** ARNR 240 or BIOL 303, STAT 216 or PSES 318, and Junior standing.
Focus on collecting, analyzing, and interpreting measures of rangeland resources including plant, animal, soil, and watershed components. Emphasis on sampling objectives, field procedures, monitoring, and evaluation.

**ARNR 456 CONFLICT RESOLUTION IN NATURAL RESOURCE MANAGEMENT**
F 1 cr. LEC 1
**PREREQUISITE:** ARNR 101 and Senior or graduate standing.
Consensus-based, collaborative planning processes for resolving conflicts in natural resource management.

**ARNR 470 INDIVIDUAL PROBLEMS**
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.

**ARNR 476 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.

**ARNR 489 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.

**ARNR 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**
F,S,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
**COREQUISITE:** ARNR 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

**ARNR 490 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.

**ARNR 500 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 507 RESEARCH METHODS**
ES 1 cr. SEM 1
**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 2000 5 cr. LEC 3
**PREREQUISITE:** ARNR 320, and either BCHM 122 or BCHM 340.
Biochemistry of animal nutrition with emphasis on integration of biochemical principles to animal production systems. Nutrients emphasized are proteins, carbohydrates and lipids.

**ARNR 521 ADVANCED RUMINANT NUTRITION**
F alternate years, to be offered 2000 5 cr. LEC 3
**PREREQUISITE:** ARNR 320.
Physiological and microbiol aspects of ruminant digestion and their influence on the metabolism of extraruminal tissues.

**ARNR 522 RANGE NUTRITION TECHNIQUES**
S alternate years, to be offered 2001 3 cr. LEC 3
**PREREQUISITE:** ARNR 320.
Readings and lectures on specific topics in range animal nutrition, including regulation of forage intake, foraging behavior and research techniques.
ARNR 523 ADVANCED PHYSIOLOGY OF REPRODUCTION  
S alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: BIOL 411, BCHM 540, ARNR 321 or consent of instructor.  
Study of the basic concepts of reproductive process 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 yrs., to be offered 2002 3 cr. LEC 3  
PREREQUISITE: ARNR 322, STAT 401.  
COREQUISITE: STAT 412.  
Quantitative genetics applied to the improvement of animals. Biometrical relationships among relatives, methods of estimating genetic parameters, application of crosbreeding systems and selection techniques.

ARNR 540 RANGE ECOSYSTEM MEASUREMENTS  
F alternate years, to be offered 2000 3 cr. LEC 3  
Quantitative and qualitative techniques of range and resource measurements, including research design, synthetic methods of community analysis, and dynamic modeling for evaluating range and resources.

ARNR 541 RANGE ECOPHYSIOLOGY  
S alternate years, to be offered 2002 3 cr. LEC 3  
PREREQUISITE: ARNR 240 or BIOL 303 or BIOL 450.  
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  
F alternate years, to be offered 2000 3 cr. LEC 3  
PREREQUISITE: ARNR 345, BIOL 303 and LRES 392 or ESCI 432.  
This course involves an in depth investigation of the 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 vegetation communities associated with riparian areas.

ARNR 570 INDIVIDUAL PROBLEMS  
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 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT  
FS, 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 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.

ARNR 589 GRADUATE CONSULTATION  
FS, 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 coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

ARNR 590 MASTER'S THESIS  
FS, Su 1 - 10 cr. IND Maximum credits unlimited.  
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 or help.

ART 206 METALSMITHING  
F 4 cr. RCT 2 STU 2  
PREREQUISITE: One of the following: ART 111, ART 114, or ARCH 152.  
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, lino cut, engraving, etching, and aquatint.

ART 207 SCULPTURE  
F 4 cr. RCT 2 STU 2  
PREREQUISITE: One of the following: ART 111, ART 114, or ARCH 152.  
Introduction to three-dimensional form through projects involving woodworking, welding, mold-making and casting. Discussion of tools, materials, processes, and safety procedures.

ART 209 PRINTMAKING  
F 4 cr. RCT 2 STU 2  
PREREQUISITE: One of the following: ART 110, ART 114, or ARCH 151.  
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, lino cut, engraving, etching, and aquatint.

ART 223 GRAPHIC DESIGN I  
F 4 cr. RCT 2 STU 2  
PREREQUISITE: ART 111 or ARCH 151; ART 111 or ARCH 152.  
Introduction to fundamental design principles, basic layout, tools and techniques, and creative thinking.

ART 224 GRAPHIC DESIGN II  
S 4 cr. RCT 2 STU 2  
PREREQUISITE: ART 223.  
Further exploration of design principles with increased emphasis on typographic skills and visual communications.

ART 238F REPRESENTATIONAL DRAWING  
FS, Su 4 cr. RCT 2 STU 2  
PREREQUISITE: One of the following: ART 110, ART 114, or ARCH 151.  
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.

ART 270 INDIVIDUAL PROBLEMS  
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.

ART 280 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.

ART 309 BAROQUE ART  
S alternate years, to be offered 2002 3 cr. LEC 3  
PREREQUISITE: ART 203.  
A study of the development of painting, sculpture, and architecture in Italy, Spain, and Northern Europe from the end of the 16th century through the mid-18th century.
ART 315 ADVANCED CERAMICS
F S 5 cr. RCT 2 STU 5 Maximum 15 cr.
PREREQUISITE: ART 208.
Advanced problems in ceramics.

ART 318 19TH CENTURY ART
S 5 cr. LEC 8. RCT 3
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: ART 205.
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.

ART 325 ADVANCED METALSMITHING
F S 5 cr. RCT 2 STU 5 Maximum 15 cr.
PREREQUISITE: ART 206.
Advanced course designed around a set of specific problems and demonstrations for advanced jewelry and metalforming concepts. Emphasis will be placed on technical development and personal imagery.

ART 327 PRINTMAKING-LITHOGRAPHY
F 5 cr. RCT 2 STU 5 Maximum 15 cr.
PREREQUISITE: ART 209 and ART 238.
An intermediate course in which multiple original prints are made from hand-drawn images on lithographic limestone. Etching in black and multicolor using crayon, tusche, transfer, and photo methods.

ART 333 ADVANCED SCULPTURE
F S 5 cr. RCT 3 STU 5 Maximum 15 cr.
PREREQUISITE: ART 207.
Advanced experiences in materials and methods of sculpture.

ART 338 ADVANCED DRAWING
F,S,Su 1- 5 cr. IND Maximum 15 cr.
PREREQUISITE: ART 238.
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.

ART 340 ANCIENT ART
S 5 cr. LEC 8.
This course will examine the art and architecture of ancient civilizations surrounding the Aegean and Mediterranean seas. Beginning with the Aegean civilizations, the course will then examine the rise of the historical Greeks and will conclude with the Roman world.

ART 344 PRINTMAKING-SERIGRAPHY
F S alternate years, to be offered 2001 5 cr. RCT 2 STU 3 Maximum 15 cr.
PREREQUISITE: ART 209.
An advanced course in which multiple original prints are made using plank and end grain wood and plastic/rubber relief plates. Methods include reduction and multi-plate color, shaped and found object (collagraph), color overlay, split fountain, roller and brush inking, and various hand and press printing methods.

ART 345 PRINTMAKING-SERIGRAPHY
S alternate years, to be offered 2001 5 cr. RCT 2 STU 3 Maximum 15 cr.
PREREQUISITE: ART 209.
An intermediate course in which multiple original, multi-colored prints are made using various water-based screen processes. Stencil techniques include paper, screen filler, drawing fluid, and photo.

ART 346 ADVANCED INTAGLIO PRINTMAKING
S alternate years, to be offered 2002 5 cr. RCT 2 STU 5 Maximum 15 cr.
PREREQUISITE: ART 209.
An advanced course in which multiple original prints are made using engraved and/or etched copper, zinc, and/or plastic intaglio plates. Methods include spit bite, viscosity, a la poupée, multi plate color, collograph, and chine colle.

ART 350 ADVANCED PAINTING
S 5 cr. RCT 2 STU 5 Maximum 15 cr.
PREREQUISITE: ART 205.

ART 355 WATERCOLOR
Su 5 cr. RCT 2 STU 5 Maximum 10 cr.
PREREQUISITE: ART 205.
Painting with transparent watercolors. Introduction of materials, techniques, concepts, and a brief history of the process highlighting major artists. Individual and group critiques.

ART 365 INTERMEDIATE GRAPHIC DESIGN I
F 5 cr. RCT 2 STU 5
PREREQUISITE: ART 204, Portfolio review.
Graphic production procedures and studio tools and techniques. Projects incorporate communication problem solving with fundamentals of mechanical preparation. Development of computer skills using graphic design programs including QuarkXpress, Photoshop, and Illustrator.

ART 366 INTERMEDIATE GRAPHIC DESIGN II
S 5 cr. RCT 2 STU 5
PREREQUISITE: ART 365.
A continuation of ART 365, with emphasis on practical applications and current design trends.

ART 400 SEMINAR
On Demand 1 cr. LEC 1.
Topics under the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

ART 403 DRAWING
F,S,Su 1- 5 cr. IND Maximum 15 cr.
PREREQUISITE: ART 388.
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.

ART 405PG ARTS OF AFRICA
F 3 cr. LEC 3
PREREQUISITE: Junior standing or approval of the instructor.
The course will examine the art of Sub-Saharan West Africa. Cultures from Central and East Africa will be introduced as well. Emphasis will be primarily on the sculptural traditions, especially figurative sculpture and masquerade. The arts of Africa will be examined in their social and cultural contexts, in the service of ritual and religious practices, in the service of governance, and as expression of aesthetic choices and achievements.

ART 407FG ISLAMIC ART AND ARCHITECTURE
S 3 cr. LEC 3
The art and architecture of Islam will be examined in its social and cultural contexts, in the service of religion, in the service of politics and leadership, and as an expression of aesthetic choices and achievements.

ART 410 CAREERS IN ART
F 1 cr. LEC 1
PREREQUISITE: Junior, Senior, or Graduate standing or consent of instructor.
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.

ART 411 PAINTING
F,S,Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ART 350.
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.

ART 412 SCULPTURE
F,S,Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ART 353.
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.

ART 413 METALSMITHING
S 3 cr. LEC 3. Maximum 15 cr.
PREREQUISITE: ART 429.
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.

ART 414 PRINTMAKING
F,S,Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ART 327 or ART 344.
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.

ART 415 CERAMICS
F,S,Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ART 515.
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.

ART 416 GRAPHIC DESIGN
F,S,Su 1 - 5 cr. IND Maximum 15 cr.
PREREQUISITE: ART 426.
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 course.

ART 418F BEGINNING MODERN ART
Su 5 cr. LEC 3
PREREQUISITE: ART 205.
From Post-Impressionism to World War I. Major artists include Gauguin, Van Gogh, Cezanne, Matisse, Picasso, and the German Expressionists.
ART 490C UNDERGRADUATE RESEARCH/CREATE ACTIVITY INSTRUCTION
F,S,Su 1-5 cr. IND May be repeated. Max 5 cr. COREQUISITE: ART 490.
Senior capstone course. Classroom instruction associated with directed undergraduate research/creative activity projects.

ART 495 UNDERGRADUATE RESEARCH/CREATIVITY IN ART
F,S,Su 1-5 cr. IND May be repeated. Max 5 cr. Corequisite: ART 490.
Senior capstone course. Directed undergraduate research/creative activity which may culminate in a research paper, undergraduate thesis paper, or undergraduate thesis exhibition.

ART 500 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.

ART 505 PAINTING
FS, Su 1-5 cr. IND Maximum 20 cr. PREREQUISITE: ART 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 painting.

ART 515 CERAMICS
FS, Su 1-5 cr. IND Maximum 20 cr. PREREQUISITE: ART 415, 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.

ART 524 METALSMITHING
FS, Su 1-5 cr. IND Maximum 20 cr. PREREQUISITE: ART 415, 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.

ART 526 DRAWING
FS, Su 1-5 cr. IND Maximum 20 cr. PREREQUISITE: ART 403, 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.

ART 527 PRINTMAKING
FS, Su 1-5 cr. IND Maximum 20 cr. PREREQUISITE: ART 414, 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.

ART 529 SCULPTURE
FS, Su 1-5 cr. IND Maximum 20 cr. PREREQUISITE: ART 412, 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.

ART 530 INTERMEDIA
FS, Su 1-5 cr. IND Maximum 20 cr. PREREQUISITE: ART 333, ART 358, ART 350 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.

ART 570 INDIVIDUAL PROBLEMS
On Demand 1-5 cr. IND Maximum 6 cr. PREREQUISITE: Graduate standing. Directed research and study on an individual basis.

ART 575 PROFESSIONAL PAPER
FS, Su 1-4 cr. IND Maximum 6 cr. PREREQUISITE: Undergraduate thesis or graduate study. A research or professional paper or project dealing with a topic in the field. Topic must have been mutually agreed upon by the student and his or her major advisor and graduate committee.

ART 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.

ART 588 PROFESSIONAL DEVELOPMENT
On Demand 1-3 cr. May be repeated; maximum 3 cr. PREREQUISITE: Graduate 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 or help.

ART 590 MASTER'S THESIS
FS, Su 1-10 cr. IND Maximum credits unlimited. PREREQUISITE: Master's standing.
Course Descriptions

BCHM 104N CHEMISTRY OF HUMAN LIFE
S 4 cr. LEC 3 LAB 1
Introduction for non-science majors to the chemical and biochemical basis of nutrition, health, DNA, and the human genome project. The laboratory includes training in searching Internet and library information resources, evaluating and presenting information found, and an introduction to DNA fingerprinting.

BCHM 122N ORGANIC & BIOCHEMICAL PRINCIPLES
ES, Su 4 cr. LEC 3 LAB 1
PREREQUISITE: CHEM 121, CHEM 131, or equivalent.
An introduction into functional group organic chemistry and important biochemical structures, concepts, and processes. The laboratory is closely integrated with lecture coverage.

BCHM 200 UNDERGRADUATE SEMINAR 1
F 1 cr. SEM
For the new student. Introduction to faculty research through faculty miniseminars. Socialization and integration into departmental operations, procedures, and expectations. Advising sessions. Establish oral and e-mail communication practices. Career opportunities.

BCHM 201 UNDERGRADUATE SEMINAR 2
S 1 cr. SEM 1

BCHM 270 INDIVIDUAL PROBLEMS
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.

BCHM 280 SPECIAL TOPICS
On Demand 1 - 4 cr. LEC 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.

BCHM 300 UNDERGRADUATE SEMINAR 3
ES 1 cr. SEM 1
Initiation of undergraduate research experience. Reading and oral reporting of scientific literature. Scientific technical writing (abstracts and summaries). Campus seminar attendance and discussion. Career enhancement (summer internship, student exchange, etc.)

BCHM 401C UNDERGRADUATE SEMINAR 4
ES 1 cr. SEM 1
PREREQUISITE: CHEM 490 or BCHM 490.
COREQUISITE: CHEM 490 or BCHM 490.
Senior capstone course. Taught in collaboration with departmental Honors Thesis, CHEM 451. The chemistry/biochemistry research undergraduate experience constitutes a synthesis of our (bio)chemistry class room 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.

BCHM 441 BIOCHEMISTRY OF MACROMOLECULES
F 3 cr. LEC 3
PREREQUISITE: BCHM 540.
Biochemical basis of modern molecular biology; structure and function of proteins, nucleic acids, and membranes; replication; transcription; translation; regulation of gene expression; and recombinant DNA. This course assumes and builds on the material in BCHM 340.

BCHM 442 METABOLIC REGULATION
S 3 cr. LEC 3
PREREQUISITE: BCHM 540.
In-depth biochemical treatment of metabolism and its regulation in cellular processes. This course assumes and builds on BCHM 540.

BCHM 444 BIOCHEMICAL METHODS IN MOLECULAR BIOLOGY
F 5 cr. LEC 1 LAB 2
COREQUISITE: BCHM 441.
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.

BCHM 470 INDIVIDUAL PROBLEMS
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.

BCHM 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.

BCHM 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
ES, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: BCHM 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

BCHM 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
ES, 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.

BCHM 500 SEMINAR
ES 1 cr. SEM 1
PREREQUISITE: Graduate standing or seniors by permission. Course prerequisites as determined 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.

BCHM 541 LIPIDS AND MEMBRANES
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: BCHM 442.
Biochemistry of lipids in microorganisms, plants, and animals considering the dynamics of lipid metabolism; disorders of lipid metabolism; structure and function of membranes; and assembly of lipids and proteins into membranes.

BCHM 543 PROTEINS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: BCHM 441.
Structure-function relationships of proteins and enzymes. Current literature stressed. Written student reports required.

BCHM 544 MOLECULAR BIOLOGY
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: BCHM 441.
Theoretical presentation of the molecular structures and interactions occurring in proteins and nucleic acids. Discussion of spectroscopy techniques used to study biomolecular structures and function. Includes concepts in: Nuclear Magnetic Resonance, X-ray Diffraction, Ultraviolet Absorption, Fluorescence, Circular Dichroism, Vibrational Spectroscopy including Infrared Absorption and Raman Scattering. The course will end with a discussion of molecular motion and transport properties including diffusion, sedimentation, and viscosity.

BCHM 550 PRINCIPLES OF STRUCTURE DETERMINATION BY X-RAY CRYSTALLOGRAPHY
F 5 cr. LEC 3
PREREQUISITE: BCHM 441 and BCHM 442 or the equivalent and MATH 182M.
This course focuses on theory and practice of molecular structure determination by x-ray crystallography. Topics include crystalization of macromolecules, molecular structure determination from x-ray data, and evaluation of the quality of the resulting macromolecular models.

BCHM 570 INDIVIDUAL PROBLEMS
On Demand 1 - 3 cr. IND
PREREQUISITE: Bachelor standing, consent of instructor, approval of department head and Dean of Graduate Studies.
Directed research and study on an individual basis.

BCHM 590 MASTER'S THESIS
ES, Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.

BCHM 610 STRUCTURAL AND FUNCTIONAL ORGANIZATION OF COMPLEX BIOLOGICAL SYSTEMS
F 5 cr. LEC 5
PREREQUISITE: MATH 181/182 and two out of three of the following: CHEM 111/112, PHYS 205/206 or PHYS 211/212, BCHM 540 or BIOL 102/BIOL 402.
The core goal is to integrate understanding of the components of biological systems into quantitative models of the integrated, intact systems. This course...
will cover signal transduction, cellular organization, molecular motors and the neural basis of learning and memory.

**BCHM 611 STRUCTURE AND MECHANISMS OF COMPLEX BIOLOGICAL SYSTEMS**
3 cr. LEC 3
PREREQUISITE: Structural and Functional Organization of Complex Biological Systems I.

The core goal is to integrate understanding of the components of biological systems into quantitative models of the integrated, intact systems. This course will cover genomic analysis, prediction of protein folding, allosteric regulation and nitric oxide signaling and modeling in biology.

**BCHM 689 GRADUATE RESEARCH / CREATIVE ACTIVITY INSTRUCTION**
F,Su 1 - 3 cr. RCT
PREREQUISITE: Graduate standing.

**BCHM 690 DOCTORAL THESIS**
F,S,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: PhD standing.

**BIOL**

**Biology**

Department of Biology
(406) 994-4548

**BIOL 100N ORGANISM FUNCTION**
F 5 cr. LEC 3
Comparison of plant and animal systems with respect to structure and function. The underlying chemistry, energetics, and ecological adaptations will be discussed.

**BIOL 101N BIOLOGY OF ORGANISMS**
F 4 cr. LEC 3 LAB 1
Examination of five kingdoms of organisms (monera, protista, fungi, plants, animals), with concentration on vascular plants and vertebrate animals. Considers survival strategies, nutrition, reproduction, and ecological and economic importance.

**BIOL 102N MOLECULAR & CELLULAR BIOLOGY**
F,S 4 cr. LEC 3 LAB 1
Survey of cellular organization and functions: biological macromolecules, cell structure, energy pathways (respiration, photosynthesis), cell division, classical genetics, molecular genetics, modern biotechnology, early development.

**BIOL 103N ENVIRONMENTAL ISSUES & SOCIETY**
S,Su 5 cr. LEC 3
The relationship between people and the environment using the earth as an ecosystem to show the effects of people's activities on natural ecosystems. Environmental issues such as wilderness, wolf reintroduction, global warming, fire ecology, whirling disease, and grizzlies are covered.

**BIOL 104N LIFE AND OTHER BIG QUESTIONS**
S 4 cr. LEC 2 RCT 1 LAB 1
PREREQUISITE: BCHM 101.
This course is specifically designed for the non-science major. It will integrate biology, physics, and chemistry in an understandable way to explain the emergence of human consciousness from the chaotic beginnings of matter, energy, and time.

**BIOL 201 FRONTIERS OF NEUROBIOLOGY**
F 5 cr. LEC 2 RCT 1
PREREQUISITE: BIOL 102.
Introduction to neurobiological research. Emphasis on current topics as they apply to everyday problems.

**BIOL 207 ANATOMY & PHYSIOLOGY I**
S,Su 5 cr. LEC 3 LAB 2
PREREQUISITE: CHEM 121 or CHEM 131 with a grade of "C" or better in either 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.

**BIOL 280N ANATOMY & PHYSIOLOGY II**
F 4 cr. LEC 3 LAB 1
PREREQUISITE: BIOL 102 or BIOL 207 or MB 501 with grades of "C" or better in each 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.

**BIOL 250 IDENTIFICATION OF SEED PLANTS**
S 4 cr. LEC 2 LAB 2
PREREQUISITE: BIOL 101.
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. Cross-listed with PS 250.

**BIOL 251 BOTANY: AN INTRODUCTION TO PLANT BIOLOGY**
F 4 cr. LEC 3 LAB 1
PREREQUISITE: BIOL 101.
Thorough overview of the fundamentals of plant biology - including fungi - from evolutionary, ecological, and physiological perspectives. labs will feature plant ecology and also plants that have been used as model organisms in studies of basic biological processes. Cross-listed with PS 251.

**BIOL 290 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.

**BIOL 301 PRINCIPLES OF GENETICS**
F 5 cr. LEC 3
PREREQUISITE: BIOL 102 or MB 501.
Introduction to classical and molecular genetics of eukaryotes, with emphasis on transmission genetics, the structure and regulation of genes, and mechanisms of genetic change.

**BIOL 303 PRINCIPLES OF ECOLOGY**
S 3 cr. LEC 3
PREREQUISITE: BIOL 101.
Relation of organisms to their environment. The composition, structure, function and distribution of populations, communities, and ecosystems.
Field identification of major Rocky Mountain habitat types; their environmental conditions; structure and function of climax and alternate communities; and discussion of management alternatives.

**BIOL 407 ALPINE ECOLOGY**
Su 3 cr. LEC 1 LAB 2
**PREREQUISITE:** Junior standing, BIOL 101.
The ecological characteristics of alpine areas. A three-day field trip will confirm and reinforce material presented in class and is a course requirement.

**BIOL 410 DISSECTION ANATOMY OF THE HUMAN EXTREMITIES & BACK**
S 5 cr. LEC 1 LAB 2
**PREREQUISITE:** Junior or Senior standing, BIOL 207, BIOL 208, with grades of "C" or better in each course.
A detailed dissection study of the human musculoskeletal systems with emphasis on the extremities and back. Normal anatomy of the muscles, bones, nerves, and vessels is stressed.

**BIOL 411 ANIMAL PHYSIOLOGY**
F 3 cr. LEC 3
**PREREQUISITE:** Junior standing, BIOL 102, and one of the following: CHEM 215, CHEM 311, or BCHM 122.
General homeostatic physiology of animals with emphasis on mammals. Selected body systems are covered with major emphasis on the integration of body processes.

**BIOL 412 ANIMAL PHYSIOLOGY LAB**
F 1 cr. LAB 1
**COREQUISITE:** BIOL 411.
A laboratory investigating physiological processes occurring in animals. A wide range of equipment is used including computer-controlled monitoring equipment.

**BIOL 413 NEUROPHYSIOLOGY**
S alternate years, to be offered 2001 3 cr. LEC 3
**PREREQUISITE:** Junior standing, and either BIOL 411 or BIOL 207.
Physiology of integrative mechanisms in the central nervous system. Topics include excitable membranes, chemical transmission, and sensory and motor functions.

**BIOL 415 ICHTHYOLOGY**
S 3 cr. LEC 2 LAB 1
**PREREQUISITE:** BIOL 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.

**BIOL 417 BIOLOGY OF FISHES**
F alternate years, to be offered 2000 2 cr. LEC 2
**PREREQUISITE:** Junior standing, prior or concurrent registration in BIOL 411.
Adaptations of fishes to their aquatic environments; physiological, behavioral, and structural aspects.

**BIOL 418 MAMMALOLOGY**
F 3 cr. LEC 2 LAB 1
**PREREQUISITE:** BIOL 310.
Evolution, functional biology, distribution, and classification of mammals. Labs cover taxonomy and identification of representative forms.

**BIOL 419 ORNITHOLOGY**
S 3 cr. LEC 2 LAB 1
**PREREQUISITE:** BIOL 310.
Evolution, functional biology, distribution, and classification of birds. Montana species recognition is developed through laboratory use of a representational skin collection.

**BIOL 420 FIELD ORNITHOLOGY**
Su 3 cr. LAB 3
**PREREQUISITE:** Junior standing, and either BIOL 100 or BIOL 101.
Field identification, habitat affinities and life histories of birds of the northern Rockies. Includes early morning field trips.

**BIOL 421 YELLOWSTONE WILDLIFE ECOLOGY**
Su 3 cr. LEC 2 LAB 1
**PREREQUISITE:** Junior standing, and either BIOL 100 or BIOL 101.
Basic ecology of the major animal species of the Yellowstone area and the ecological controversies surrounding their management.

**BIOL 425 NEUROETHOLOGY**
S alternate years, to be offered 2001 3 cr. LEC 3
**PREREQUISITE:** BIOL 411, BIOL 201, or by permission of instructor.
Neural and hormonal bases of animal behavior, including mechanisms underlying sensory perception and motor responses, learning and memory, spatial navigation, animal language, dominance hierarchies and aggression, mating systems, and parental behavior.

**BIOL 427 AQUATIC FIELD ECOLOGY**
F 2 cr. LEC 1 LAB 1
**PREREQUISITE:** Prior or concurrent registration in BIOL 404.
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.

**BIOL 430 PLANT PHYSIOLOGY**
S 3 cr. LEC 3
**PREREQUISITE:** Junior standing, BIOL 101 and one of the following: CHEM 215, CHEM 311, or BCHM 122.
Physiological processes of higher plants, including photosynthesis, water relations, mineral nutrition, and development. Cross-listed with PS 450.

**BIOL 431 PLANT ANATOMY**
F alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
**PREREQUISITE:** Junior standing. BIOL 101.
Advanced plant biology examining structure and functions of plant cells and tissues. Includes experience with plant growth in greenhouse, light microscopy, and an individual project with slide preparation. Cross-listed with PS 452.

**BIOL 433 PHYLIOLOGY**
S alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
**PREREQUISITE:** BIOL 102 and BIOL 303.
Identification, physiology, ecology, and evolution of marine and freshwater algae. Cross-listed with PS 453.

**BIOL 434 AGROSTOLOGY**
F alternate years, to be offered 2001 3 cr. LEC 1 LAB 2
**PREREQUISITE:** BIOL 230.
Determination, classification, evolution, and nomenclature of grasses and grasslike plants; morphological and ecological features; preparation of reference specimens. Cross-listed with PS 454.

**BIOL 436 PLANT SYSTEMATICS**
F alternate years, to be offered 2000 3 cr. LEC 1 LAB 2
**PREREQUISITE:** BIOL 101 and BIOL 230.
Introduction to methods of analyzing evolutionary relationships of land plants, classification, and species concepts. Lab concentrates on plant identification emphasizing angiosperm plant families of Montana; preparation of reference specimens. Cross-listed with PS 456.

**BIOL 445 DEVELOPMENTAL MECHANISMS**
F alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
**PREREQUISITE:** BIOL 402.
This course will focus on the molecular and cellular mechanisms which drive developmental processes. Students will learn how such processes underlie the formation and modulation of the neural circuits comprising the scaffolding which produces "behavior."

**BIOL 449 STREAM ECOLOGY**
F 3 cr. LEC 2 LAB 1
**PREREQUISITE:** BIOL 101, CHEM 121 or CHEM 151, and PHYS 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.

**BIOL 450 CURRENT TOPICS IN BIOLOGY**
S 2 cr. SEM 2
**PREREQUISITE:** Senior standing in Biology Option, and prior or concurrent registration in BIOL 408.
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.

**BIOL 451C BIOMEDICAL SCIENCES SEMINAR**
ES alternate years, to be offered 2000 2 cr. SEM 2
**PREREQUISITE:** Senior standing in the biomedical sciences curriculum, BIOL 301, and one or more of the following courses: BIO1 310, BIOL 311, BIOL 312, BIOL 402 or BIOL 411.
Senior capstone course. Seminar presentations of advanced topics from the current biomedical literature which expand upon material in regular courses in the biomedical sciences curriculum. Students are expected to present and discuss seminar material and to write at least one paper.

**BIOL 470 INDEPENDENT PROBLEMS**
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.

**BIOL 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.

**BIOL 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**
FS, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: BIOL 489.
Classroom instruction associated with directed undergraduate research/creative activity projects.

**BIOL 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY**
FS, Su 1 - 6 cr. IND May be repeated. Max 12 cr.
COREQUISITE: BIOL 489.
Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis.

**BIOL 500 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.

**BIOL 501 EVOLUTIONARY GENETICS**
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: BIOL 501.
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.

**BIOL 502 ADVANCED LIMNOLOGY**
S alternate years, to be offered 2002 4 cr. LEC 2 LAB 2
PREREQUISITE: MATH 170, BIOL 404, BIOL 427, BCHM 122 or BCHM 540.
Advanced quantitative study of the physical, chemical and biological dynamics of lakes and reservoirs.

**BIOL 503 PALEOBIOLOGY**
S alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOL 310, BIOL 403.
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.

**BIOL 504 QUANTITATIVE BIOLOGY**
F alternate years, to be offered 2000 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOL 303, either STAT 216 or STAT 392, and one of the following: MATH 170, MATH 181, MATH 182.
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.

**BIOL 505 ENVIRONMENTAL ANALYSIS**
S alternate years, to be offered 2002 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOL 303, either STAT 216 or STAT 392 and one of the following: MATH 170, MATH 181, MATH 182.

**BIOL 506 POPULATION DYNAMICS**
S alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOL 503, either STAT 216 or STAT 392, and one of the following: MATH 170, MATH 181, MATH 182.
Techniques for modeling the growth, regulation, harvesting and persistence of populations. Computer lab.

**BIOL 507 COEVOLUTION**
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: BIOL 501, BIOL 503 or BIOL 403.
Exploration of nature and dynamics of symbiotic relationships between and among plants, animals, fungi and bacteria.

**BIOL 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.

**BIOL 513 TERRESTRIAL ECOLOGY OF PLAINS AND PRAIRIES**
Su 1 cr. RCT 1
PREREQUISITE: BIOL 406 or BIOL 516. Graduate standing, secondary teacher certification and two years teaching experience, 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.

**BIOL 515 LANDSCAPE ECOLOGY AND MANAGEMENT**
F 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.

**BIOL 516 TERRESTRIAL ECOLOGY OF THE NORTHERN ROCKY MOUNTAINS**
Su 2 cr. RCT 1 LAB 1
PREREQUISITE: Graduate standing, two years of classroom teaching, undergraduate science degree, one year of biology.
Description and comparison of grassland, forest, and alpine ecosystems of the NMR 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.

**BIOL 519 BIOLOGY OF RIPARIAN ZONES AND WETLANDS**
Su 2 cr. RCT 2
PREREQUISITE: BIOL 516 or BIOL 406.
Secondary teacher certification and two years teaching experience, computer access.

**BIOL 520 RESEARCH METHODS AND THE SCIENTIFIC PROCESS**
S 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.

**BIOL 523 PHYSIOLOGICAL PLANT ECOLOGY**
S alternate years, to be offered 2001 1 cr. LAB 1
COREQUISITE: BIOL 523.
A research project in physiological plant ecology will be chosen, carried out and reported in scientific journal format.

**BIOL 524 VEGETATION ECOLOGY**
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: BIOL 503.
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 BIOL 406.

**BIOL 526 INDIVIDUAL PROBLEMS**
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.

**BIOL 527 INTERNSHIP**
On Demand 2 - 12 cr. IND
PREREQUISITE: Graduate standing, consent of instructor and approval of department head. Academic and professional assignment arranged with an agency, business or other organization to provide guided experience in the field.

**BIOL 530 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.

**BIOL 531 PROFESSIONAL DEVELOPMENT**
On Demand 1 - 3 cr. May be repeated; maximum 6 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.

**BIOI 589 GRADUATE CONSULTATION**
F,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.

**BIOI 590 MASTER'S THESIS**
F,Ss 1 - 10 cr. IND Maximum credits unlimited. **PREREQUISITE:** Master's standing.

**BIOI 610 STRUCTURAL AND FUNCTIONAL ORGANIZATION OF COMPLEX BIOLOGICAL SYSTEMS I**
F 3 cr. LEC 3  
**PREREQUISITE:** Consent of instructor or IGERT (Interdisciplinary Graduate Education and Research Training) trainee status. The core goal is to integrate understanding of the components of biological systems into quantitative models of the integrated, intact systems. This course will cover signal transduction, cellular organization, molecular motors and the neural basis of learning and memory.

**BIOI 611 STRUCTURE AND MECHANISMS OF COMPLEX BIOLOGICAL SYSTEMS II**
S 3 cr. LEC 3  
**PREREQUISITE:** BIOI 610. The core goal is to integrate understanding of the components of biological systems into quantitative models of the integrated, intact systems. This course will cover genomic analysis, prediction of protein folding, allosteric regulation and nitric oxide signaling and modeling in biology.

**BIOI 690 DOCTORAL THESIS**
F,Ss 1 - 10 cr. IND Maximum credits unlimited. **PREREQUISITE:** Doctoral standing.

**BREN**

**Bio-resources Engineering**

Department of Civil Engineering  
(406) 994-2111

**BREN 430 WATER RESOURCES LAW**
S alternate years, to be offered 2002 2 cr. LEC 2  
**PREREQUISITE:** ENGL 121. Principles of the riparian and appropriative water law systems. Water law development through legislation and court decisions. Influence of water law on management and use.

**BREN 432 ADVANCED ENGINEERING HYDROLOGY**
S 3 cr. LEC 3  
**PREREQUISITE:** CE 331. **COREQUISITE:** CE 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.

**BREN 456 WATER IN THE SOIL-PLANT ENVIRONMENT**
F 3 cr. LEC 2 LAB 1  
**PREREQUISITE:** CE 332. Water relationships in the soil and plant microenvironment. Fundamentals of irrigation system design, operation, evaluation, and the interactions between irrigation and the environment. Water quality, soluble transport, and systems approaches to problem solving are stressed. Laboratory exercises emphasize computer based solutions.

**BREN 441 NATURAL TREATMENT SYSTEMS**
S 3 cr. LEC 3  
**PREREQUISITE:** CE 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.

**BREN 470 INDIVIDUAL PROBLEMS**
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.

**BREN 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.

**BREN 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**
F,S,Su 1 - 2 cr. RCT May be repeated. Max 4 cr. **COREQUISITE:** BREN490. Classroom instruction associated with directed undergraduate research/creative activity projects.

**BREN 490 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.

**BREN 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.

**BREN 589 GRADUATE CONSULTATION**
F,Su 1 - 4 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.

**BREN 590 MASTER'S THESIS**
F,Ss 1 - 10 cr. IND Maximum credits unlimited. **PREREQUISITE:** Master's Standing.

**BUED**

**Business Education**

College of Business  
(406) 994-4421

**BUED 575 PROFESSIONAL PAPER**
F,Su 1 - 4 cr. IND  
**PREREQUISITE:** Graduate standing. A research or professional paper or project dealing with a topic in the field. The topic must be agreed upon between the student and his or her major adviser and graduate committee.

**BUED 576 INTERNSHIP**
On Demand 2 - 12 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.

**BUED 580 GRADUATE CONSULTATION**
F,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 coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

**BUED 590 MASTER'S THESIS**
F,Ss 1 - 10 cr. IND Maximum credits unlimited. **PREREQUISITE:** Master's Standing.

**BUS**

**Business**

College of Business  
(406) 994-4421

**BUS 101V FRESHMAN SEMINAR**
F 3 cr. LEC 1 SEM 2  
Introduction to significant readings in business, economics and their impact on current professional practice in business. Taught as seminar where students participate in preparing and presenting discussion material. Includes brief overview of business curriculum, self assessment using interest, skills inventories.

**BUS 201 MANAGERIAL COMMUNICATION**
F,Ss 3 cr. LEC 3  
**PREREQUISITE:** Completion of Oral Communication and English University Core Requirement and one of the following: ENGR 100, CS 150, ME 101, MET 101. Strategies for written, oral, graphical, and nonverbal communications in business organizations.

**BUS 221 PRINCIPLES OF ACCOUNTING I**
F,Ss 3 cr. LEC 3  
**PREREQUISITE:** MATH 105 or Math Placement Test. An introduction to the principles of financial accounting for students of all business curricula. Specific topics include accounting concepts, recording transactions, financial statement preparation, accounting systems, cash, receivables, inventory, long-term assets, liabilities, corporations, and analysis of financial statements.

**BUS 222 MANAGERIAL ACCOUNTING**
F,Ss 3 cr. LEC 3  
**PREREQUISITE:** BUS 221, CS 150. An introduction to the phase of accounting that is concerned with providing information to managers for use in planning and controlling operations and in decision making. Specific topics include manufacturing cost, cost-volume-profit relationship, budgeting, relevant cost, and service department allocation.
BUS 301 MANAGEMENT & ORGANIZATION
F,Su 3 cr. LEC 3
PREREQUISITE: Junior standing, ECON 102S#, CS 150, and for business majors, Formal Admission to the College.

Design and control of organizations: work groups, individual behavior, interpersonal relations, communication, leadership, organizational structure, decision making, planning, control, staffing, motivation, and international issues.

BUS 311 INFORMATION SYSTEMS
FS 3 cr. LEC 3
PREREQUISITE: Junior standing, CS 150, BUS 221, and for business majors, formal admission to the College.

A survey of the uses of information in organizational management, with emphasis on systems to support managerial decision making. Students apply concepts in practical application projects using currently available software.

BUS 331 OPERATIONS MANAGEMENT
F,Su 3 cr. LEC 3
PREREQUISITE: Junior standing, BUS 311, and for business majors, formal admission to the College.

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.

BUS 341 MARKETING
F,Su 3 cr. LEC 3
PREREQUISITE: Junior standing, ECON 102S#, CS 150, and for business majors, Formal Admission to the College.

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.

BUS 351 FINANCE
F,Su 3 cr. LEC 3
PREREQUISITE: Junior standing, completion of Business Pre-Core, and for business majors, Formal Admission to the College.

Study of the principles of finance with emphasis on the application and integration of financial concepts in decision making.

BUS 361 INTRODUCTION TO LAW
FS 3 cr. LEC 3
PREREQUISITE: Junior standing, completion of Social Science Core, and for business majors, Formal Admission to the College.

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, product liability, agency, intellectual property, partnerships and corporations.

BUS 474C BUSINESS SENIOR SEMINAR
FS 4 cr. LEC 1 SEM 3
PREREQUISITE: Senior standing, formal admission to the College of Business, and completion of Business Core. Take last or next to last semester prior to graduation.

Policy, strategy, and ethics will be addressed in this integrative senior capstone course.

CE
Civil Engineering
Department of Civil Engineering
(406) 994-2111

CE 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 who choose to forego the course will utilize the one credit in the senior year as an additional technical elective credit. Students choosing to take the course will be introduced to civil engineering, including department programs and areas of specialty, civil engineering career options, professionalism, history, and ethics.

CE 201 SURVEYING
FS; Su on demand, 3 cr. LEC 2 LAB 1
COREQUISITE: MATH 175 or MATH 181.

Surveying field practice, error propagation analysis, survey for project design.

CE 202 APPLIED ANALYSIS
FS 1 cr. LAB 1
PREREQUISITE: MATH 175 or MATH 181.

Computer applications in civil engineering using math-based software and a programming language.

CE 280 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.

CE 304 CONSTRUCTION PLANNING AND METHODS
FS 3 cr. LEC 2 LAB 1
PREREQUISITE: ME 115.
COREQUISITE: I&ME 925, ME 116

Construction planning, equipment, and methods including: construction equipment, economics, applications, production and scheduling, plan reading.

CE 306 CONSTRUCTION PRACTICE
F 3 cr. LEC 3
PREREQUISITE: CE 201, ENGL 121.

Contract documents, insurance, bonding, specifications, drawings, labor and labor law, business ownership, construction management, estimating and bidding, project cost accounting, human relations, and ethics. A minimum of one credit is in report writing.

CE 312 STRUCTURES I
FS 3 cr. LEC 3
PREREQUISITE: EM 253.

Study of loading on structures. Study of structural systems and systems modeling. Analysis of determinate and indeterminate structures. Introduction to matrix methods. Introduction to structural analysis software. Introduction to design approaches and philosophies.

CE 315 STRUCTURES II
FS 3 cr. LEC 2 LAB 1
PREREQUISITE: CE 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.

CE 330 GEOTECHNICAL ENGINEERING
FS 3 cr. LEC 2 LAB 1
PREREQUISITE: EM 253.

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.

CE 331 ENGINEERING HYDROLOGY
F 2 cr. LEC 2
PREREQUISITE: I&ME 350.

Descriptive and quantitative hydrology with applications in water resources engineering.

CE 332 ENGINEERING HYDRAULICS
FS 2 cr. LEC 1 LAB 1
PREREQUISITE: EM 335.

Pipe flow, open channel flow, and hydraulic machines with applications in water resources engineering.

CE 340 PRINCIPLES OF ENVIRONMENTAL ENGINEERING
FS 3 cr. LEC 3
PREREQUISITE: CHEM 131.
COREQUISITE: EM 335.

Fundamentals of environmental engineering with emphasis on water and wastewater.

CE 350 HIGHWAY ENGINEERING
FS 3 cr. LEC 2 LAB 1
PREREQUISITE: CE 201.

Introduction to vehicle operating characteristics, traffic flow analysis and forecasting, transportation systems management and administration, geometric design, and pavement design. Laboratory work will include use of various in-practice software packages.

CE 361 LEGAL PRINCIPLES IN SURVEYING
F alternate years, to be offered 2000 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 2003 3 cr. LEC 3
PREREQUISITE: CE 201.

Federal and state laws and regulations governing legal land surveying; case studies and professional responsibilities.

CE 363 ADVANCED SURVEYING COMPUTATIONS
S alternate years, to be offered 2002 3 cr. LEC 2 LAB 1
PREREQUISITE: CE 201.

Modern instrumental and computational techniques in surveying.

CE 401 PROFESSIONAL PRACTICE AND ETHICS
FS 2 cr. LEC 2
PREREQUISITE: ENGL 121, I&ME 925. Student must be within two semesters of graduation.
COREQUISITE: CE 457

Discussion of the design process including data acquisition, preliminary and final design, plans, specifications, financing, and construction inspection. Professional ethics, social responsibility, and public policy.
Course Descriptions

CE 407 ESTIMATING AND SCHEDULING
F S 3 cr. LEC 2 LAB 1
PREREQUISITE: CE 304.
Preparation of time and cost estimates and bids for construction projects. Critical path network preparation and use for construction projects.

CE 412 COMPUTATIONAL STRUCTURAL ANALYSIS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CE 312.
Presentation of energy methods for structural analysis. Development of truss and beam finite elements and their use in solution to civil engineering problems. Introduction to finite element analysis topics.

CE 413 REINFORCED CONCRETE DESIGN
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: CE 315.
Design of reinforced concrete members and systems.

CE 414 STEEL DESIGN
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CE 315.
Design of structural steel members and systems.

CE 415 WOOD & MASONRY BUILDING DESIGN
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: CE 315.
Introduction to wood and masonry design. Integrated building design, including load calculations, design of foundations, structural elements, and connections. Emphasis on load-bearing buildings constructed with wood, masonry, prefabricated steel, and concrete.

CE 420 EARTH AND FOUNDATION ENGINEERING
S alternate year, to be offered 2002 3 cr. LEC 3
PREREQUISITE: CE 320.
Application of soil mechanics principles to the engineering of shallow and deep foundations, analysis of lateral earth pressures and design of retaining walls, and the stability of natural and engineered slopes.

CE 421 APPLIED GEOTECHNICAL ENGINEERING
S alternate year, to be offered 2001 2 cr. LEC 1 LAB 1
PREREQUISITE: CE 320.
Principles of geotechnical site investigations. Advanced laboratory testing. Application of laboratory results to the design of geotechnical engineering structures.

CE 431 OPEN CHANNEL HYDRAULICS
F 3 cr. LEC 3
PREREQUISITE: CE 392 or consent of the instructor.
Principles of open channel flow; hydraulic design of open channel structures.

CE 432 GROUNDWATER
S 3 cr. LEC 3
PREREQUISITE: EM 355.
Contemporary groundwater topics including contaminant transport, water supply, multiphase flow, remediation technologies, and groundwater modeling.

CE 435 CLOSED-CONDUIT HYDRAULICS
F 3 cr. LEC 3
PREREQUISITE: CE 392.
Advanced topics in hydraulic engineering, with emphasis on analysis and design of pipe transmission lines, pumps, and pipe distribution networks.

CE 442 ENVIRONMENTAL SCIENCE
F 3 cr. LEC 3
PREREQUISITE: CHEM 121 or CHEM 131.
The application of physical, chemical, and biological sciences to the solution of environmental problems including air pollution, water quality, and waste disposal. (Not for engineering majors)

CE 443 AIR POLLUTION CONTROL
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: EM 355, CHEM 131 and ME 324 or equivalent.
Fundamentals of air quality management with emphasis on the design of processes and equipment for controlling gaseous and particulate emissions.

CE 444 SOLID WASTE MANAGEMENT
F alternate years, to be offered 2001 2 cr. LEC 2
PREREQUISITE: EM 355 and CHEM 131.
Fundamentals of solid waste management with emphasis on collection, recycling, processing, and disposal. Introduction to hazardous waste management.

CE 445 HAZARDOUS WASTE TREATMENT
S 3 cr. LEC 3
PREREQUISITE: CE 540 or equivalent.
Principles, theory, and practice of treating hazardous materials.

CE 451 HIGHWAY PAVEMENTS
F alternate years, to be offered 2000 3 cr. LEC 2 LAB 1
PREREQUISITE: CE 320, CE 350.
Design of highway pavements including drainage and base/subbase/subgrade preparation. Laboratory in bituminous materials.

CE 452 TRAFFIC ENGINEERING
F alternate years, to be offered 2001 2 cr. LEC 2
PREREQUISITE: CE 320, EM 350.
Application of driver, vehicle, and roadway characteristics to principles of traffic control, operations, and safety.

CE 454 TRANSPORTATION PLANNING
S alternate years, to be offered 2001 2 cr. LEC 2
PREREQUISITE: CE 350.
Transportation planning methodology and practice, traffic circulation analysis, and transportation demand impact assessment.

CE 456 HIGHWAY GEOMETRIC DESIGN
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: CE 201, CE 350.
Advanced geometric design of highway systems including twolane and interstate roadways including intersection design and traffic control.

CE 457C SENIOR PROJECT I
F 1 cr. LEC 1 LAB 1
PREREQUISITE: Student must be within two semesters of graduation.
COREQUISITE: CE 401.
Senior capstone course. Senior project design. Development of project proposals for engineering services. Preliminary project design including development of scope of work, data acquisition and organization of design team.

CE 458C SENIOR PROJECT II
ES 2 cr. RCT 1 LAB 1
PREREQUISITE: CE 457.
Senior capstone course. Preliminary design of an engineering project. Evaluation of design alternatives. Cost estimates, design recommendations, and beginning of final design.

CE 463 PHOTOGRAMMETRY
F alternate years, to be offered 2001 2 cr. LEC 1
LAB 1
PREREQUISITE: MATH 175 or MATH 181.
Measurement and computation techniques for mapping from photographs; photo geometry, flight planning, ground control, cameras, control extension, stereoscopic instruments.

CE 464 PROJECT DESIGN IN SURVEYING
S alternate years, to be offered 2001 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.

CE 470 INDIVIDUAL PROBLEMS
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.

CE 476 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.

CE 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.

CE 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: CE 490.
Directed research and professional practice, guided experience in the field. Students may not take this course the semester they graduate.

CE 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,S 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.

CE 500 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.

CE 504 CONSTRUCTION PRODUCTIVITY
F 3 cr. LEC 3
PREREQUISITE: CE 407 and one year of industrial experience or one internship (CE 476 or CET 476).
Productivity improvement data collection, analysis, and solutions to include the construction work face and the office. Human factors and economics involved in productivity will be emphasized.
CE 505 QUALITY ASSURANCE/RISK MANAGEMENT IN CONSTRUCTION
F 3 cr. LEC 3
PREREQUISITE: Either I&ME 350, 354; or STAT 392 and CE 306 plus one year of industrial experience or one internship (CE 476 or CET 476).
Analysis of quality assurance and control concepts to include utilization of statistical analysis. Application of risk analysis principles to the construction process to minimize liability and project costs.

CE 506 ADVANCED CONSTRUCTION MANAGEMENT
S 3 cr. LEC 3
PREREQUISITE: CET 408 and one year of industrial experience or one internship (CE 476 or CET 476).
Quality improvement techniques to include Total Quality Management and Partnering. Enlightened leadership and management concepts.

CE 511 BUILDING STRUCTURAL SYSTEMS
F alternate years, to be offered 2000 2 cr. LEC 2
PREREQUISITE: CE 412 or CE 413 or CE 414 or CE 415
COREQUISITE: CE 512
Analysis of multistory structural systems. Emphasis on lateral force resisting systems in buildings.

CE 512 STRUCTURAL DYNAMICS
F alternate years, to be offered 2000 2 cr. LEC 2
PREREQUISITE: CE 512.
Response of structures to dynamic loads, including seismic loads.

CE 513 BEHAVIOR OF CONCRETE STRUCTURES
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CE 418.
Behavior of reinforced concrete members, frames, and shear wall systems. Significance of behavior in design of reinforced concrete structures.

CE 514 BEHAVIOR OF STEEL STRUCTURES
F alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: CE 414 and EM 415.
Behavior of steel members and frames. Significance of behavior in design of steel structures.

CE 519 BRIDGE & PRESTRESSED CONCRETE DESIGN
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CE 315
Design of concrete structures utilizing pre- and post-tensioned concrete elements. Introduction to bridge analysis and design.

CE 524 ADVANCED SOIL MECHANICS
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: CE 320.
Topics leading to an advanced understanding of the engineering behavior of soils with an emphasis on settlement and shear strength.

CE 525 ADVANCED EARTH AND FOUNDATION ENGINEERING
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CE 420, CE 524.
Analysis and design of advanced geotechnical engineering structures using state-of-art methods.

CE 526 SOIL PLASTICITY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CE 320.

CE 527 SOIL DYNAMICS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: CE 320.
Principles of soil dynamics applied to the analysis and design of dynamic resistant soil structures.

CE 529 GROUNDWATER CONTAMINATION
S 3 cr. LEC 3
PREREQUISITE: CE 454.
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.

CE 530 ADVANCED HYDRAULIC INVESTIGATIONS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: CE 451.
Advanced topics in open channel flow.

CE 531 RIVER HYDRAULICS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CE 451.
Analysis and control of riverine systems focusing on mobile-bed hydraulics. Topics include sediment transport, bank stabilization and restoration, and vegetative influences on these processes.

CE 533 INTELLIGENT TRANSPORTATION SYSTEMS
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CE 350 or equivalent.
Application of intelligent transportation system technology to address both urban and rural mobility and safety problems. Emphasis will be on analysis of functional requirements, physical architecture, and operational deployment strategies.

CE 535 SAFETY MANAGEMENT SYSTEMS
S 3 cr. LEC 3
PREREQUISITE: CE 350, CET 305 or equivalent.
Overview of industry safety issues and OSHA guidelines. Emphasis will be placed on risk analysis and job site hazards with protection requirements. Legal responsibilities with product design and tort liability will be analyzed.

CE 557 ADVANCED TRAFFIC MANAGEMENT
F alternate years, to be offered 2003 3 cr. LEC 2
LAB 1
PREREQUISITE: CE 452, CE 350.
Design and operation of advanced traffic management systems including signalization, simulation models, freeway operation strategies, real-time motorist information, and urban incident response.

CE 559 RURAL TRANSPORTATION ISSUES
F alternate years, to be offered 2000 3 cr. LEC 2
LAB 1
PREREQUISITE: CE 350, CE 454.
Evaluation of rural transportation issues related to administration, design, operations, and maintenance.

CE 570 INDIVIDUAL PROBLEMS
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.

CE 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.

CE 576 INTERNSHIP
On Demand 2 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.

CE 581 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.

CE 589 GRADUATE CONSULTATION
F,S,Su 5 cr. TUT
PREREQUISITE: Master's standing and approval of the Dean of Graduate Studies.
Can be taken 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.

CE 590 MASTER'S THESIS
F,S,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's standing.

CE 690 DOCTORAL THESIS
F,S,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

CET
Construction Engineering Technology
Department of Civil Engineering
(406) 994-2111

CET 202 CONSTRUCTION SURVEYING & EARTHWORK
S 5 cr. LEC 2 LAB 1
PREREQUISITE: CE 201.
Advanced construction and route surveys, earthwork mass diagrams, quantity takeoff, computer analysis.

CET 280 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.

CET 501 COMPUTERS IN CONSTRUCTION
F 1 cr. LAB 1
COREQUISITE: One of the following: CET 202, CET 305, CE 304, or CET 505.
Course Descriptions

CET 302 SOILS & FOUNDATIONS
F 4 cr. LEC 5 LAB 1
COREQUISITE: EM 215.
Physical properties of construction materials with emphasis on soils and aggregates. Earth pressures, flow nets, bearing capacity, piles, retaining walls, and slope stability.

CET 305 HIGHWAY TECHNOLOGY
S 3 cr. LEC 2 LAB 1
PREREQUISITE: CET 302.
Principles of traffic engineering, drainage, geometric and structural design, stabilization, surface treatments, and paving materials.

CET 308 CONCRETE TECHNOLOGY & STRUCTURES
S 3 cr. LEC 2 LAB 1
PREREQUISITE: CET 302.
Properties of concrete constituents, mechanical and service properties of concrete, mix design, field practices, Concrete reinforcing requirements and analysis of concrete members.

CET 402 COMPUTERIZED ESTIMATING AND SCHEDULING
F,S 2 cr. LEC 2
PREREQUISITE: CE 407.
Use of commercially available software to assist in project estimating, scheduling, and management. Principles of estimating database development.

CET 400C CONSTRUCTION MANAGEMENT
F,S 5 cr. LEC 2 LAB 1
PREREQUISITE: CE 306 and CE 407.
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.

CET 412 STRUCTURAL ELEMENTS
S 2 cr. LEC 2
PREREQUISITE: EM 215.

CET 470 INDIVIDUAL PROBLEMS
On Demand 1 - 5 cr. IND Maximum 4 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of Department Head.
Directed research and study on an individual basis.

CET 470 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.

CET 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.

CET 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: CET 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

CET 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,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.

CH E Chemical Engineering
Department of Chemical Engineering
(406) 994-2221

CH E 100 FRESHMAN SEMINAR
F 1 cr. LEC 1
An introduction to engineering methods, problem solving, and computers. Description of chemical engineering and discussion of special interests to students.

CH E 213 MATERIALS SCIENCE
F,S 3 cr. LEC 3
PREREQUISITE: CHEM 131 or CHEM 121.
Properties of concrete constituents, mechanical and structural design, stabilization, surface treatments, and paving materials.

CH E 215 ELEMENTARY PRINCIPLES I
F,S 3 cr. LEC 3
PREREQUISITE: CHEM 131.
Chemistry and internal structure of solids and the relationship of structure to physical and mechanical properties of metals and nonmetallic solids.

CH E 215 ELEMENTARY PRINCIPLES II
F,S 3 cr. LEC 3
PREREQUISITE: CHEM 131.
Material balance calculations applied to industrial processes. Analysis of gas behavior and gas-liquid systems.

CH E 216 ELEMENTARY PRINCIPLES IV
F 4 cr. LEC 4
PREREQUISITE: CH E 215, MATH 182.
Effective methods for applying the computer to common numerical problems encountered in chemical engineering. Chemical engineering examples will provide a basis for the more comprehensive problems encountered in the other professional level courses.

CH E 220 COMPUTATIONS IN CHEMICAL ENGINEERING
S 5 cr. LEC 3 RCT 1
PREREQUISITE: CH E 215, MATH 182.
Effective methods for applying the computer to common numerical problems encountered in chemical engineering. Chemical engineering examples will provide a basis for the more comprehensive problems encountered in the other professional level courses.

CH E 251V SOCIETAL IMPACTS OF CHEMICAL ENGINEERING
F 3 cr. LEC 3 RCT 1
PREREQUISITE: ENGL 121, CH E 215.
Study of ethical guidelines and professional practices and impacts of engineering on society and technology through discussion format, readings and formal oral presentations.

CH E 270 INDIVIDUAL PROBLEMS
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of the Associate Dean.
Directed research and study on an individual basis.

CH E 350 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
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.

CH E 307 CHEMICAL EQUILIBRIUM
S 4 cr. LEC 4
PREREQUISITE: CH E 216, MATH 224.
Application of first and second laws of thermodynamics to phase and chemical equilibrium, thermodynamic cycles, statistical mechanics, and process analysis.

CH E 322 FLUID MECHANICS & HEAT TRANSFER
F 4 cr. LEC 4
PREREQUISITE: CH E 216, CH E 217.
Theory and equipment for fundamental chemical engineering operations involving fluid mechanics and heat transfer. Equipment design and computations of operational rates.

CH E 323 MASS TRANSFER OPERATIONS
S 3 cr. LEC 3
PREREQUISITE: CH E 322, MATH 224.
Theory and equipment for fundamental chemical engineering operations involving mass transfer. Equipment design and computations of operational rates.

CH E 328 CHEMICAL REACTION ENGINEERING
S 3 cr. LEC 3 LAB 1
PREREQUISITE: CH E 216, CH E 217, and MATH 224.
COREQUISITE: CH E 323, CH E 307 or CHEM 324.
Application of the chemical kinetics of homogeneous and heterogeneous reactions to the design of chemical processing equipment.

CH E 338 BIOPROCESSES IN ENGINEERING
S 3 cr. LEC 3
PREREQUISITE: BCHM 340, CH E 322.
Biotechnology fundamentals on physiology and metabolism of microbes in natural and engineered systems for both planktonic and biofilm phenotypes and transition between types.

CH E 400 SEMINAR
F 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Senior 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.

CH E 402 CHEMICAL AND PETROLEUM INDUSTRIES
S 3 cr. LEC 2 SEM 1
PREREQUISITE: CH E 322, CHEM 215.
Present day chemical and biochemical processes in industry and processes which may assume industrial importance. Problems in economic and thermal analysis of processes.

CH E 411C DESIGN OF CHEMICAL & PETROLEUM PROCESSES I
F 2 cr. LEC 1 RCT 1
PREREQUISITE: CH E 328, CH E 323.
Senior capstone course. Design and simulation of chemical engineering equipment, processes and plants.
Course Descriptions

CH E 412C DESIGN OF CHEMICAL & PETROLEUM PROCESSES II
S 3 cr. LEC 2 RCT 1
PREREQUISITE: CH E 411.
Senior capstone course. Design and economic analysis of chemical engineering equipment, processes and plants.

CH E 415 DESIGN CASE STUDIES
S 2 cr. LEC 2
PREREQUISITE: CH E 323.
Design of chemical processes, equipment and plants utilizing open-ended case problems. Process troubleshooting and optimization.

CH E 424 TRANSPORT ANALYSIS
F 3 cr. LEC 3
PREREQUISITE: CH E 323, MATH 225.
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.

CH E 438 BIOPROCESS ENGINEERING
F 2 cr. LEC 2
PREREQUISITE: CH E 328, CH E 338.
Biotechnology process engineering - microbial process fundamentals, enzyme catalysis, biocatalyst design and analysis, separation of biomaterials.

CH E 441 CHEMICAL ENGINEERING LABORATORY
F 4 cr. LAB 4
PREREQUISITE: CH E 251, CH E 323.
Experimental studios of unit operations and transport phenomena. Pilot plant studies. Design of chemical processes and equipment from experimental studies.

CH E 444 HAZARDOUS WASTE MANAGEMENT
F 3 cr. LEC 3
PREREQUISITE: Junior standing and one of the following: CHEM 215 or EM 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.

CH E 451 PROCESS DYNAMICS & CONTROL
S 3 cr. LEC 2 LAB 1
PREREQUISITE: CH E 528, CH E 323, MATH 225.
Transient response analysis of controllers and instruments. Design of chemical process control systems.

CH E 452 ADVANCED ENGINEERING MATERIALS
S 3 cr. LEC 3
PREREQUISITE: ME 250 or CH E 213, MATH 225.
Micro and macro properties of electronic materials and material processing.

CH E 465 COMPOSITE MATERIALS
S 3 cr. LEC 3
PREREQUISITE: CH E 213.
Structure and properties of composite materials and design procedures for composite structures. Crosslisted with ME 465.

CH E 467 INTRODUCTION TO POLYMER ENGINEERING
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CH E 213, CH E 215.
The nature and special characteristics of synthetic high polymers and the technology of their manufacture and processing.

CH E 470 INDIVIDUAL PROBLEMS
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.

CH E 475 INTERNSHIP
On Demand 1 - 12 cr. IND Maximum 12 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of associate dean.
An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field.

CH E 480 SPECIAL TOPICS
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: Course prerequisites as determined for each offering. CH E 480 5 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.

CH E 488 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: CH E 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

CH E 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,S,Su 1-8 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Senior Standing.
Directed undergraduate research/creative activity which may culminate in research paper, journal article, or undergraduate thesis.

CH E 498 Co-OP EXPERIENCE
On Demand 1-12 cr. IND
PREREQUISITE: Co-op program participant, junior or senior.
An individualized cooperative education assignment arranged to provide guided experience in the field.

CH E 505 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.

CH E 507 THERMODYNAMICS
F 3 cr. LEC 3
PREREQUISITE: CH E 307.
Chemical engineering application to phase equilibria and chemical reaction equilibria. Liquid - liquid, vapor - liquid, and multiple reaction system.

CH E 508 SEPARATIONS
On Demand 3 cr. LEC 3
PREREQUISITE: CH E 328.
Separation topics of interest, including distillation, membranes, specialized separation of low concentration materials.

CH E 510 REACTION ENGINEERING & REACTION MODELING
F 3 cr. LEC 3
PREREQUISITE: CH E 328.
Theory and practice of industrial reactions, kinetics, synthesis, modeling of fixed and fluidized beds, process design problems.

CH E 511 CATALYSIS AND APPLIED SURFACE CHEMISTRY
S Alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: CH E 398.
The fundamental principles of catalysis, surface chemistry, and reactor design at a working research level.

CH E 515 ADVANCED COMPOSITE MATERIALS
S alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: CH E 465.
Advanced treatment of composite materials, including constituent properties, interfaces, micromechanics, microscopic behavior, modes and mechanisms of failure. This course is cross-listed with ME 551.

CH E 519 SURFACE ENGINEERING
S 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.

CH E 520 ADVANCED ENGINEERING ANALYSIS I
F 3 cr. LEC 3
PREREQUISITE: CH E 451.
Analysis and design of advanced control systems in the chemical industry.

CH E 523 PROCESS CONTROL
S 3 cr. LEC 3
PREREQUISITE: CH E 220.
Numerical methods used to solve common chemical engineering research problems. Solutions to non-linear equations. Optimization methods.

CH E 530 TRANSPORT PHENOMENA
F 3 cr. LEC 3
PREREQUISITE: CH E 307, CH E 217, CH E 322.
Comprehensive treatment of mass, momentum, and energy transport. Cross listed with ME 533.

CH E 533 VISCOUS FLUID DYNAMICS
S 3 cr. LEC 3
PREREQUISITE: EM 355.

CH E 534 MASS TRANSFER
S 3 cr. LEC 3
PREREQUISITE: CH E 424.
Mass transfer theory, transport in liquids, porous solids, interfacial effects, related mathematical techniques and application.

CH E 550 FAILURE OF MATERIALS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: One of the following: CH E 463, EM 415, ME 450.
Concepts of brittle and ductile fracture, fatigue, creep-rupture and environmentally assisted fracture. Applications to metals, polymers, ceramics and composite materials. This course is cross listed with ME 550.

CH E 551 ADVANCED COMPOSITE MATERIALS
S alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: CH E 465.
Advanced treatment of composite materials, including constituent properties, interfaces, micromechanics, microscopic behavior, modes and mechanisms of failure. This course is cross listed with ME 551.
CHEM 570 INDIVIDUAL PROBLEMS
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.

CHEM 580 SPECIAL TOPICS
On Demand 1 - 5 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
Chemistry, 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.

CHEM 589 GRADUATE CONSULTATION
FS,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 coursework (and thesis if on a thesis plan) but who need additional faculty or staff time or help.

CHEM 590 MASTER'S THESIS
FS,Su 1 - 10 cr. IND
PREREQUISITE: Master's standing.

CHEM 590 DOCTORAL THESIS
FS,Su 1 - 10 cr. IND
PREREQUISITE: Doctoral standing.

CHEMISTRY
Chemistry
Department of Chemistry
and Biochemistry
(406) 994-4801

CHEM 121N INTRODUCTORY GENERAL CHEMISTRY
FS,Su 4 cr. LEC 5 LAB 1
PREREQUISITE: High school algebra.
Introduction to general chemistry. Measurement systems, atomic structure, chemical periodicity, bonding, chemical reactions, acid-base chemistry, electrochemistry, nuclear chemistry.

CHEM 131N GENERAL CHEMISTRY I
FS,Su 4 cr. LEC 5 LAB 1
PREREQUISITE: Two years of high school math including algebra, or math test score to be eligible for college calculus.
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.

CHEM 132N GENERAL CHEMISTRY II
FS,Su 4 cr. LEC 5 LAB 1
PREREQUISITE: CHEM 131 or CHEM 141.
The second semester of the two-semester general chemistry sequence.

CHEM 141N HONORS GENERAL 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 CHEM 131, with emphasis on critical and analytical thought and with a greater reliance on math skills. For departmental honors program.

CHEM 142N HONORS GENERAL CHEMISTRY II
S 4 cr. LEC 3 LAB 1
PREREQUISITE: A grade better than a C in Chem 131 or Chem 141.
Topic coverage parallels CHEM 132, with emphasis on critical and analytical thought and with a greater reliance on math skills. For departmental honors program.

CHEM 200 SEMINAR
F 1 cr. SEM 2
For the new student. Introduction to faculty research through faculty miniseminars. Socialization and integration into departmental operations, procedures and expectations. Advising sessions. Establish oral and e-mail communications practices. Career opportunities.

CHEM 201 UNDERGRADUATE SEMINAR 2
S 1 cr. SEM 1

CHEM 215N ELEMENTS OF ORGANIC CHEMISTRY
FS 5 cr. LEC 4 LAB 1
PREREQUISITE: One of the following: CHEM 121, CHEM 152, or CHEM 142.
A one-semester introduction to organic chemistry. The unique character of carbon: bonding, structure, nomenclature, and common reactions of hydrocarbons and functional organic compounds.

CHEM 224 FUNDAMENTAL ANALYTICAL CHEMISTRY
S 5 cr. LEC 2 LAB 1
PREREQUISITE: CHEM 152 or CHEM 142.
Introduction to wet analytical chemistry with emphasis on the systematic treatment of equilibria, acid-base chemistry, redox equilibria and titrations, complexometric equilibria and titrations, Beer's law, fundamental lab skills.

CHEM 270 INDIVIDUAL PROBLEMS
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.

CHEM 280 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.

CHEM 289 FUNDAMENTAL ANALYTICAL CHEMISTRY
F 1 cr. LEC 3
PREREQUISITE: CHEM 152 or CHEM 142.
The advanced laboratory to accompany CHEM 224. In-depth experiments and data analysis. Required of all chemistry majors who take CHEM 224.

CHEM 300 INDIVIDUAL PROBLEMS
S 2 cr. LEC 2
PREREQUISITE: CHEM 301 or CHEM 302.
The second semester of a two-course physical chemistry sequence for science/engineering majors. Students should take both semesters of the sequence.

CHEM 324 PHYSICAL CHEMISTRY II
F 3 cr. LEC 3
PREREQUISITE: CHEM 152 or CHEM 142, PHYS 206, MATH 182, CHEM 215 or CHEM 512.
The first semester of a two-course sequence for science and engineering majors on quantum chemistry, statistical thermodynamics, spectroscopy, classical thermodynamics and kinetics.

CHEM 325 PHYSICAL CHEMISTRY I
F 3 cr. LEC 3
PREREQUISITE: CHEM 302 or CHEM 304, PHYS 206, MATH 182, CHEM 215 or CHEM 312.
The second semester of a two-course sequence for science and engineering majors on quantum chemistry, statistical thermodynamics, spectroscopy, classical thermodynamics and kinetics.

CHEM 354 INORGANIC CHEMISTRY
S 3 cr. LEC 3
PREREQUISITE or corequisite: CHEM 301 or CHEM 302.
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.

CHEM 382 ELECTRONICS FOR CHEMICAL INSTRUMENTATION
S 3 cr. LEC 1 LAB 2
PREREQUISITE: CHEM 132 or CHEM 142, and PHYS 205 or PHYS 211.
An introduction to the principles of electronics and computer design involved in modern laboratory instrumentation. Basic principles of analog signal conditioning, basic principles of digital logic and control circuits, computer architecture and interfacing, simple programming for data acquisition.
Course Descriptions

CHEM 55SN CHEMICAL PERSPECTIVES & PRACTICE
F 4 cr. LEC 2 RCT 1 LAB 1
PREREQUISITE: CHEM 132 or CHEM 142.
An integrated course to bring the understanding of chemistry concepts together with real world chemistry experiments and demonstrations. Laboratory based on analytical/physical techniques. Designed for students interested in chemical education.

CHEM 401C CAPSTONE SEMINAR
F S 1 cr. SEM 1
PREREQUISITE or COREQUISITE: CHEM 490 or BCHM 490.
Senior capstone course. Taught in collaboration with departmental Honors Thesis, CHEM 451. The chemistry/biochemistry research undergraduate experience constitutes a synthesis of our (bio)chemistry class room 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.

CHEM 417 SYNTHETIC CHEMISTRY
F 5 cr. LEC 2 LAB 1
PREREQUISITE: CHEM 312.
COREQUISITE: CHEM 501 or CHEM 524.
Organic and inorganic reaction chemistry for advanced students. Modern reagents and transformations are treated in detail, along with relevant theoretical and mechanistic considerations.

CHEM 425 ELECTROCHEMISTRY AND CHROMATOGRAPHY
F 3 cr. LEC 3
PREREQUISITE: CHEM 228.
COREQUISITE: CHEM 501 or CHEM 524.
An advanced analytical chemistry course which covers modern instrumental methods that are based on electrochemistry and chromatography.

CHEM 428 SPECTROCHEMICAL METHODS OF ANALYSIS
S 3 cr. LEC 3
COREQUISITE: CHEM 501 or CHEM 524.
An advanced analytical chemistry course which covers modern instrumental methods that are based on spectrochemical principles.

CHEM 427 ELECTROCHEMISTRY AND CHROMATOGRAPHY LABORATORY
F 2 cr. LAB 2
COREQUISITE: CHEM 425.
The laboratory to accompany CHEM 425.

CHEM 429 SPECTROCHEMICAL METHODS LABORATORY
S 2 cr. LAB 2
COREQUISITE: CHEM 426.
This laboratory to accompany CHEM 426 will emphasize the use of spectrochemical methods for the identification and purification of unknowns.

CHEM 451 DEPARTMENTAL HONORS THESIS
S 1 cr. LEC 1
PREREQUISITE: CHEM 142, and CHEM 490 or BCHM 490 (minimum of 3 cr.).
The 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.

CHEM 470 INDIVIDUAL PROBLEMS
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.

CHEM 490 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.

CHEM 499 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: CHEM 490.
Graduate instruction associated with directed undergraduate research/creative activity projects.

CHEM 499 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 graduate thesis.

CHEM 500 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.

CHEM 505 CRITICAL CONCEPTS IN CHEMISTRY
Su 3 cr. LAB 1
PREREQUISITE: Secondary teacher certification and 2 years teaching experience. One year introductory chemistry course (CHEM 131 and 132) and coursework or experience equivalent to one semester physical chemistry (CHEM 501). 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.

CHEM 507 MODERN ORGANIC AND BIOCHEMISTRY
S 3 cr. RCT 3
PREREQUISITE: Secondary teaching certification and 2 years teaching experience. One year introductory chemistry course (CHEM 131,132) and coursework or experience equivalent to one semester physical chemistry (CHEM 501). 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)

CHEM 515 STRUCTURE AND BONDING IN INORGANIC CHEMISTRY
F 5 cr. LEC 3
PREREQUISITE: CHEM 354.
Spectroscopy, structure, and bonding of coordination and organometallic compounds.

CHEM 516 MECHANISMS AND DYNAMICS IN INORGANIC CHEMISTRY
S 3 cr. LEC 3
PREREQUISITE: CHEM 354.
Mechanisms and dynamics of the reactions of coordination and organometallic compounds.

CHEM 523 ORGANIC REACTION MECHANISMS
F 5 cr. LEC 1
PREREQUISITE: CHEM 312. One year of undergraduate organic chemistry required.
COREQUISITE: CHEM 533.
A problem solving course concentrating on analyzing organic reactions and transformations via electron-pushing 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.

CHEM 524 MASS SPECTROMETRY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CHEM 523.
Mass spectrometric methods of analysis.

CHEM 525 CHEMICAL REACTIONS AND TRANSPORT IN ANALYTICAL METHODS
S alternate years, to be offered 2002 2 cr. LEC 3
PREREQUISITE: CHEM 324.
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.

CHEM 526 NUCLEAR MAGNETIC RESONANCE RESONANCE
S alternate years, to be offered 2001 5 cr. LEC 3
PREREQUISITE: CHEM 525.
Modern methods of nuclear magnetic resonance.

CHEM 527 OPTICAL SPECTROSCOPY
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: CHEM 525.
Use of optical spectroscopic methods for chemical analysis.

CHEM 533 PHYSICAL ORGANIC CHEMISTRY
F 3 cr. LEC 3
PREREQUISITE: CHEM 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.

CHEM 535 REAGENT CHEMISTRY
S 3 cr. LEC 3
PREREQUISITE: CHEM 417.
A thorough study of reagents, synthetic methodologies, and reagents.

CHEM 540 ORGANIC SYNTHESIS
F beginning 2001 5 cr. LEC 3
PREREQUISITE: CHEM 417.
A thorough study of reagents, synthetic methodologies, synthesis processes, and strategies.

CHEM 551 ORGANIC STRUCTURE ELUCIDATION
F 5 cr. LEC 3
PREREQUISITE: CHEM 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 spectroscopy. Emphasis will be on interpreting spectra to deduce the structure of the compound in question.

CHEM 554 ORGANOMETALLIC CHEMISTRY
S 3 cr. LEC 3
PREREQUISITE: CHEM 354 and CHEM 417.
Course Descriptions

Application of organometallic chemistry to organic transformations.

CHEM 557 QUANTUM MECHANICS
F 5 cr. LEC 3
PREREQUISITE: CHEM 524.
Applications of quantum to molecules and spin systems.

CHEM 558 CLASSICAL THERMODYNAMICS & STATISTICAL MECHANICS
S alternate years, to be offered 2001 5 cr. LEC 3
PREREQUISITE: CHEM 524.
Classical & statistical thermodynamics applied to chemical systems.

CHEM 559 KINETICS AND DYNAMICS
S alternate years, to be offered 2002 5 cr. LEC 3
PREREQUISITE: CHEM 524 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.

CHEM 560 SYMMETRY, ORBITALS AND SPECTROSCOPY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CHEM 524.
Group theory with applications, semi-empirical and ab initio calculations, vibrational and electronic spectroscopy, and their interrelationship will be covered.

CHEM 564 ADVANCED QUANTUM CHEMISTRY
S alternate years, to be offered 2002 5 cr. LEC 3
PREREQUISITE: CHEM 557.
Time independent and time dependent quantum mechanics with some application to molecular spectroscopy and dynamics.

CHEM 570 INDIVIDUAL PROBLEMS
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.

CHEM 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.

CHEM 588 PROFESSIONAL DEVELOPMENT
On Demand 1-3 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 inservice educators. A specific focus is given to each course which is appropriately subtitled.

CHEM 589 GRADUATE CONSULTATION
F,S 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 coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

CHEM 590 MASTER'S THESIS
F,S 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's standing.

CHEM 689 GRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1-5 cr. RCT
PREREQUISITE: Graduate standing.
COREQUISITE: CHEM 590 or CHEM 690.
Classroom instruction associated with directed graduate research/creative activity projects.

CHEM 690 DOCTORAL THESIS
F,S,Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

CLS College of Letters and Science

COM 130 INTRODUCTION TO MANUAL COMMUNICATION
F 3 cr. LEC 3
COREQUISITE: COM 131.
A beginning course in "total communication" with the severely hearing impaired. Includes study of the manual alphabet and numbers, 500 basic signs, Manually Coded English, and ASL colorings.

COM 131 MANUAL COMMUNICATION RECITATION
F 1 cr. RCT 1
COREQUISITE: COM 130.
Recitation to accompany COM 130. Students meet 30 hours outside the regular class time with a teaching assistant to practice sign vocabulary and technique.

COM 250 INTERMEDIATE SIGN LANGUAGE
F 3 cr. LEC 3
PREREQUISITE: COM 130, COM 131.
Improvement of students' receptive/productive sign skills beyond COM 130.

COM 430 CONVERSATIONAL SIGN LANGUAGE
F 3 cr. LEC 3
PREREQUISITE: COM 250.
Improvement of students' receptive/productive sign skills through group interaction. No voice is used in class.

CS Computer Science

Department of Computer Science

CS 120 PROGRAM DESIGN WITH C
F 5 cr. LEC 3
COREQUISITE: MATH 160.
Top-down design, modularity, efficiency, and robustness. I/O, assignment, decision, recursion, iteration, scalar types, one-dimensional arrays, and multi-dimensional arrays. C programming language. No previous programming experience required. Students cannot receive credit for both CS 120 and CS 160.

CS 150 COMPUTER LITERACY
F,S,Su 3 cr. LEC 2 LAB 1
Computer hardware and software concepts as they apply to all computers. Exposure to software packages such as Windows, word processors, spreadsheets, and Internet applications. Laboratory projects reflect practical usage in resolving real world problems/situations.

CS 160 INTRODUCTION TO COMPUTER SCIENCE
F,S 4 cr. LEC 3 LAB 1
Computer hardware and software concepts as they apply to all computers. Exposure to software packages such as Windows, word processors, spreadsheets, and Internet applications. Laboratory projects reflect practical usage in resolving real world problems/situations.

COM Communications

Department of Psychology

COM 110V INTRODUCTION TO PUBLIC COMMUNICATION
F 5 cr. RCT 2 LEC 1
Overview of the theories, concepts, and principles of public speaking, to include audience analysis, evidence, intercultural communication, and small group communication. Application of those concepts and principles through preparation and delivery of ceremonial, informative, persuasive, and group presentations.

Contact Information

(406) 994-3801

For more information, contact the College of Letters and Science at (406) 994-4288.
CS 210 OBJECT ORIENTED PROGRAMMING USING C++
FS 4 cr. LEC 3 LAB 1
PREQUISITE: CS 160 or CS 120.
Two part course. Part 1 - Lecture and lab cover programming using C. Part 2 - Lectures cover object-oriented design topics including encapsulation, information hiding, message passing, inheritance and polymorphism. Lab implements the designs using C++.

CS 221 COMPUTER SCIENCE I
FS 4 cr. LEC 3 LAB 1
PREQUISITE: CS 221.
COREQUISITE: MATH 181.
First in a four-course sequence that provides an integrated, breadth-first coverage of the field of computer science. Material is drawn from algorithms and data structures, discrete mathematics, theoretical computer science, and ethics. The laboratory uses Java.

CS 302 COMPUTER ORGANIZATION & SYSTEMS PROGRAMMING
F 4 cr. LEC 3 LAB 1
PREQUISITE: CS 221 and CS 301.
Machine organization and assembly language programming. Introduction to logical elements of machines, instruction sets, interrupt handling, I/O programming, device characteristics, and architectural components.

CS 302. ACM 302
ACCELERATED INTRODUCTION TO COMPUTER SCIENCE IV
FS 4 cr. LEC 3 LAB 1
PREQUISITE: CS 223.
Fourth in a four-course sequence that provides an integrated, breadth-first coverage of the field of computer science. Material is drawn from algorithms and data structures, discrete mathematics, theoretical computer science, and ethics. The laboratory uses C++.

CS 302. ACM 302
ACCELERATED INTRODUCTION TO COMPUTER SCIENCE III
FS 4 cr. LEC 3 LAB 1.
PREQUISITE: CS 222 and CS 210.
Third in a four-course sequence that provides an integrated, breadth-first coverage of the field of computer science. Material is drawn from algorithms and data structures, discrete mathematics, theoretical computer science, and ethics. The laboratory uses Java.

CS 210. ACM 210
INDIVIDUAL PROBLEMS
On Demand 1 - 5 cr. IND
PREQUISITE: Consent of instructor and approval of department head. Directed research and study on an individual basis.

CS 290 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREQUISITE: 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.

CS 350 THEOREY OF COMPUTATION
S 3 cr. LEC 3
PREQUISITE: CS 223 or CS 301. MATH 328.
The fundamental theory underlyng computer science. Formal languages, automata, computability, the Church-Turing thesis, computational complexity, and intractability.

CS 430 COMPUTER ORGANIZATION & SYSTEMS PROGRAMMING
F 4 cr. LEC 3 LAB 1
PREQUISITE: CS 223 or CS 301.
The engineering of software projects. Project conception, analysis, specification, design methodologies, reviews, walkthroughs, verification strategies, complexity analysis, implementation, testing, configuration control, debugging, and maintenance. Team project: using rapid prototyping to develop software requirements. Team psychology and personnel organization.

CS 430. ACM 430
DESIGN OF PROGRAMMING LANGUAGES
S 3 cr. LEC 3
PREQUISITE: CS 224 or CS 301.
General concepts and constructs of programming languages. Survey of various programming languages. Introduction to programming language syntax and semantics.

CS 430 MULTIMEDIA DEVELOPMENT METHODS
S alternate years, to be offered 2002 5 cr. LEC 2 LAB 1
PREQUISITE: CS 324 or CS 302 or consent of instructor.
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.

CS 499 SYSTEMS ADMINISTRATION
F alternate years, to be offered 2000 3 cr. LEC 3
PREQUISITE: CS 223 or CS 302.
The administration and management of computer systems. Includes user management, performance monitoring, disk management, systems and device configuration, and purchasing decisions. Emphasis will be on Unix and NT operating systems.

CS 481. INTEGRATED SIMULATION TECHNOLOGY
F 3 cr. LEC 3
PREQUISITE: CS 331 or EE 371, and either CS 324 or CS 302.
Operating system design including necessary hardware support. Processes, threads, concurrent programming, and scheduling. Memory, file, and I/O management. Security issues.

CS 482. INTEGRATED SIMULATION TECHNOLOGY
F 3 cr. LEC 3
PREQUISITE: CS 120 and either I&ME 354 or STAT 217.
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 I&ME 422.

CS 485. PLATFORM INDEPENDENT PROGRAMMING WITH JAVA
S alternate years, to be offered 2003 2 cr. LEC 2
PREQUISITE: CS 224 or CS 301.
Programming methods and languages that promote architecture independence. Topics include Java applets, Java applications, Java virtual machine, object orientation, and threaded programming.

CS 485. PLATFORM INDEPENDENT PROGRAMMING WITH JAVA
F 4 cr. LEC 3 LAB 1
PREQUISITE: CS 223 or CS 301.
Programming methods and languages that promote architecture independence. Topics include Java applets, Java applications, Java virtual machine, object orientation, and threaded programming.

CS 485. PLATFORM INDEPENDENT PROGRAMMING WITH JAVA
S cr. LEC 3
PREQUISITE: CS 223 or CS 301. MATH 328.
The fundamental theory underlying computer science. Formal languages, automata, computability, the Church-Turing thesis, computational complexity, and intractability.

CS 485. PLATFORM INDEPENDENT PROGRAMMING WITH JAVA
F cr. LEC 3 LAB 1
PREQUISITE: CS 223 or CS 301.
The engineering of software projects. Project conception, analysis, specification, design methodologies, reviews, walkthroughs, verification strategies, complexity analysis, implementation, testing, configuration control, debugging, and maintenance. Team project: using rapid prototyping to develop software requirements. Team psychology and personnel organization.

CS 485. PLATFORM INDEPENDENT PROGRAMMING WITH JAVA
S 3 cr. LEC 3
PREQUISITE: CS 224 or CS 301.
General concepts and constructs of programming languages. Survey of various programming languages. Introduction to programming language syntax and semantics.

CS 504. COMPUTATIONAL BIOLOGY
S alternate years, to be offered 2002 3 cr. LEC 2 LAB 1
PREQUISITE: CS 324 or CS 302.
This course surveys classic and recent problems in computational biology. Topics covered include algorithms for genomic sequencing and searching, protein structure prediction, and regulatory network discovery. Course projects could lead to undergraduate and graduate research projects.
CS 435 DATABASE SYSTEMS  
S 3 cr. LEC 3  
PREREQUISITE: CS 223 or CS 302.  
Database architecture; major database models; relational database fundamentals; SQL query language; database file structures.

CS 436 ARTIFICIAL INTELLIGENCE  
F 3 cr. LEC 3  
PREREQUISITE: CS 223 or CS 302.  
The fundamental bases of artificial intelligence: knowledge representation, search, and learning. Applications include game playing, neural networks, expert systems. Common Lisp and CLOS are introduced.

CS 440 COMPUTER NETWORKS  
F 4 cr. LEC 3 LAB 1  
PREREQUISITE: CS 223 or CS 302.  
How computer systems are organized into networks and how communication across networks is organized. Communication protocols and their design with emphasis on current technology and implementation of software.

CS 445 EMBEDDED SYSTEMS  
S alternate years, to be offered 2001 3 cr. LEC 2 LAB 1  
PREREQUISITE: CS 350 or CS 351 or EE 371.  
The design and implementation of embedded and real-time computer systems including both operating and control systems. The course emphasis will be on the hardware/software interface, programming techniques for asynchronous mechanisms, and state of the art tools for developing and supporting embedded systems.

CS 450C COMPILERS  
S 4 cr. LEC 3 LAB 1  
PREREQUISITE: CS 350, CS 355.  
Senior capstone course. Compiler design and construction. Lexical analysis, parsing, code generation, optimization, and symbol table management. Implementation of a small compiler.

CS 460 SENIOR DESIGN PROJECT I  
ES, Su 3 cr. IND 5  
PREREQUISITE: CS 351, consent of instructor and approval of department head.  
First in a two-course sequence. Students select and analyze a problem, develop requirements, and design a solution. Includes project planning, instructor and/or user meetings, and final design documents. Students will implement their solution in CS 461.

CS 461 SENIOR DESIGN PROJECT II  
ES, Su 3 cr. IND 5  
PREREQUISITE: CS 460.  
Second in a two-course sequence. Students implement their design from CS 460 using a programming language. Includes coding, test planning, test generation, user documentation, meeting with instructor and/or user, and a final project report.

CS 470 INDIVIDUAL PROBLEMS  
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.

CS 474 UNDERGRADUATE CONSULTATION  
ES 1 cr. RCT 1 Maximum 2 cr.  
PREREQUISITE: CS 223 or CS 301; or CS 150 and consent of instructor.  
Directed consultation for lower division CS students.

CS 476 INTERNSHIP  
On Demand 2 - 8 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.

CS 480 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.

CS 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INTRODUCTION  
F,S,Su 1 - 2 cr. RCT May be repeated.  
PREREQUISITE: CS 460.  
Introduction to working with directed undergraduate research/creative activity projects.

CS 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY  
F,S,Su 1 - 6 cr. IND May be repeated.  
PREREQUISITE: Graduate standing or seniors by petition.  
Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis.

CS 500 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.

CS 510 COMPUTABILITY  
F 3 cr. LEC 3  
PREREQUISITE: CS 350.  
Turing machine computability and decidability; abstract time and space complexity; intractability.

CS 513 COMPUTATIONAL COMPLEXITY  
S 3 cr. LEC 3  
PREREQUISITE: CS 510.  

CS 515 ANALYSIS OF ALGORITHMS  
F alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: CS 350.  
Concrete time and space complexity; combinatorial algorithms; greedy algorithms; dynamic programming; probabilistic and randomized algorithms; branch-and-bound algorithms.

CS 518 ADVANCED OPERATING SYSTEMS & SYSTEMS PROGRAMMING RESEARCH  
F alternate years, to be offered 2000 3 cr. LEC 3  
PREREQUISITE: CS 418.  
Contemporary topics in systems programming and operating system design and research.

CS 525 GRAPHICS & SCIENTIFIC VISUALIZATION  
S alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: CS 429.  

CS 530 PATTERN RECOGNITION  
F alternate years, to be offered 2000 3 cr. LEC 3  
PREREQUISITE: STAT 217 or I&ME 354.  
Statistical and syntactic pattern recognition; neural nets; performing automated recognition of information in a data set. Applications include vision systems, speech understanding, tactile sensing and information retrieval systems.

CS 535 DATABASE THEORY  
F alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: CS 435.  
Advanced database models including active, extended relational, deductive, temporal, object-oriented, and multimedia.

CS 556 ADVANCED ARTIFICIAL INTELLIGENCE  
S alternate years, to be offered 2002 3 cr. LEC 3  
PREREQUISITE: CS 436.  
An exposure to one or two advanced topics from the field of artificial intelligence. Topics include machine learning, artificial life, natural language processing, and cognitive science.

CS 560 DISTRIBUTED COMPUTING  
S alternate years, to be offered 2002 3 cr. LEC 3  
PREREQUISITE: CS 440.  
The design and implementation of software systems that utilize multiple host computer networks as a foundation. Concurrency control, homogeneous and heterogeneous systems, interprocess communication, protocols and application design.

CS 565 PARALLEL COMPUTING SYSTEMS  
F alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: CS 324.  
Models of parallel computation, architectures, operating systems, and compilers. Algorithm design for vector, array, and multi-processors.

CS 550 DESIGN & TRANSLATION OF PROGRAMMING LANGUAGES  
F alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: CS 450.  
Contemporary topics in advanced compiler design and research.

CS 570 INDIVIDUAL PROBLEMS  
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.

CS 571 RESEARCH EXPERIENCE  
ES, Su 1 - 4 cr. IND Maximum 6 cr.  
PREREQUISITE: Graduate standing.  
Research experience normally obtained through participation in a supervised research project acceptable to the department graduate committee.

CS 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT  
ES, 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.

CS 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.
ECON 312 LABOR & HUMAN RESOURCE ECONOMICS
F S cr. LEC 3
PREREQUISITE: ECON 201 or ECON 250SG.
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.

ECON 313 MONEY & BANKING
FS 3 cr. LEC 3
PREREQUISITE: ECON 102SG or ECON 250SG.
Principles and problems of money, banking, and credit. Monetary and banking history, monetary theory and policy, structure and operation of our financial system.

ECON 314SG INTERNATIONAL ECONOMICS
F S cr. LEC 3
PREREQUISITE: ECON 201 or ECON 250SG.
A survey of international economic theory and policy. Major concepts explored are comparative advantage, impacts of tariffs, exchange rates, and international payments.

ECON 317SG ECONOMIC DEVELOPMENT
S S cr. LEC 3
PREREQUISITE: ECON 201 or ECON 250SG.
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.

ECON 320 PUBLIC FINANCE
F S cr. LEC 3
PREREQUISITE: ECON 201 or ECON 250SG.
Analysis of public expenditure programs, governmental behavior, and public decision making. Topics such as health care and welfare programs, and principles of taxation will be covered.

ECON 3325 ECONOMICS OF NATURAL RESOURCES
F S cr. LEC 3
PREREQUISITE: ECON 201 or ECON 250SG.
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.

ECON 3725 ECONOMIC HISTORY OF THE US
S S cr. LEC 3
PREREQUISITE: ECON 101S or ECON 250SG.
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.

ECON 393SG COMPARATIVE ECONOMIC SYSTEMS
S 3 cr. LEC 3
PREREQUISITE: ECON 101S or ECON 250SG.
Economic theory of economies that are strongly market-oriented versus centrally planned economies, with discussions of intermediate cases. Contemporary criticisms of the U.S. economy are also discussed.

ECON 400 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Junior standing and as
ECON 500 SEMINAR
Prerequisite: ECON 501.
Advanced economic theory of price determination with analysis of consumer demand and production economics.

ECON 406 INDUSTRIAL ORGANIZATION
Prerequisite: ECON 501.
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 economic majors.

ECON 492C BENEFIT-COST ANALYSIS
Senior capstone course. Applied welfare economics and methods and criteria for evaluating benefits and costs of public policies and investments. Applications include environmental and natural resource issues.

ECON 470 INDIVIDUAL PROBLEMS
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.

ECON 480 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.

ECON 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F, Su 1 - 2 cr. RCT. May be repeated. Max. 4 cr. Corequisite: ECON 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

ECON 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F, Su 1 - 8 cr. Ind
Prerequisite: ECON 201, junior standing, and approval of instructor.
Interned for upper division undergraduate research/undergraduate scholars program. The student will work closely with the supervising faculty.

ECON 500 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.

ECON 501 MICROECONOMIC THEORY
S 5 cr. LEC 5
Prerequisite: ECON 401.
Economic models of optimization as they apply to consumer and firm decision making. Topics covered include comparative statics, theory of the firm and consumer, and consumer and producer surplus.

ECON 502 MACROECONOMIC THEORY
S 3 cr. LEC 5
Prerequisite: ECON 302.
Systematic review of accepted macroeconomic theory and critical study of the functional relationships contained therein.

ECON 561 ECONOMETRICS
F 3 cr. LEC 3
Prerequisite: ECON 501, STAT 216, MATH 221.
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.

ECON 569 RESEARCH METHODOLOGY
S 1 cr. LEC 1
Prerequisite: Graduate standing, ECON 301, ECON 302.
The research process as a means of acquiring knowledge which is reliable and relevant to problems.

ECON 570 INDIVIDUAL PROBLEMS
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.

ECON 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F, 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.

ECON 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.

ECON 589 GRADUATE CONSULTATION
F, 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 coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

EDCI 590 MASTERS THESIS
F, Su 1 - 10 cr. Ind May be repeated.
Prerequisite: Master's standing.

EDCI 592 IN SCHOOL EXPERIENCE
F 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.

EDCI 598 EDUCATIONAL PSYCHOLOGY & HUMAN DEVELOPMENT OF SCHOOL AGE CHILDREN
F, Su alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: EDCI 102, HDPE 150.
Human growth and psychological development of school age students, to include physical, cognitive, and psychosocial development within an educational, familial, and societal context.

EDCI 223 BASIC MEDIA PRODUCTION
F, Su 1 cr. IND 1
A self-paced/self-instructional course in which students will learn to operate presentation and classroom equipment such as video recorders, optical disc players, and slide and overhead projectors. Students also produce simple visuals such as transparencies and mounted pictures.

EDCI 240 INTRODUCTION TO MULTICULTURAL EDUCATION
F, Su 2 cr. LEC 2
Examination of the impact of cultures on present educational process and recognition of the multicultural nature of U.S. society through multiple perspectives of ethnic diversity in relation to learning and teaching.

EDCI 280 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.

EDCI 506 HEALTH ENHANCEMENT CONCEPTS FOR CHILDREN
F, Su alternate years, to be offered 2001 1 cr. LEC 1
Prerequisite: HDHL 106 and EDCI 360 or good standing in the exercise and wellness curriculum.
The relationship between physical fitness, nutrition, mental health, disease prevention, and other health related behaviors. Conceptual understanding of content and applications to the development of educational/intervention programs with emphasis on school age children.

EDCI 507 HEALTH EFFECTS OF EXERCISE
S, Su alternate years, to be offered 2001 1 cr. LEC 1
Prerequisite: EDCI 506, BIOL 209, and BIOL 210.
The relationship between habitual exercise and children's health; the physiological basis of physical fitness in children; application of theoretical knowledge into prescriptive exercise programs in various settings.
<table>
<thead>
<tr>
<th>Course Descriptions</th>
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<tbody>
<tr>
<td><strong>EDCI 320 FOUNDATIONS OF INSTRUCTIONAL COMPUTING</strong></td>
<td>F,S,Su 2 cr. LEC 1 LAB 1</td>
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<tr>
<td>PREREQUISITE: EDCI 208 or EDCI 209.</td>
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<tr>
<td>To prepare teachers to use computers confidently, thoughtfully, and effectively in their teaching.</td>
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<td>Topics include: hardware, selection and use of software, development of teaching materials, privacy, telecommunications, and issues related to computers and education.</td>
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<td><strong>EDCI 351 INFORMATION RESOURCES</strong></td>
<td>S 2 cr. RCT 2</td>
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<tr>
<td>PREREQUISITE: EDCI 320 or consent of instructor.</td>
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<tr>
<td>Development of skills in identifying information sources for library media centers, selecting and using reference and research sources, and use of media to enhance curricular content.</td>
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<tr>
<td><strong>EDCI 360 FOUNDATIONS OF ASSESSMENT</strong></td>
<td>F,S,Su 2 cr. RCT 2</td>
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<tr>
<td>PREREQUISITE: EDCI 208 or EDCI 209, and junior standing.</td>
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<tr>
<td>Fundamental concepts of educational assessment for classroom teachers including the relationship of assessment to educational aims, quality of assessment, principles of item construction, evaluation of student responses, interpretation of results, and improvement of techniques.</td>
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<tr>
<td><strong>EDCI 362 METHODS OF TEACHING MODERN LANGUAGES</strong></td>
<td>S 4 cr. LEC 4</td>
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<tr>
<td>PREREQUISITE: EDCI 360, 20 or more credits in subject area, and good standing in Teacher Education Program.</td>
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<tr>
<td>Provides prospective foreign language instructors with a practical and theoretical foundation for planning (including lesson/unit), implementing teaching, and evaluating programs and learning for levels K-12. Content reading skills are also addressed. Includes classroom paraprofessional experience for majors only.</td>
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<tr>
<td><strong>EDCI 364 HEALTH METHODS K-12</strong></td>
<td>F,S 2 cr. LEC 2</td>
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<tr>
<td>PREREQUISITE: EDCI 360, HDHL 230, HDHL 240, 20 or more credits in teaching subject area, good standing in Teacher Education Program.</td>
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<tr>
<td>Strategies for planning, implementing, evaluating, and advocating for comprehensive school health programs K-12. This is an active, student-centered, skills-based methods class.</td>
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<tr>
<td><strong>EDCI 400 SEMINAR</strong></td>
<td>On Demand 1 cr. SEM 1 Maximum 4 cr.</td>
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<tr>
<td>PREREQUISITE: Junior standing and as determined for each offering.</td>
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<tr>
<td>Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.</td>
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<tr>
<td><strong>EDCI 401 EDUCATIONAL STATISTICS I</strong></td>
<td>F,S,Su 3 cr. RCT 7</td>
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<tr>
<td>PREREQUISITE: STAT 216.</td>
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<tr>
<td>The application of statistical processes to the analysis of educational data. Educational problems that require hypothesis testing, test construction statistics, regression, estimation and the t-distribution, analysis of frequencies, and ANOVA in their solution will be included.</td>
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<tr>
<td><strong>EDCI 406 YOUNG ADULT LITERATURE</strong></td>
<td>F alternate years, to be offered 2000 2 cr. RCT 2</td>
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<tr>
<td>PREREQUISITE: EDCI 351.</td>
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<tr>
<td>COREQUISITE: EDCI 380.</td>
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<tr>
<td>Survey and evaluation of materials for young adult readers, aged 12-17. Includes curriculum integration and motivational strategies.</td>
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<tr>
<td><strong>EDCI 411 ORGANIZATION OF INFORMATION</strong></td>
<td>F alternate years, to be offered 2000 2 cr. RCT 2</td>
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<tr>
<td>PREREQUISITE: EDCI 320.</td>
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<tr>
<td>Methods for organizing, cataloging and classifying information. Use of technology as applicable for library automation and management.</td>
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<tr>
<td><strong>EDCI 412 ADMINISTRATION OF LIBRARY MEDIA CENTERS</strong></td>
<td>F alternate years, to be offered 2001 2 cr. RCT 2</td>
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<tr>
<td>PREREQUISITE: EDCI 325, EDCI 390 or consent of instructor.</td>
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<tr>
<td>COREQUISITE: EDCI 416.</td>
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<tr>
<td>Examination of administrative principles, procedures, assessment, leadership, and guidelines for library media centers.</td>
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<tr>
<td><strong>EDCI 415 INFORMATION LITERACY AND EDUCATIONAL CHANGE</strong></td>
<td>F alternate years, to be offered 2001 2 cr. RCT 2</td>
</tr>
<tr>
<td>PREREQUISITE: EDCI 390, EDCI 351 or consent of instructor.</td>
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<tr>
<td>Enhancement of skills in instructional design emphasizing information and media literacy, collaboration activities, instructional role of the library media professional, and programs in the educational community.</td>
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<tr>
<td><strong>EDCI 416 INFORMATION RESOURCE MANAGEMENT</strong></td>
<td>F alternate years, to be offered 2001 2 cr. RCT 2</td>
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<tr>
<td>COREQUISITE: EDCI 415 or consent of instructor.</td>
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<tr>
<td>Study of collection management and resource sharing in libraries and information centers. Includes copyright law, intellectual freedom, analysis of information needs, criteria for selection, collection evaluation, and resources and policies for collection development.</td>
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<tr>
<td><strong>EDCI 425 TECHNOLOGY IN THE CLASSROOM</strong></td>
<td>F 3 cr. LEC 2 LAB 1</td>
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<tr>
<td>PREREQUISITE: EDCI 225, EDCI 390 or recent teaching experience.</td>
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<td>Various means by which instructional technology may be used in the classroom. Emphasis on how to produce and teach with media. Previous projects have included videos, multimedia web pages, animations, and interactive learning technologies such as computer controlled video discs.</td>
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<tr>
<td><strong>EDCI 437 GRAPHICS FOR COMMUNICATION &amp; DISPLAY</strong></td>
<td>FS 3 cr. LEC 2 LAB 1</td>
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<tr>
<td>PREREQUISITE: EDCI 223.</td>
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<tr>
<td>Preparation of presentation materials, from handmade classroom displays to high technology video and computer graphics. Creative projects for students in teaching, library media, public relations, marketing, engineering, extension and other areas requiring professional visual presentations. No artistic talent required.</td>
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<tr>
<td><strong>EDCI 438 CORRECTIVE &amp; REMEDIAL READING: CLINICAL EXPERIENCE</strong></td>
<td>S 3 cr. LEC 2 LAB 1</td>
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<tr>
<td>PREREQUISITE: EDEL 505 or EDEL 405.</td>
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<tr>
<td>Current theory and techniques in reading assessment and correction/remediation. Emphasis will be on specific instructional strategies that focus on what students do not know about reading in order to expand their repertoire of reading skills, which would lead to independence in reading. A practicum is included.</td>
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<tr>
<td><strong>EDCI 450 EDUCATIONAL COMPUTING MANAGEMENT AND APPLICATION</strong></td>
<td>F,S,Su 1 - 3 cr. IND</td>
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<tr>
<td>PREREQUISITE: EDCI 320.</td>
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<tr>
<td>A flexible format that allows the student to select from the following modules: design and maintenance of an instructional computing lab, enhanced software competency, or instruction technology leadership in the schools.</td>
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<tr>
<td><strong>EDCI 451 EDUCATIONAL SOFTWARE DESIGN</strong></td>
<td>S alternate years, to be offered 2001 3 cr. LEC 1 RCT 1 LAB 1</td>
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<tr>
<td>PREREQUISITE: EDCI 320 or EDCI 425.</td>
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<tr>
<td>Techniques for designing, developing, creating, and evaluating educational software and World Wide Web pages. Students will produce finished, documented programs for classroom use.</td>
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<tr>
<td><strong>EDCI 455 COMPUTER GRAPHICS AND CURRICULUM MATERIALS DESIGN</strong></td>
<td>F alternate years, to be offered 2000 3 cr. LEC 1 RCT 1 LAB 1</td>
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<tr>
<td>PREREQUISITE: EDCI 320.</td>
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<tr>
<td>Graphic design techniques and research of various topics related to how people read and respond to visual materials are studied in order to produce a variety of classroom-ready curriculum materials. Numerous software applications are used.</td>
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<tr>
<td><strong>EDCI 460 METHODS OF INSTRUCTIONAL COMPUTING</strong></td>
<td>S alternate years, to be offered 2002 3 cr. LEC 1 RCT 1 LAB 1</td>
</tr>
<tr>
<td>PREREQUISITE: EDCI 320.</td>
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<tr>
<td>Strategies for using the computer in the classroom in ways which empower students and help teachers think critically about their use of technology. Topics include: educational software and teacher tools, telecommunications and World Wide Web resources for the classroom, discussion of research and issues related to instructional technology, and actual classroom experience.</td>
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<tr>
<td><strong>EDCI 469 PUBLIC SCHOOLING IN THE AMERICAN SOCIETY</strong></td>
<td>F 2 cr. LEC 2</td>
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<tr>
<td>PREREQUISITE: EDCI 208 or EDCI 209 and junior standing.</td>
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<tr>
<td>A basic survey of the historical, political, philosophical, social, economic, and legal foundations of public schooling in the United States.</td>
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<tr>
<td><strong>EDCI 470 INDIVIDUAL PROBLEMS</strong></td>
<td>On Demand 1 - 3 cr. IND Maximum 6 cr.</td>
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<tr>
<td>PREREQUISITE: Junior standing, consent of instructor, and approval of department head.</td>
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<tr>
<td>Directed research and study on an individual basis.</td>
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<tr>
<td><strong>EDCI 474 MIDDLE SCHOOL LITERACY</strong></td>
<td>S,Su alternate years, to be offered 2001; Su alternate years, to be offered 2002 2 cr. LEC 2</td>
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<tr>
<td>PREREQUISITE: One of the following: EDDS 450, EDEL 505, or EDEL 405.</td>
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<tr>
<td>This course prepares students for teaching various middle school reading programs and examines the varying roles of reading instruction within different middle school organizational patterns.</td>
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<tr>
<td><strong>EDCI 478 INTERNSHIP</strong></td>
<td>On Demand 2.5 cr. IND</td>
</tr>
<tr>
<td>PREREQUISITE: EDCI 360, consent of instructor, and approval of department head.</td>
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<tr>
<td>An individualized assignment with a professional agency to provide a guided field experience.</td>
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</tbody>
</table>
### Course Descriptions

**EDCI 489 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.

**EDCI 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**  
F,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.  
**COREQUISITE:** EDCI490.  
Classroom instruction associated with directed undergraduate research/creative activity projects.

**EDCI 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY**  
F,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.

**EDCI 500 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 which are not covered in regular courses. Students participate in preparing and presenting discussion material.

**EDCI 502 EDUCATIONAL STATISTICS II**  
S,Su 3 cr. RCT 3  
**PREREQUISITE:** EDCI 402.  
The application of statistical processes to the analysis of educational data. Educational problems that apply multifactor ANOVA, multiple comparison techniques, ANCOOVA, multiple regression, Janson and factor analysis in their solution are included.

**EDCI 504 EVALUATION AND MEASUREMENT IN EDUCATION**  
F,Su On Demand 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, program, and/or institutional levels.

**EDCI 505 FOUNDATION OF ACTION RESEARCH IN TEACHING AND LEARNING**  
On Demand 2 cr. LEC 2  
A course in the design of classroom-based educational research for practicing teachers. Students will learn the basic of action research in professional development and construct an action research proposal based on their individual teaching situation.

**EDCI 506 APPLIED EDUCATIONAL RESEARCH**  
F,Su 5 cr. LEC 3  
**PREREQUISITE:** 9 hours completed in major field of study.  
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 educational research study.

**EDCI 507 QUALITATIVE EDUCATIONAL RESEARCH**  
S,Su On Demand 3 cr. LEC 3  
**PREREQUISITE:** Graduate standing and EDCI 506.  
Within the context of systematic scientific inquiry, the qualitative research paradigm and approaches, approach-related data collection and management methodologies, appropriate data analysis and writing strategies, and the role of qualitative research in decision-support will be addressed. A research project is conducted.

**EDCI 508 ADVANCED EDUCATIONAL PSYCHOLOGY**  
S,Su 3 cr. LEC 3  
**PREREQUISITE:** EDEI 410 or EDSD 410, graduate standing.  
The cognitive revolution in psychology over the past 40 years has profound implications for education. In this course, students examine current theory and practice in the context of schooling.

**EDCI 509 IMPLEMENTING ACTION RESEARCH IN TEACHING AND LEARNING**  
S, 1998 only 2 cr. LEC 2  
**PREREQUISITE:** Must be enrolled in the MSSE or Master of Education in curriculum and instruction programs; certified to teach and 2 years teaching experience.  
A course in the implementation of classroom-based educational research for practicing teachers. Students will learn how to effectively conduct action research based on their individual teaching situation and its implications for their professional development.

**EDCI 513 SOCIAL FOUNDATIONS OF EDUCATION**  
F, alternate years, to be offered 2000; Su alternate years, to be offered 2001 3 cr. LEC 3  
**PREREQUISITE:** Graduate standing.  
This course examines the nature of education and the process of schooling through the disciplines of anthropology, sociology, and social psychology.

**EDCI 516 MODELS OF TEACHING: INFORMATION PROCESSING AND BEHAVIORAL SYSTEMS**  
On Demand 3 cr. RCT 3  
**PREREQUISITE:** EDEI 410 or EDSD 410.  
A course in generic teaching strategies which can be applied in most subject areas and at all instructional levels kindergarten through adult. Emphasizes training in classroom applications of concept attainment, inquiry training, simulations and direct instruction models of teaching.

**EDCI 517 MODELS OF TEACHING: PERSONAL & SOCIAL**  
On Demand 5 cr. RCT 13  
**PREREQUISITE:** EDEI 410 or EDSD 410.  
A course in generic teaching strategies which can be applied in most subject areas and at all instructional levels kindergarten through adult. Emphasizes training in classroom applications of syntax, group investigation, jurisprudence, and educational technology.

**EDCI 522 MEDIA SYSTEM DESIGN**  
Su alternate years, to be offered 2001 2 cr. RCT 2  
**PREREQUISITE:** EDEI 425.  
Examination and application of principles of communication and message design as these subjects apply to the design of instructional materials used with educational technology.

**EDCI 525 GENERAL SCHOOL CURRICULUM**  
F,S 3 cr. LEC 3  
**PREREQUISITE:** Graduate standing.  
A survey of current curriculum issues including the relationship of school curriculum to educational philosophy, school policy decisions, the impact on the classroom, curriculum and teaching, and the supervision of curriculum changes.

**EDCI 533 MIDDLE YEARS SCHOOL**  
Su alternate years, to be offered 2002 2 cr. RCT 2  
**PREREQUISITE:** EDEI 410 or EDSD 410, graduate standing.  
History, philosophy and organization of Junior High and middle schools, emphasizing curriculum and instruction based on the characteristics and needs of students 10 to 13 year olds.

**EDCI 534 CORRECTIVE & REMEDIAL READING**  
S 3 cr. LEC 2 LAB 1  
**PREREQUISITE:** EDEI 505, EDEI 405, teaching experience.  
Current theory and techniques in corrective/remedial reading and assessment procedures. Emphasis on instructional strategies and assessment tools for use with small groups outside of the classroom/one-on-one instruction. A practicum is included.

**EDCI 535 NEEDS ASSESSMENT IN EDUCATION**  
S,Su 2 cr. LEC 2  
**PREREQUISITE:** EDCI 532 or EDDL 540 or EDDL 501 or EDDL 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**  
S,Su 3 cr. LEC 5  
**PREREQUISITE:** EDCI 532 or EDEI 510, 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**  
S 2 cr. LEC 2  
**PREREQUISITE:** Must be enrolled in MSSE or Master of Education in curriculum and instruction; must have teacher certification and at least 2 years teaching experience.  
An overview course focusing on current problems in science education. Students will investigate a variety of teaching, learning and curriculum issues especially as they relate to their own teaching practices. Modern teaching methods addressing identified issues will be presented.

**EDCI 541 HISTORY & PHILOSOPHY OF EDUCATION**  
F,Su 2 cr. LEC 2  
**PREREQUISITE:** EDEI 410 or EEDF 410, graduate standing.  
A historical overview of the origins and development of western intellectual culture as it pertains to the interests of educators.

**EDCI 542 CREATIVE PROCESSES IN EDUCATION**  
S 2 cr. LEC 3  
**PREREQUISITE:** EDCI 525 or EEDF 410, teaching experience.  
Reviews historical and current issues in art education, aesthetic education and related areas which inform how we know our world and construct...
EDCI 544 PHILOSOPHICAL ISSUES IN EDUCATION
S,Su alternate years, to be offered 2002 2 cr. LEC 2
PREREQUISITE: Graduate standing.
An examination of contemporary educational issues using the perspectives of traditional philosophical documents.

EDCI 550 ADVANCED TEACHING STRATEGIES
S,Su alternate years, to be offered 2002 2 cr. RCT 2
PREREQUISITE: EDEL 410 or EDSD 410, teaching experience.
Teaching techniques and questioning strategies for experienced teachers set in a context of peer coaching for professional development.

EDCI 551 LEADERSHIP IN INSTRUCTIONAL TECHNOLOGY
Su alternate years, to be offered 2001 2 cr. LEC 1 LAB 1
PREREQUISITE: EDCI 550 and teaching experience.
Implementing technology based, constructivist strategies to improve learning and to develop a vision to lead others to effective use of technology.

EDCI 570 INDIVIDUAL PROBLEMS
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.

EDCI 571 IN-SERVICE EDUCATION
On Demand 1 - 4 cr. RCT/DIS/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 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.

EDCI 576 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.

EDCI 580 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.

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 inservice educators. A specific focus is given to each course which is appropriately subtitled.

EDCI 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.

EDCI 590 MASTER'S THESIS
F,S,Su 1 - 10 cr. IND May be repeated.
PREREQUISITE: Master's standing.

EDCI 607 QUANTITATIVE EDUCATIONAL RESEARCH
F,Su On Demand 2 cr. LEC 3
PREREQUISITE: EDCI 502, EDCI 506, graduate standing.
Within the context of systematic scientific inquiry, the quantitative research paradigm and designs, design-related data collection and management methods, appropriate data analysis and writing strategies, and the role of quantitative research in decision-support will be addressed. A research project is conducted.

EDCI 690 DOCTORAL THESIS
F,S,Su 1 - 10 cr. IND May be repeated.
PREREQUISITE: Doctoral standing.

EDEL Education, Elementary
Department of Education (406) 994-3120

EDEL 204 CHILDREN'S LITERATURE
ES 3 cr. LEC 3
PREREQUISITE: EDCI 208 or EDCI 209 and junior standing.
A survey of children's books with an emphasis on their use in K-6 classrooms. Introduces the history and current genres of children's literature, selection criteria, award-winning books, and strategies for sharing books with students.

EDEL 301 PARAPROFESSIONAL EXPERIENCE
F,S,Su 3 cr. Maximum credits unlimited.
PREREQUISITE: EDCI 306, good standing in Teacher Education Program.
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 subject areas corresponding to the methods classes in which they are currently enrolled.

EDEL 303 PRINCIPLES AND PRACTICES OF EMERGENT LITERACY I & II
ES 3 cr. IND Maximum 10 cr.
PREREQUISITE: EDCI 204, EDCI 306, at good standing in Teacher Education Program.
Current theory concerning emergent literacy and developmentally appropriate classroom practices. Emphasis is on a balanced approach which includes phonics and other cue systems, use of authentic children's literature, and use of programmed reading materials.

EDEL 507 TEACHING THE MULTICULTURAL CHILD
On Demand 1 - 3 cr. RCT 1
PREREQUISITE: EDCI 208 and EDCI 240.
To recognize the factors impacting minority language and ethnic group students in the elementary classroom with an emphasis on Native Americans, and to apply pedagogical principles to the teaching of reading and language arts in multicultural classrooms.

EDEL 509 HEALTH ENHANCEMENT INSTRUCTIONAL TECHNIQUES
F,Su alternate years, to be offered 2001 1 cr. LEC 1
PREREQUISITE: HDHL 106 and EDCI 560.
COREQUISITE: EDCI 506 and EDEL 309.
Health enhancement issues for elementary education majors. The role of a comprehensive school health education curriculum in elementary education.

EDEL 510 CHILDREN'S HEALTH ENHANCEMENT METHODS
F,Su alternate years, to be offered 2001 1 cr. LEC 1
PREREQUISITE: HDHL 106 and EDCI 560.
COREQUISITE: EDCI 506 and EDEL 308.
The course is designed for the elementary and physical education specialists to help them explore activities that can be incorporated into their health enhancement curricula.

EDEL 513 TEACHING SOCIAL STUDIES
F,S,Su alternate years, to be offered 2001 1 cr. LEC 1
PREREQUISITE: Completion of social science core including POLS 206, 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.
Concurrent paraprofessional experience registration during the academic year.

EDEL 535 TEACHING ELEMENTARY SCIENCE
F,Su alternate years, to be offered 2002 5 cr. LEC 3
PREREQUISITE: PSNS 108, EDCI 560, either BIOL 101 or MB 101, and good standing in Teacher Education Program.
This course focuses upon methods of teaching science inquiry skills, content, and attitudes in the elementary classroom.

EDEL 532 TEACHING ART AND THE ELEMENTARY CURRICULUM
F,S,Su alternate years, to be offered 2002 3 cr. LEC 2 LAB 1
PREREQUISITE: ART 110 or ART 114, EDCI 560, 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.

EDEL 533 TEACHING MATHEMATICS
F,Su alternate years, to be offered 2002 5 cr. LEC 3
PREREQUISITE: EDCI 560, MATH 151, and good standing in Teacher Education Program.
Math methods and materials for the prospective elementary teacher. Classroom organization, operation, management, applied technology, evaluation, and current theory.

EDEL 585 TEACHING PHYSICAL EDUCATION
F 2 cr. LEC 2
PREREQUISITE: EDCI 560, good standing in Teacher Education Program.
The theoretical and practical aspects of teaching physical education in the elementary schools.
EDEL 410 TEACHING MATH
F,Su alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: EDCI 350, EDEL 204, and good standing in Teacher Education Program.
Methods of teaching mathematics in the elementary school: types of instruction, development of teaching materials, and evaluation of student achievement.

EDEL 414 PROFESSIONAL ISSUES
FS 2 cr. LEC 2
PREREQUISITE: Senior standing, completion of all required EDEL methods courses, and good standing in Teacher Education Program.
Senior capstone course: Review 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.

EDEL 470 INDIVIDUAL PROBLEMS
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.

EDEL 480 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.

EDEL 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS,SS 1 - 2 cr. CRT May be repeated. Max 4 cr.
COREQUISITE: EDEL 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

EDEL 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS,SS 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.

EDEL 500 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 which are not covered in regular courses. Students participate in preparing and presenting discussion material.

EDEL 505 ISSUES AND TRENDS IN READING
FS,SS alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: EDEL 410.
This course focuses upon improving teaching behaviors in reading with an emphasis on children's literature and integration with other curricular areas. Research supported by practitioners will help define the necessary knowledge, skills and dispositions needed to nurture effective reading programs.

EDEL 510 ELEMENTARY SCHOOL CURRICULUM
SS alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: EDEL 410 or EDSS 410.
Understanding attitudes and skills for inservice teachers and administrators to be applied to selection and implementation of learning experiences for elementary school children.

EDEL 512 ISSUES AND TRENDS IN LANGUAGE ARTS
SS alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: EDEL 410.
Trends in teaching the communication skills (listening, speaking, reading, writing) in the elementary schools with an emphasis on improving classroom practices, especially in composition.

EDEL 513 ISSUES AND TRENDS IN SOCIAL STUDIES INSTRUCTION
SS alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: EDEL 513, EDEL 410.
Addresses teaching and supervision of social studies in public schools. Specific focus is given to concept teaching, teaching for thinking and value education in a democratic society. There is emphasis on a reflective approach to social studies education within the course.

EDEL 525 IMPROVEMENT OF INSTRUCTION IN SCIENCE
SS alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: EDEL 410.
This course has a dual focus on theoretical and practical concerns in science education. Research, conceptual frameworks and policy issues will be introduced, as well as practical activities for elementary and secondary science classrooms.

EDEL 533 IMPROVEMENT OF INSTRUCTION IN MATH
SS alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: EDEL 353, EDEL 410.
Explores the importance of art in children's lives and possibilities for art experiences within an integrated elementary curriculum. Emphasizes philosophical and cultural groundings for teaching art, studio experiences and research potentials.

EDEL 535 IMPROVEMENT OF INSTRUCTION IN HEALTH ENHANCEMENT
SS alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: EDEL 410.
Stresses use of appropriate knowledge from mathematics education, learning theory, developmental psychology, readiness, evaluation, curriculum development and individual differences in selecting, designing, organizing and presenting mathematical content for elementary school children.

EDEL 540 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS,SS 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: EDEL 410.
Directed undergraduate research/creative activity projects.

EDEL 543 MATH LABS IN THE SELF-CONTAINED CLASSROOM
SS alternate years, to be offered 2001 3 cr. LEC 2
PREREQUISITE: EDEL 410.
Prepares 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.

EDEL 545 MATH LABS IN THE SELF-CONTAINED CLASSROOM
SS alternate years, to be offered 2002 2 cr. LEC 1 RCT 1
PREREQUISITE: EDEL 353, EDEL 410.
Establishment, management and operation of an elementary school with an emphasis on improving classroom practices, especially in composition.

EDEL 555 MATH LABS IN THE SELF-CONTAINED CLASSROOM
SS alternate years, to be offered 2001 2 cr. LEC 1
PREREQUISITE: EDEL 410.
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.

EDEL 556 MATH LABS IN THE SELF-CONTAINED CLASSROOM
SS alternate years, to be offered 2001 2 cr. LEC 1
PREREQUISITE: EDEL 410.
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.

EDEL 557 DESCRIPTIVE STATISTICS
SS alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: EDEL 410.
Addresses teaching and supervision of social studies in public schools. Specific focus is given to concept teaching, teaching for thinking and value education in a democratic society. There is emphasis on a reflective approach to social studies education within the course.
EDLD 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
ES,Su 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: EDCI 506, 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.

EDLD 576 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.

EDLD 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.

EDLD 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 5 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.

EDLD 589 GRADUATE CONSULTATION
ES,Su 5 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 coursework (and thesis if on a thesis plan) but who need additional faculty or staff time or help.

EDLD 590 MASTER'S THESIS
ES,Su 1 - 10 cr. IND Maximum credits unlimited
PREREQUISITE: Master's standing.

EDLD Educational Leadership
Department of Education
(406) 994-3120

EDLD 489 UNDERGRADUATE RESEARCH/CREATIVITY ACTIVITY INSTRUCTION
ES,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
Corequisite: EDLD 490.
Classroom instruction associated with directed undergraduate research/creativity activity projects.

EDLD 490 UNDERGRADUATE RESEARCH/CREATIVITY ACTIVITY
ES,Su 1 - 6 cr. IND May be repeated. Max 12 cr.
Directed undergraduate research/creativity activity which may culminate in a research paper, journal article, or undergraduate thesis.

EDLD 500 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 presented at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

EDLD 501 FOUNDATIONS OF ADULT EDUCATION
F alternate years, to be offered 2000, Su 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.

EDLD 503 COMMUNITY EDUCATION
S alternate years, to be offered 2002; Su On Demand 2 cr. LEC 2
PREREQUISITE: EDLD 501.
Emphasis on the historical and philosophical development, understanding the concept, goals and objectives, emerging models and institutions and agencies of community education.

EDLD 504 TEACHING AND LEARNING IN ADULT EDUCATION
F alternate years, to be offered 2001, Su On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
A study of the adult learner, closely related learning theories, and teaching strategies appropriate for adult education strategies.

EDLD 505 HIGHER EDUCATION HISTORY AND PHILOSOPHY
F alternate years, to be offered 2000, Su On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
This foundations course presents the historical and philosophical development of American higher education against the background of political, social, economic, cultural and intellectual issues from its founding to the present for contemporary application.

EDLD 507 FOUNDATIONS OF EDUCATIONAL LEADERSHIP
ES,Su alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Graduate standing, BA/BS in Education.
This is the entry course to the K-12 Educational Leadership program. Topics included are 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.

EDLD 508 SUPERVISION OF INSTRUCTION
F alternate years, to be offered 2001, Su 3 cr. LEC 3
PREREQUISITE: Graduate standing, BA/BS in Education.
This course emphasized 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.

EDLD 509 COMMUNITY AND TRIBALLY CONTROLLED COLLEGES
F alternate years, to be offered 2000; Su on demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
Analysis of the mission, historical development and current status of the community college movement. Includes a focus on the growth and development of tribally controlled colleges. Topics include historical development, organization structures, characteristics of students and faculty, funding patterns and relationships with other organizations and agencies.

EDLD 510 ORGANIZATION AND ADMINISTRATION OF HIGHER EDUCATION
F alternate years, to be offered 2001, Su On Demand 3 cr. LEC 3
PREREQUISITE: EDLD 506.
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, organizational structures will be examined in relation to the role of the "educational" unit and organizational theory.

EDLD 511 PLANNING PROGRAM ASSESSMENT
F alternate years, to be offered 2001, Su On Demand 3 cr. LEC 3
PREREQUISITE: EDLD 506 and graduate standing.
This is a study of the literature, models, standards, strategies, and skills needed to plan and implement the assessment of postsecondary educational programs, services, and administration for various internal and external clients including accrediting agencies.

EDLD 512 FINANCE AND ADMINISTRATION IN HIGHER EDUCATION
F alternate years, to be offered 2000, Su On Demand 3 cr. LEC 3
PREREQUISITE: EDLD 505 or consent of instructor.
The study of financial governance across higher education: from macro-systems (national, state governing boards) to micro-systems (university, college, and department). In the course, students model the potential impact of various decisions on an institution's financial status.

EDLD 513 RESOURCE AND PROGRAM MANAGEMENT
F alternate years, to be offered 2001, Su On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.
The study of program department management in higher and continuing education for both academic and administrative. Support units include: issues that deal with the management of faculty, students, support personnel, programs, facilities, budgeting, equipment, and program assessment.

EDLD 515 PLANNED CHANGE
F,S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: EDLD 540.
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 including CBAM and systems, and leadership and evaluation of change.

EDLD 520 SCHOOL AND THE COMMUNITY
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: Graduate standing, BA/BS in Education.
This course covers the techniques for connecting the school with parents and the community. Additionally, the course covers various curriculum 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.

EDLD 585 ORGANIZATION & SUPERVISION OF SCHOOL READING PROGRAMS
Su alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: EDEL 410 or EDSD 410.

The role of the supervisor or administrator in improving reading instruction; different approaches to reading instruction; the purpose and place of basal readers and children's literature; what research indicates; what conditions promote effective teaching.

EDLD 588 COLLEGE CURRICULUM
S alternate years, to be offered 2001, Su On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.

This course reviews the organization and philosophy of higher education; the role of the college in the community; the relationship between college and community; and the functions of academic units.

EDLD 590 POST SECONDARY EDUCATION
S alternate years, to be offered 2002; Su On Demand 5 cr. LEC 3
PREREQUISITE: Graduate standing.

The study of the social, educational, and administrative problems of higher education.

EDLD 595 STUDENT SERVICES
F alternate years, to be offered 2001, Su On Demand 3 cr. LEC 3
PREREQUISITE: EDLD 510.

The study of student affairs and services; the roles of the advisor, the specialist, and the guidance counselor; the guidance process; the effect of diversity on student services; and the implications of the American Association of Higher Education in the changing role of higher education.

EDLD 597 INSTITUTIONAL RESEARCH AND ASSESSMENT
S alternate years, to be offered 2001, Su On Demand 3 cr. LEC 3
PREREQUISITE: EDLD 510.

The study of institutional research and assessment in higher education. Identifying appropriate measures for academic and administrative assessment, internal and external data sources, analysis techniques, and the communication of information to academic and administrative decision makers.

EDLD 598 CAREER DEVELOPMENT
S alternate years, to be offered 2001, Su On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.

The study of career development, including the process of career planning, the development of career counseling, and the role of the career counselor in the educational system.

EDLD 599 PROFESSIONAL DEVELOPMENT
S alternate years, to be offered 2001, Su On Demand 3 cr. LEC 3
PREREQUISITE: Graduate standing.

The study of professional development, including the role of the administrator in the development of professional skills and the use of professional development strategies.

EDLD 600 IN-SERVICE EDUCATION
F,S,Su 3 cr. TUT
PREREQUISITE: Master's standing and approval of the Dean of Graduate Studies.

This course focuses on the leadership skills necessary for the development of professional development needs of in-service educators. A specific focus is given to each course which is appropriately subtitled.

EDLD 601 LEADERSHIP AND ORGANIZATIONAL THEORY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MA in Educational Leadership or Principal's Certification, EDLD 510.

This course provides 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, styles, values, and ethics required of school leaders. The development of a shared vision and strategic plan will be emphasized.
EDLD 630 SUPERVISION AND INSTRUCTIONAL LEADERSHIP
Su alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MA in Educational Leadership or Principal's Certification, and EDLD 512.
Advanced course in the supervision of the teaching-learning process. Designed for school administrators and superintendents or supervisors. Emphasized staff development, especially job-embedded and action research, for greater student achievement.

EDLD 635 DATA DRIVEN DECISIONS
Su alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: MA in Educational Leadership or Principal’s Certification, and EDLD 515.
This course focuses on the systematic collection and analysis of data to inform decision-making for increased student learning. Computer use is emphasized along with the ongoing collection of student results data.

EDLD 645 PERSONNEL MANAGEMENT IN EDUCATION
S, Su 3 cr. LEC 3
PREREQUISITE: MA in Educational Leadership or Principal's Certification, and EDLD 512, EDLD 530.
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, and apply appropriate policies, criteria, processes for recruitment, selection, induction, and compensation of personnel with an emphasis on equity and diversity.

EDLD 650 RESOURCE MANAGEMENT: FINANCE AND FACILITIES
Su alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: MA in Educational Leadership or Principal’s Certification, and EDLD 555.
The course focus is on financial and facility planning, management, and policy making for school leaders. A knowledge of funding and resource allocation and using technology to make data driven decisions will be stressed.

EDLD 655 LEGAL AND POLICY STUDIES
Su alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MA in Educational Leadership or Principal’s Certification, and EDLD 555 and 556.
The course is designed to facilitate a more in-depth understanding of legal issues relative to education 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.

EDLD 690 DOCTORAL THESIS
F,S,Su 5 -12 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

EDSD
Education, Secondary
Department of Education
(406) 994-3120

EDSD 352 METHODS OF TEACHING VOCATIONAL AGRICULTURE & TECHNOLOGY EDUCATION
F 3 cr. LEC 3

EDSD 353 METHODS OF TEACHING ART
F 3 cr. LEC 3
PREREQUISITE: EDSD 350 and good standing in Teacher Education program.
Problem solving approach to planning (including lesson/unit), teaching and evaluating vocational and technology education at the middle and secondary school levels. Content area reading will be investigated. Includes classroom paraprofessional experience.

EDSD 355 METHODS OF TEACHING ART
F 3 cr. LEC 3
PREREQUISITE: EDSD 350 and good standing in Teacher Education Program.
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.

EDSD 357 METHODS OF TEACHING ENGLISH
F,S 3 cr. LEC 3
PREREQUISITE: EDSD 350 and good standing in Teacher Education Program.
Teaching strategies, methods and materials for planning (including lesson/unit); implementing evaluating language arts instruction. Includes components on course design, writing, reading, literature, speaking and media instruction, and professional development. Includes classroom paraprofessional experience.

EDSD 358 METHODS OF TEACHING SOCIAL STUDIES
S 3 cr. LEC 3
PREREQUISITE: EDSD 350, 20 or more credits in subject area, and good standing in Teacher Education Program.
Curriculum, materials, procedures and content reading for planning (including lesson/unit), implementing, teaching, and evaluating social studies programs in secondary schools. Includes classroom paraprofessional experience.

EDSD 359 METHODS OF TEACHING FAMILY AND CONSUMER SCIENCES
F 3 cr. LEC 3
PREREQUISITE: EDSD 350, 20 or more credits in subject area, and good standing in Teacher Education Program.
Teaching strategies, methods, materials, and content reading for planning (including lesson/unit); implementing and evaluating family and consumer science programs. Includes classroom paraprofessional experience.

EDSD 361 METHODS OF TEACHING MIDDLE SCHOOL MATHEMATICS
F 3 cr. LEC 3
PREREQUISITE: Senior standing, completion of all course work, and good standing in Teacher Education Program.
MIDDLE SCHOOL MATHEMATICS
EDSD 362 METHODS OF TEACHING SENIOR HIGH MATHEMATICS
F 3 cr. LEC 3
PREREQUISITE: EDSD 360, 20 or more credits in subject area, and good standing in Teacher Education Program.
Teaching strategies, methods, materials, and content reading for planning (including lesson/unit); implementing and evaluating family and consumer science programs. Includes classroom paraprofessional experience.

EDSD 363 MULTICULTURAL EDUCATION
S 3 cr. LEC 3
PREREQUISITE: EDSD 350.
Provides students with an opportunity to reflect on their own culture/heritage as they explore the backgrounds and experiences of other cultural groups in this country. An emphasis is placed on democratic community building in a multicultural society.

EDSD 365 METHODS OF TEACHING SECONDARY SCIENCE
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EDSD 350, 20 or more credits in subject area, and good standing in Teacher Education Program.
Corequisite: For science majors, EDSD 400.
Focuses on methods of planning (including lesson/unit), teaching, and evaluating science inquiry skills, content, attitudes, and safety in the secondary classroom.

EDSD 371 METHODS OF TEACHING ART
F,S 3 cr. LEC 3
PREREQUISITE: MA in Educational Leadership or Principal's Certification, and EDSD 400.
Emphasizes techniques in presenting materials, planning class activities, and creating good learning experiences. Methods of teaching and evaluating artistic, remedial mathematics, basic geometry, introductory algebra, and reading/writing mathematics.

EDSD 400 SEMINAR
S 3 cr. LEC 3
PREREQUISITE: EDSD 413.
Solutions to the problems inherent in high school drama teaching and directing. Philosophy of educational theatre, planning (including lesson/unit), evaluation, content reading, and relationships between the high school program and the community. Includes classroom paraprofessional experience.

EDSD 410 STUDENT TEACHING
S, Su 5 -12 cr. IND
PREREQUISITE: Senior standing, completion of all required EDSD special methods courses, and good standing in Teacher Education Program.
Corequisite: EDSD 413.
Observation and teaching in a classroom setting; preparation and delivery of lesson plans. The student teaching experience will be supervised by experienced teachers and MSU staff supervisors. Observational participation at grades five and/or six also takes place.

EDSD 413C PROFESSIONAL ISSUES
F 3 cr. LEC 3
PREREQUISITE: Senior standing, completion of all EDSD special methods courses, and good standing in Teacher Education Program.
Corequisite: EDSD 410.
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.
Course Descriptions

EDSD 450 CONTENT AREA READING
S 2 cr. LEC 2
PREREQUISITE: EDEL 305 or EDEL 405.
- Techniques, materials, organization, and theory in teaching effective reading skills in all content fields, grades 5-12.

EDSD 462 TEACHING THE EXCEPTIONAL STUDENT
ES 1 cr. LEC 1
PREREQUISITE: EDCI 360 and junior standing; may be taken corequisite with major methods course.
- Provides information about the special needs student and the education of these students in both the special and regular classroom setting. Included will be assessment and placement procedures, the individualized education program, appropriate instructional practices, and mainstreaming.

EDSD 464 TEACHING CONTENT READING STRATEGIES
ES 1 cr. LEC 1
PREREQUISITE: EDCI 360 and junior standing; may be taken corequisite with major methods course.
- This course will examine content area reading/learning strategies that enable learners to better understand and remember course content. It is designed to aid secondary teachers to teach more effectively in their specific discipline.

EDSD 470 INDIVIDUAL PROBLEMS
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.

EDSD 480 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.

EDSD 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
ES, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: EDSD 490.
- Classroom instruction associated with directed undergraduate research/creative activity projects.

EDSD 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
ES, 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.

EDSD 570 INDIVIDUAL PROBLEMS
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Good standing, consent of instructor, approval of department head, and approval of Dean of Graduate Studies.
- Directed research and study on an individual basis.

EDSD 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.

EE 101 INTRODUCTION TO ELECTRICAL FUNDAMENTALS LAB
ES 1 cr. LAB 1
PREREQUISITE: EE 101, MATH 182.
- Lecture/lab introduction to electrical fundamentals including Kirchhoff's laws, Ohm's Law, power and energy in resistive circuits, use of meters and oscilloscopes, time-varying signals in electric circuits, inductors and capacitors, series and parallel resonance circuits and digital circuits.

EE 256 CIRCUITS I
ES 4 cr. LEC 3 LAB 1
PREREQUISITE: EE 207, MATH 225.
- An introductory course which covers Ohm's Law, Kirchhoff's Laws, nodal and mesh analysis method, network theorems, capacitors, inductors, RC-RL, response, complex frequency, phasors, steady state AC circuits, and three phase circuits.

EE 257 CIRCUITS II
ES 4 cr. LEC 3 LAB 1
PREREQUISITE: EE 206, MATH 225.
- This is the first course in linear electronics. It covers: two port networks, operational amplifiers, diodes, bipolar transistors, field effect transistors, and bipolar and MOS digital circuits.

EE 261 LINEAR ELECTRONICS I
ES 4 cr. LEC 3 LAB 1
PREREQUISITE: EE 206.
- Transient response of RLC circuits to DC and AC excitations, mutual inductance and transformers, two port networks, Laplace transforms and its application to linear circuit analysis, Fourier series, Fourier transform and filters.

EE 262 LINEAR ELECTRONICS II
ES 3 cr. LEC 3
PREREQUISITE: EE 207 or FEET 312.
- Directed research and study on an individual basis.

EE 308 SIGNAL AND SYSTEM ANALYSIS
FS 3 cr. LEC 3
PREREQUISITE: EE 207, MATH 224, CS 120 or CS 160.
- Fourier analysis and discrete system analysis. Variability in electrical engineering circuit and system design. Application of random variables and processes.

EE 316 ELECTRONICS II
FS 4 cr. LEC 3 LAB 1
PREREQUISITE: EE 207, EE 216.
- This is the second course in linear electronics. It covers differential and multistage amplifiers, frequency response, feedback, output stages of power amplifiers, analog integrated circuits, filters, and tuned circuits.

EE 321 CONTROL SYSTEMS I
S 5 cr. LEC 3
PREREQUISITE: EE 308.
- Analysis and design of continuous linear feedback systems, mathematical characterization of systems, stability theory and signal flow analysis, computer-aided design with root locus and frequency response techniques, compensator and controller types, state description of systems, and introduction to digital control systems.

EE 334 ELECTROMAGNETIC THEORY I
F 3 cr. LEC 3
PREREQUISITE: PHYS 212, MATH 224.
- 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 the definition of impedance, power flow, and the use of the Smith Chart.

EE 335 ELECTROMAGNETIC THEORY II
S 3 cr. LEC 3
PREREQUISITE: EE 334.
- This course provides students the opportunity to gain more depth in EM fields topics such as Maxwell's equations, plane wave propagation, radiation and antennas, and the use of the scattering matrix.

EE 355 INDUSTRIAL ELECTRIC AND ELECTRONIC SYSTEMS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: PHYS 212 or PHYS 206 and MATH 182 or MATH 176.
- Electric industrial system overview and requirements, selection of electrical industrial drives and associated power converters, industrial power systems, illumination, load estimation and feeder design, power quality and system security.

EE 354 ELECTRICAL CIRCUIT APPLICATIONS
F 5 cr. LEC 2 LAB 1
PREREQUISITE: MATH 176 or MATH 182.
- An applied study of electricity and electrical circuits, with laboratory experiences, for that person not expected to deal with electronics or advanced circuit techniques.

EE 360 ENERGY CONVERSION DEVICES
S 4 cr. LEC 3 LAB 1
PREREQUISITE: EE 207 or EEET 312.
- Introduction to electrical energy conversion devices such as DC and AC generators and motors, transformers, single phase and special purpose motors, and power electronic converters; introduction to power systems. Laboratory experience includes construction and demonstration of energy conversion circuits.
EE 367 LOGIC DESIGN
S 4 cr. LEC 3 LAB 1
PREREQUISITE: EE 216 or EEET 215, EE 262, EE 371.
Advanced combinational, synchronous and asynchronous sequential logic system design including hardware descriptive languages. Laboratory experience in advanced logic circuit design.

EE 371 MICROPROCESSOR HARDWARE AND SOFTWARE SYSTEM
F 4 cr. LEC 3 LAB 1
PREREQUISITE: EE 261 and knowledge of a programming language or consent of instructor.
Introduction to the structure of microprocessors, arithmetic and logic units, processor control, interrupts, memories, and input/output. Laboratory experience in assembly level programming of microprocessor applications.

EE 391 ELECTRICAL ENGINEERING DESIGN I
F S 1 cr. LEC 1
PREREQUISITE: EE 316, EE 371.
Activities involved in planning, budgeting, and implementing a design project. Design teams are formed and projects are proposed with a formal proposal. Design solutions are examined, a final solution is chosen, and implementation is begun.

EE 400 SEMINAR
On Demand 1 cr. SEM 1 Maximum 1 cr.
PREREQUISITE: Junior standing.
Engineers from industry and others present weekly seminars about new developments in EE, research at MSU, law and the EE, starting companies, etc. The course is designed to expose students to different career options and present background in related areas.

EE 409 MATERIAL SCIENCE
F 3 cr. LEC 3
PREREQUISITE: EE 316.
Basic material properties of dielectrics, magnetic materials, conductors, and semiconductors. Practical applications of materials to circuit design.

EE 411 ADVANCED ANALOG ELECTRONICS
S 3 cr. LEC 3
PREREQUISITE: EE 316.
Filters, impedance matching networks, multistage amplifier design, oscillators, noise in electronics, current topics.

EE 412 ELECTRONIC INSTRUMENTATION DESIGN
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EE 316.
Applications of integrated instrumentation amplifiers, comparators, sample and hold devices, and A-D and D-A converters. Design using electrical transducers, signal conditioning and filtering circuits, passive elements, and ground-loop considerations. Lab experience in graphical programming applications for data acquisition and instrument control. Analog and digital I/O considerations to control processes and generate patterns for testing and communication with peripheral equipment.

EE 414 INTRODUCTION TO VLSI DESIGN
F 3 cr. LEC 3
PREREQUISITE: EE 262, EE 316.
Introduction to CMOS fabrication, CAD tools setup, MOSFET operation, metal, active and poly layers, CMOS passive elements, design rules and layout, BSIM SPICE simulation, the inverter, static logic and transmission gates, dynamic logic, and CMOS opamps.

EE 422 CONTROL SYSTEMS II
F 3 cr. LEC 3
PREREQUISITE: EE 251.
Analysis and design of discrete-time and computer-controlled linear feedback systems, z-transforms, sampling analog components, digital control design using state-space and state-space methods, mechanization of control algorithms on computers, computer simulation of discrete-time systems.

EE 423 CONTROL SYSTEMS LAB
F 1 cr. LEC 1 LAB 1
PREREQUISITE: EE 251.
Identification of characteristics and parameters of physical systems, hardware implementation of various modes of feedback control on physical systems, simulation and control application design.

EE 433 MICROWAVE PRINCIPLES
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EE 354.
This is a design course studying how microwaves are used. Laboratory measurements and the design of microwave devices are stressed along with the use of impedance concepts, the reflection coefficient, the S matrix and the use of the Smith Chart.

EE 446 TELECOMMUNICATIONS SYSTEMS
F 3 cr. LEC 3
PREREQUISITE: EE 358, EE 316.
Random variables and signals, frequency domain analysis, sampling theory, quantization, digital modulation, bandwidth considerations, statistical representation of noise and probability of error, analog modulation, power budgets, and system comparisons.

EE 446 TELECOMMUNICATIONS LAB
F 1 cr. LAB 1
COREQUISITE: EE 445.
Fourier analysis and use of spectrum analyzers. Experiment involving modulation and demodulation of analog and digital signals, sampling theory, and aliasing.

EE 447 ADVANCED TELECOMMUNICATIONS AND FIBER OPTIC SYSTEMS
S 3 cr. LEC 3
PREREQUISITE: EE 445.
Analog and digital communication system performance in noise environment, matched filter detection, Shannon's Capacity Theorem, error-correcting codes, spread spectrum modulation, current wireless communication systems, and other digital systems.

EE 451 POWER ELECTRONICS
S alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
PREREQUISITE: EE 316, EE 321, EE 355.
This course incorporates a design oriented study of power electronic devices such as DC-DC, DC-AC, AC-DC, and AC-AC converters used in various electrical and electronic systems. Laboratory experience includes construction and demonstration of a regulated power converter.

EE 454 ELECTRIC POWER SYSTEMS
F 3 cr. LEC 3
PREREQUISITE: EE 355.
Power system components, transmission system design, power flow studies, automatic generation and control, symmetrical components, faulted power systems, protection, introduction to transient stability.

EE 465 REAL TIME MICROCONTROLLER APPLICATIONS
S 4 cr. LEC 2 LAB 2
PREREQUISITE: EE 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.

EE 466 COMPUTER ARCHITECTURE AND SYSTEM ORGANIZATION
S 3 cr. LEC 3
PREREQUISITE: EE 371.
Design of computer system instruction sets, data path, storage, and memory systems. Cost and speed relations, tradeoffs between hardware and software architectures including CISCs and RISCs, multiprocessors, and distributed processors. Control and implementation tradeoffs.

EE 470 INDIVIDUAL PROBLEMS
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.

EE 475 HARDWARE AND SOFTWARE ENGINEERING FOR EMBEDDED SYSTEMS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EE 465 and CS 190 or CS 210 or consent of instructor.
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.

EE 476 INTERNSHIP
Fall, Spring 1-2 cr. IND
PREREQUISITE: Sophomore standing.
On-site, one semester practicum under guidance of employer designated mentor.

EE 477 DIGITAL SIGNAL PROCESSING
S 4 cr. LEC 3 LAB 1
PREREQUISITE: EE 308, EE 371.
This course provides the tools to analyze and manipulate digital signals. Properties of FIR and IIR filters, the design and analysis of these filters, and implementation of these filters to manipulate the frequency content of signals. Determination of spectral content of signals using Fourier analysis and how to implement Fast Fourier Transform with windowing.

EE 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.

EE 483 ELECTRO-OPTICAL SYSTEMS
S alternate years, to be offered 2000 3 cr. LEC 2 LAB 1
PREREQUISITE: EE 354 or consent of instructor.
Provides an overview of electro-optic systems and components. Lectures will cover ray optics, scalar wave optics, laser and Gaussian beam optics, light sources, detectors, and electro-optic and acoustic-optic photonic devices. Laboratory experiments will introduce basic photonic instrumentation and measurement techniques.

EE 485 FIBER AND INTEGRATED OPTICS
S alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
PREREQUISITE: PHYS 215 and EE 354 or PHYS 318.
Course Descriptions

EE 489 UNDERGRADUATE RESEARCH/ CREATIVITY ACTIVITY INSTRUCTION
F, S, Su 1-2 cr. SCT May be repeated. Max 4 cr.
Corequisite: EE 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

EE 490 UNDERGRADUATE RESEARCH/ CREATIVITY ACTIVITY
F, S, Su 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.

EE 492C ELECTRICAL ENGINEERING DESIGN II
ES 3 cr. SEM 1 IND 2
Prerequisite: EE 391.
Senior capstone course. The design project proposed culminates with the actual construction and demonstration of the project. Design teams report progress to the design supervisor periodically. Students are required to write a technical paper, orally present it, and generate a technical manual for the project.

EE 495 PROFESSIONALISM, ETHICS AND SOCIAL RESPONSIBILITY
S 1 cr. LEC 1
Prerequisite: Junior standing.
The course examines ethical problems faced by engineers and other professionals. It calls upon specific well-known, historical engineering ethics problems (BART, space shuttle disaster, "whistle blowings"), etc., and guest lectures by outside speakers who have faced ethical problems.

EE 498 CO-OP EXPERIENCE
F, S, Su 3 cr. IND
Prerequisite: Junior standing, GPA of 3.00 or better.
On-site cooperative work experience for electrical engineering co-op students.

EE 501 PASSIVE & ACTIVE FILTERS
F alternate years, to be offered 2000 5 cr. LEC 3
Prerequisite: EE 316.
Modern passive network synthesis and realization using lumped and distributed elements, filter and network design procedures, computer simulation, optimization, and sensitivity analysis of network response characteristics.

EE 502 DIGITAL FILTERS
S alternate years, to be offered 2001 5 cr. LEC 3
Prerequisite: EE 308.

EE 503 ADVANCED ELECTRONICS I
F alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: EE 316.
Solid state device models, computer simulations, single and multistage amplifiers, current sources and active loads, operational amplifier design, frequency response and feedback. Noise in integrated circuits.

EE 504 ADVANCED RADIO FREQUENCY ELECTRONICS
S alternate years, to be offered 2002 3 cr. LEC 3
Prerequisite: EE 503.
S parameter design techniques for RF amplifiers and oscillators, distributed element matching networks, circuit applications, introduction to RF and microwave active devices.

EE 505 SOLID STATE DEVICE PRINCIPLES
F alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: EE 409.
Introduction to physical principles and operational characteristics of semiconductor devices including junction, MOS, optoelectronic, and bulk devices.

EE 506 ADVANCED POWER ELECTRONICS
S alternate years, to be offered 2002 3 cr. LEC 3
Prerequisite: EE 451.
Mathematical modeling of switching power converters, advanced power converter topologies, design constraints and control methods, design-oriented analysis techniques for applications in electromechanical systems, power systems, transportation systems, etc.

EE 521 ADVANCED CONTROL SYSTEMS I
F alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: EE 451.
Nonlinear feedback systems, linearization techniques, harmonic balance and describing function methods, perturbation methods, Lyapunov stability and related stability concepts, state-space methods, numerical solutions, feedback linearization, and input-output linearization.

EE 522 ADVANCED CONTROL SYSTEMS II
S alternate years, to be offered 2002 3 cr. LEC 3
Prerequisite: EE 391.
Lagrangian methods of constrained optimization. Background for optimal control: calculus of variations, dynamic programming, Pontryagin's maximum principle. Digital and continuous optimal linear-quadratic controllers, state observer design, advanced topics in control.

EE 525 SYSTEM IDENTIFICATION AND ADAPTIVE CONTROL
S alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: EE 452.
Identification of linear system parameters, least-squares identification, recursive least-squares (RLS) and related real-time identification methods, open-loop versus closed-loop identification, self-tuning adaptive control and model-reference adaptive control.

EE 526 KALMAN FILTERING AND STOCHASTIC CONTROL
F alternate years, to be offered 2000 3 cr. LEC 3
Prerequisite: EE 422.
Probability and random variable descriptions for stochastic control processes. Kalman prediction, filtering and smoothing for discrete and continuous systems. Selected identification problems in stochastic systems, feedback control in the presence of noise. Linear-quadratic Gaussian optimal control.

EE 533 APPLIED ELECTROMAGNETIC THEORY I
F alternate years, to be offered 2000 5 cr. LEC 3
Prerequisite: EE 354.
Mathematical and computational treatment of electromagnetic theory including methods of solution for Laplace, Poisson and general boundary value problems. Emphasis on static domain solutions. Solution of time-dependent Maxwell equations by classical and numerical methods.

EE 534 APPLIED ELECTROMAGNETIC THEORY II
S alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: EE 533.
General wave solutions for isotropic and non-isotropic media, including rectangular, cylindrical, and spherical systems. Solutions to Maxwell's equations for propagating or radiation regions. Topics include: mode theory of LF propagation, linear antennas, ferrite and dielectric antennas, the Dirichlet problem diffraction theory, and numerical design using the methods of moments.

EE 541 ADVANCED COMMUNICATION THEORY
F alternate years, to be offered 2000 3 cr. LEC 3
Prerequisite: EE 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.

EE 542 INFORMATION THEORY, CODING & SYSTEM DESIGN
S alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: EE 445.
Information theory, source encoding, noise statistics, channel capacity and the coding theorem, modulation and detection, linear block codes, cyclic codes, trellis code modulation, Viterbi decoding, coding gain, CDMA, communication system design.

EE 543 TELECOMMUNICATIONS SWITCHING & TRANSMISSION SYSTEMS
F alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: EE 445.
Digital and analog switching systems, telecommunication transmission networking and media selection (fiber optics, cable, microwave and satellite), network configuration, network technologies, equipment selection, system design examples, and project.

EE 551 POWER SYSTEM OPERATION & CONTROL
F alternate years, to be offered 2000 3 cr. LEC 3
Prerequisite: EE 355.
Characteristics of power generating plants, economic dispatch, transmission losses, hydrothermal coordination, control of generation, power pools, power system security, state estimation in power systems, and operation of energy dispatch centers.

EE 552 ADVANCED POWER SYSTEMS ANALYSIS & HIGH VOLTAGE TRANSMISSION
F alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: EE 454.
Representation of power system elements, bus reference frame, symmetrical and nonsymmetrical network faults and contingency calculations, active and reactive power flow, characteristics of electric AC and DC transmission lines, line noise, electric and magnetic fields, insulation design, and converter and inverter circuits.

EE 553 POWER SYSTEM DYNAMICS
S alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: EE 454.
Power system transient and dynamic stability studies, synchronous machine simulation-linear models of synchronous machine, excitation and speed governing systems, ALFC, multimachine system stability, and typical models and problems.
Course Descriptions

EE 554 POWER SYSTEMS TRANSIENT & PROTECTION
S alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: EE 454.
Methods of computation of power systems transients, lightning and switching surges, methods of suppression of transients, protection of electrical equipment, grounding, computer relaying, and selection and application of protective devices.

EE 563 REMOTE SENSING & IMAGE PROCESSING
S alternate years, to be offered 2002 2 cr. LEC 2
PREREQUISITE: EE 516, EE 508 or consent of instructor.
Remote sensing and image processing from the physical optics point of view. An introduction to various types of image processing, including optical and digital processing.

EE 564 ADVANCED COMPUTER ARCHITECTURE
F alternate years, to be offered 2001 2 cr. LEC 2
PREREQUISITE: CS 466.
Advanced design considerations in modern digital computers including: CISC and RISC designs, tightly coupled multiprocessors and software decomposition, network architectures, database computer design, array processors, hardware and software adaptive processors, and distributed memory processors.

EE 565 PARALLEL & ASSOCIATIVE PROCESSORS
S alternate years, to be offered 2001 2 cr. LEC 2
PREREQUISITE: EE 564.
Architecture and applications of parallel processors, major design issues, fault tolerant computing, associative processors, performance measures of parallel and associative processors.

EE 570 INDIVIDUAL PROBLEMS
On Demand 1 - 10 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.

EE 571 RESEARCH EXPERIENCE
F,S,Su 1 - 4 cr. LEC
PREREQUISITE: Graduate standing.
Research experience, required of all M.S.E.E. students in option B program, is normally obtained through participation in a supervised research project acceptable to the department graduate committee.

EE 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.

EE 581 FOURIER OPTICS AND IMAGING THEORY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: EE 394 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.

EE 589 GRADUATE CONSULTATION
F,S 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.

EE 590 MASTER'S THESIS
F,S,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's standing.

EE 690 DOCTORAL THESIS
F,S,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

EEET 211 INTRODUCTORY ELECTRIC CIRCUITS
F 4 cr. LEC 3 LAB 1
COREQUISITE: MATH 175, CS 120.
Basic concepts of voltage, current, work, and power. Analysis of resistors, capacitors, inductors, and operational amplifiers; steady state DC and AC applications including phasors, impedance concepts and resonance. Introduction to circuit analysis using computer software.

EEET 215 ELECTRONICS I
S 4 cr. LEC 3 LAB 1
PREREQUISITE: EEET 211, CS 120.
Principles and characteristics of diodes, transistors and integrated circuits, with applications to power supplies, logic, basic amplifiers and instrumentation. Introduction to electronic circuit analysis and instrumentation control using computer software.

EEET 270 INDIVIDUAL PROBLEMS
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: EEET 215.
Directed research and study on an individual basis.

EEET 280 SPECIAL TOPICS
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Determined 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.

EEET 312 INTERMEDIATE CIRCUIT ANALYSIS
F 4 cr. LEC 3 LAB 1
PREREQUISITE: EEET 211, MATH 176.
a more in-depth coverage of network theorems; transient response in RL, RC, RLC, DC and AC circuits; and magnetically coupled circuits (transient and steady state analysis).

EEET 315 ADVANCED CIRCUIT ANALYSIS
S 5 cr. LEC 3
PREREQUISITE: EEET 312.
Laplace transforms in circuit analysis, Fourier series and transform, and two port networks. System modelling. Introduction to computer software for dynamic system simulation.

EEET 351 ELECTRONICS II
F 4 cr. LEC 3 LAB 1
PREREQUISITE: EEET 215.
The use of discrete and integrated circuit devices in small and large signal amplifier design; applications in instrumentation are stressed. Introduction to logic circuits and logic families. Laboratory experience in graphical programming applications for data acquisition and instrument control.

EEET 383 INDUSTRIAL PROCESS LAB I
F 2 cr. LAB 2
PREREQUISITE: EEET 215.

EEET 384 INDUSTRIAL PROCESSES LAB II
S 2 cr. LAB 2
PREREQUISITE: EEET 383.
Students in the Applied Electronics Technology program may use this course to complete additional coursework in electrical processing and related areas.

 EEET 385 INDUSTRIAL PROCESS LAB III
S 3 cr. LAB 2
PREREQUISITE: EEET 383.
Students in the Applied Electronics Technology program may use this course to complete additional coursework in electrical processing and related areas.

EEET 400 SEMINAR
On Demand 1 cr. IND
PREREQUISITE: EEET 215.
Seminars on emerging technologies and current research in electrical engineering, including new developments in EE, research at MSU, and the EE, starting companies, etc. The course is designed to expose students to different career options and present background in related areas.

EEET 405 ELECTRICAL SAFETY, GROUNDING & SHIELDING
S 3 cr. LEC 2 LAB 1
PREREQUISITE: EEET 315, EE 355.
Use of the National Electric Code in designing electrical systems. Signal preservation through proper grounding and shielding techniques.

EEET 416 ADVANCED ELECTRONICS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EEET 315.
Advanced topical coverage of electronic devices and digital and analog integrated circuits. Emphasis on applications in an industrial environment. Use of computer programs for circuit analysis and design.

EEET 422 FEEDBACK CONTROL SYSTEM
F S cr. LEC 2 LAB 1
PREREQUISITE: EEET 315, EM 205.
Mathematical characterization of physical components and systems; analysis of linear feedback systems using differential equations and Laplace transforms, analog and digital simulation, stability theory, introduction to the design of control systems.

EEET 425 ELECTRONIC COMMUNICATIONS
F 4 cr. LEC 3 LAB 1
PREREQUISITE: EEET 315.
Course coverage includes: A review of frequency domain representations of signals, amplitude and frequency modulation, vestigial sideband, digital modulation of analog signals, Nyquist's Law and the fundamentals of digital communications, and emerging digital communications techniques.

EEET 451 POWER SYSTEMS I
F 3 cr. LEC 3
PREREQUISITE: EE 355.
Advanced topics on transformers, rotating energy conversion, and their applications in electric utilities. Transmission and distribution components and operation and per unit analysis.
EM 215 STRENGTH OF MATERIALS
F S cr. LEC 3
PREREQUISITE: EM 205.
Equilibrium and deformation of structural elements; concepts of stress and strain and interrelation between representation and transformation of combined stress states; axial, torsional and flexural stresses and deformation; column buckling.

EM 251 STATICS AND PARTICLE DYNAMICS
ES,Su 5 cr. LEC 3
PREREQUISITE: PHYS 211.
COREQUISITE: MATH 224.
Equilibrium of particles and rigid bodies; analysis of structures, Coulomb friction, kinematics, kinetics, work-energy for particles.

EM 252 RIGID BODY MECHANICS
FS; Su on demand 3 cr. LEC 3
PREREQUISITE: EM 251.
Mass centers and centroids, moments and products of inertia, kinematics, kinetics, work-energy, impulse-momentum for rigid bodies, vibration of rigid bodies, and beams.

EM 253 MECHANICS OF MATERIALS
FS,Su 5 cr. LEC 3
PREREQUISITE: EM 251.
Stress and strain, Hooke’s Law, thermal strain, torsion, bending of beams, combined stress, limit analysis, energy methods, virtual work, column theory.

EM 280 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.

EM 400 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
PREREQUISITE: EM 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

EM 415 ADVANCED MECHANICS OF SOLIDS
F S cr. LEC 3
PREREQUISITE: EM 253.
Advanced topics in deformational mechanics of materials; application to contemporary engineering problems. Computer applications.

EM 452 POWER SYSTEMS
F,S 3 cr. LEC 3
PREREQUISITE: PHYS 205.

EM 470 INDIVIDUAL PROBLEMS
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.

EM 478 INTERNSHIP
On Demand 1 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
An individualized one-time assignment arranged with an agency, business or other organization to provide guided experience in the field.

EM 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS,Su 1 - 2 cr. RCT May be repeated. Max 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.

EM 498 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
ES,Su 1 - 2 cr. RCT May be repeated. Max 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.

EM 506 ADVANCED MECHANICS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: EM 355.
Kinematics of particles, rigid bodies, and mechanisms. Lagrange’s equations, constraints, applications, and numerical solutions.

EM 510 ELASTIC AND INELASTIC ANALYSIS I
S 3 cr. LEC 3
PREREQUISITE: EM 525 or EM 415.
Fundamentals of linear elasticity, linear viscoelasticity, and plasticity. A previous knowledge of Cartesian tensors in conjunction with small deformation stress and strain theory is expected. Correspondence principles for elastic and viscoelastic materials and analogy between elastic and inelastic materials will be presented. Constitutive theories of linear elasticity, linear viscoelasticity, and plasticity. Application to static structural theories for beams, torsion, plane stress, and plane strain will be covered for elastic and inelastic behavior.

EM 512 ELASTIC AND INELASTIC ANALYSIS II
On demand 3 cr. LEC 3
PREREQUISITE: EM 510.
Topics in two and three dimensional linear and non-linear elasticity, viscoelasticity, and plasticity, including large deformation theory, computer applications.

EM 518 THEORY OF PLATES & SHELLS
S alternate years, to be offered 2002 3 cr. LEC 2
PREREQUISITE: EM 415.
Theory of small plate deformations, membrane shell theory, shell bending.

EM 525 CONTINUUM MECHANICS
F 3 cr. LEC 3
PREREQUISITE: EM 415 or ME 426.
Solid and fluid mechanics, laws of vector and tensor transformations, vector and tensor calculus using cartesian tensors, theory of deformation, principles of thermodynamics, constitutive equations for elastic solids and viscous fluids.

EM 526 ADVANCED CONTINUUM MECHANICS
On demand 3 cr. LEC 3
PREREQUISITE: EM 525.
Laws of vector and tensor transformations using non-orthogonal tensors. Large deformation theory, constitutive equations for non-linear solids and fluids.

EM 560 FINITE ELEMENT ANALYSIS
IN ENGINEERING
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: EM 335.
General finite element analysis based upon the
Course Descriptions

ENGL 001 BASIC WRITING I
FS 3 cr. RCT 3
PREREQUISITE: Available only to Advance By Choice students.

Instruction and practice in basic writing skills, to gain confidence and fluency with sentence structure and sequence of ideas. If needed, students may enroll in ENGL 002 and ENGL 003 for additional basic instruction prior to ENGL 121.

ENGL 002 BASIC WRITING II
FS 3 cr. RCT 3
PREREQUISITE: ENGL 001. Available only to Advance By Choice students.

A second semester of instruction in basic writing skills for students requiring additional preparation for or supporting instruction concurrent with ENGL 121.

ENGL 003 BASIC WRITING III
FS 3 cr. RCT 3
PREREQUISITE: ENGL 002. Available only to Advance By Choice students.

A third semester of instruction in basic writing skills for students requiring additional preparation for or supporting instruction concurrent with ENGL 121.

ENGL 005 BASIC READING SEMINAR
S 3 cr. RCT 3
PREREQUISITE: Available only to Advance By Choice students.

Improvement of reading skills for students who have difficulty understanding what they read. Emphasis on reading comprehension, critical thinking, and inquiry.

ENGL 121W COLLEGE WRITING I
FS, 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.

ENGL 123H INTRODUCTION TO LITERARY STUDY
FS 3 cr. RCT 3
PREREQUISITE: ENGL 123.

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 accompany all future English courses.

ENGL 212H BIBLICAL AND CLASSICAL BACKGROUND TO LITERATURE
FS 3 cr. RCT 3
PREREQUISITE: ENGL 123.

Study of the Bible and related texts and of the literature of classical Greece and Rome and how these traditions have influenced subsequent literature.

ENGL 214H REGIONAL LITERATURE
FS 3 cr. RCT 3

Studies in American regional literature with variable topics, such as literature of the West and Montana literature.

ENGL 216 SURVEY OF BRITISH LITERATURE I
FS 3 cr. RCT 3
PREREQUISITE: ENGL 123.

A survey of selected works and writers of British literature from the Old English period through the 18th century in the context of cultural, historical, and social patterns.

ENGL 217 SURVEY OF BRITISH LITERATURE II
FS 3 cr. RCT 3
PREREQUISITE: ENGL 123.

A survey of selected works of British literature from the 18th century to the present in the context of cultural, historical, and social patterns.

ENGL 218 SURVEY OF AMERICAN LITERATURE I
FS 3 cr. RCT 3
PREREQUISITE: ENGL 123.

Survey of selected works and authors in the American literary tradition from the early period to 1865. Taught within the contexts of historical, social, and cultural developments.

ENGL 219 SURVEY OF AMERICAN LITERATURE II
FS 3 cr. RCT 3
PREREQUISITE: ENGL 123.

Survey of selected works and authors in the American literary tradition from 1865 to the present. Taught within the contexts of historical, social, and cultural developments.

ENGL 221 COLLEGE WRITING II
FS 3 cr. RCT 3
PREREQUISITE: ENGL 121.

Study and practice of strategies and devices of expository and argumentative prose. Builds upon writing skills learned in ENGL 121.

ENGL 223 TECHNICAL WRITING
FS 3 cr. RCT 3
PREREQUISITE: ENGL 121.

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.

ENGL 226 INTRO TO LANGUAGE & LINGUISTICS
FS 3 cr. RCT 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 238 THE STRUCTURE AND FUNCTION OF LANGUAGE
FS 3 cr. RCT 3
PREREQUISITE: Consent of instructor and approval of department head.

Directed research and study on an individual basis.

ENGL 290 SPECIAL TOPICS
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.

ENGL 301 MULTICULTURAL LITERATURE
S 3 cr. RCT 3
PREREQUISITE: ENGL 123 and one other literature course.

Focuses on literature by American minorities, themes, and/or critical approaches.

ENGL 304 STUDIES IN CHILDREN'S AND YOUNG ADULT LITERATURE
F alternate years, to be offered 2000 3 cr. RCT 3
PREREQUISITE: ENGL 125 and one other literature course.

Studies in selected literary works for children and young adults. The course may focus on genres, authors, themes, and/or critical approaches.

ENGL 308 WORLD LITERATURE
S 3 cr. RCT 3
PREREQUISITE: ENGL 123 and one other literature course.

Designed specifically for English Education students. Focuses on literature by American minorities, women, and ethnic subcultures. Includes young adult literature and popular literature.

ENGL 399HG MYTHOLOGIES
FS alternate years, to be offered F 2000 3 cr. RCT 3
PREREQUISITE: ENGL 123.

The study of specific cultural mythologies to explore the nature, function, and theory of myth.

ENGL 311HG WORLD LITERATURE
FS alternate years, to be offered F 2001, S 2001 3 cr. RCT 3
PREREQUISITE: ENGL 123.

Selected literary works in translation from non-English cultures and/or from English speaking cultures outside the United States and Britain.

ENGL 314H LITERATURE OF PLACE
F 3 cr. RCT 3
PREREQUISITE: ENGL 123.

Examines the relationship between environment and literary production. Variable topics.
ENGL 320H SHAKESPEARE
S 3 cr. RCT 3
PREREQUISITE: ENGL 123.
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.

PREREQUISITE: ENGL 123 and at least one other literature course.

Intensive study in the works, biography, and criticism of a particular author.

ENGL 325 ADVANCED COMPOSITION
F 3 cr. RCT 3
PREREQUISITE: ENGL 221, junior standing.
Advanced composition with attention to research writing, academic standards of evidence, logic, and development of style.

ENGL 329 PROFESSIONAL WRITING
S alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: ENGL 221 and junior standing.
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.

ENGL 330H WOMEN AND LITERATURE
F alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: ENGL 123.
A study of the relationship between women and literature, with some attention to feminist approaches to critical interpretation.

ENGL 331 STUDIES IN EMERGENT LITERATURES
S 3 cr. LEC 3 Maximum 6 cr.
PREREQUISITE: ENGL 123 and at least one other literature course.

Studies in non-traditional literatures such as popular literature, gender studies, literature of American minorities, and post-colonial literatures. Selection and approach will vary with each offering.

ENGL 335 STUDIES IN IMAGINATIVE GENRES
F alternate years, to be offered 2000 5 cr. RCT 3
PREREQUISITE: ENGL 123 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.

ENGL 337 ORAL TRADITIONS
F 3 cr. LEC 3
PREREQUISITE: ENGL 123 and one other literature course.
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.

ENGL 338 LANGUAGE FOR TEACHERS
S 4 cr. RCT 4
PREREQUISITE: ENGL 121.

Designed to provide English Teaching option students with an overview of linguistic systems, such as phonetics, phonemics, and semantics, and an intensive study of the structure of American English.

ENGL 340 STUDIES IN BRITISH LITERATURE: OLD/MIDDLE ENGLISH
F alternate years, to be offered 2000 3 cr. RCT 3
PREREQUISITE: ENGL 216.
Intensive studies in selected Old English and/or Medieval literary works, with attention to historical and cultural context.

ENGL 341 STUDIES IN BRITISH LITERATURE: 16TH/17TH CENTURIES
F alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: ENGL 216.
Intensive studies in selected literary works of the 16th and 17th centuries, with attention to historical and cultural context.

ENGL 342 STUDIES IN BRITISH LITERATURE: RESTORATION/18TH CENTURY
S alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: ENGL 216 or ENGL 217.
Intensive studies in selected literary works by writers of the Restoration period and 18th-century England, with attention to historical and cultural context.

ENGL 343 STUDIES IN BRITISH LITERATURE: 19TH CENTURY
S alternate years, to be offered 2002 3 cr. RCT 3
PREREQUISITE: ENGL 217.
Intensive study in selected literary works by 19th-century British writers, with attention to historical and cultural context.

ENGL 344 STUDIES IN BRITISH LITERATURE: EARLY AMERICAN
F alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: ENGL 218.
Intensive studies in early American literature, with attention to development of a distinct national literature and culture.

ENGL 345 STUDIES IN AMERICAN LITERATURE: 19TH CENTURY
S alternate years, to be offered 2002 3 cr. RCT 3
PREREQUISITE: ENGL 218.
Intensive studies in selected literary works by 19th-century American writers, with attention to historical and cultural context, particularly America's evolving national culture.

ENGL 346 STUDIES IN BRITISH LITERATURE: RESTORATION/18TH CENTURY
F alternate years, to be offered 2000 3 cr. RCT 3
PREREQUISITE: ENGL 217 or ENGL 219.
Intensive study of selected English literary works by British and American authors, and in various genres written between the end of the 19th century and World War II, with attention to historical and cultural contexts and current literary trends and issues.

ENGL 347 CONTEMPORARY BRITISH/AMERICAN LITERATURE
S alternate years, to be offered 2000 3 cr. RCT 3
PREREQUISITE: ENGL 217 or ENGL 219.
Intensive study of selected English literary works by British and American authors, and in various genres written since World War II with attention to historical and cultural contexts and current literary trends and issues.

ENGL 348 HISTORY OF THE ENGLISH LANGUAGE
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: ENGL 236, or ENGL 238, or ENGL 352.
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 401C INTEGRATIVE TEACHING METHODS
S in 2000-2001; F only in 2001-2002 3 cr. RCT 3
PREREQUISITE: EDSD 357, senior standing.
Senior capstone course for senior English teaching majors and minors. Integration of methodologies and English content for secondary school instruction through unit plans and videotaped mini-lessons. Class will include close analysis of issues and tasks central to the preparation of secondary teachers. Restricted entry.

ENGL 410C CAPSTONE: RESEARCH ISSUES IN ENGLISH
S 3 cr. RCT 3
PREREQUISITE: Senior standing.
Senior capstone course for literature majors. Integration and assessment of students' cumulative experiences as English literature majors through specific seminar-style research issues which vary with each offering. Restricted entry.

ENGL 420 CRITICAL THEORY
S alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: ENGL 300.
An intensive study of one or more of the major themes, issues, schools, or critics related to literary theory.

ENGL 429 CREATIVE WRITING
F in 2000; S in 2002 3 cr. RCT 3 Maximum 6 cr.
PREREQUISITE: ENGL 121, junior standing and consent of instructor based on review of writing sample provided by student.
Exploration of creative writing techniques in a particular genre, such as fiction, poetry, playwriting, autobiographical writing, creative nonfiction.

ENGL 450 HISTORY AND THEORY OF RHETORIC/COMPOSITION
F alternate years, to be offered 2000 3 cr. RCT 3
PREREQUISITE: ENGL 221.
Intensive study in composition/rhetorical theory, with attention to writing pedagogy.

ENGL 470 INDIVIDUAL PROBLEMS
On Demand 1 - 9 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 476 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 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1- 2 cr. RCT May be repeated. Maximum 6 cr.
COREQUISITE: ENGL 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.
ENGL 490 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.

ENGL 500 SEMINAR
On Demand 1-4 cr. SEM Maximum 6 cr.
PREREQUISITE: Graduate standing. Course prerequisites as determined for each offering.
Topics offered at the graduate level which are not covered in regular courses. Involves a scholarly paper, as well as participation in preparing and presenting discussion material. Topics will vary.

ENGL 501 GRADUATE ENGLISH STUDIES AND METHODS
F 3 cr. RCT 3
PREREQUISITE: Graduate standing and ENGL 410 or equivalent
Provides a history of English as a discipline, with close attention to the interconnectedness of critical theory, literature history, pedagogy, and composition. Current problems and approaches, as well as current research methods in the discipline, will be included.

ENGL 510 STUDIES IN CRITICAL THEORY AND PRACTICE
S 3 cr. RCT 3
PREREQUISITE: ENGL 300 or ENGL 420 or equivalent
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 STUDIES IN PEDAGOGICAL THEORY AND PRACTICE
S 3 cr. RCT 3
PREREQUISITE: 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 alternate years, to be offered 3 cr. RCT 3 PREREQUISITE: ENGL 300 or ENGL 450 or equivalent
Topics in rhetoric and composition. Examines a variety of models that have historically governed composition theory and writing practice.

ENGL 540 STUDIES IN THEORY AND PRACTICE OF LITERARY HISTORY
F alternate years, to be offered 3 cr. RCT 3 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 INDIVIDUAL PROBLEMS
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 575 PROFESSIONAL PAPER
F,S,Su 1-4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing.
A research on 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 576 INTERNSHIP
On Demand 1-12 IND PREREQUISITE: Graduate standing, consent of instructor, approval of the department chair, and completion of 15 credits of graduate work in English.
An individualized assignment arranged with an agency, business, school, or other organization to provide guided experience in the field.

ENGL 580 SPECIAL TOPICS
On Demand 1-4 cr. SEM Maximum 9 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 585 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 inservice 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.

ENGR 400 SEMINAR
On Demand 1 cr. RCT 1
PREREQUISITE: Doctoral standing. Seminar experience. Emphasis on dissemination of engineering research with cross-disciplinary communication and collaboration.

ENGR 401 MULTIDISCIPLINARY DESIGN I
F 2 cr. RCT 1
PREREQUISITE: Senior standing in Science of Engineering. Continuation of ENGR 401.

ENGR 402 MULTIDISCIPLINARY DESIGN II
S 1-3 cr. LEC PREREQUISITE: Doctoral standing in Science of Engineering. Continuation of ENGR 401.

ENGR 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.

ENGR 490 ENGINEERING PROGRAM ASSESSMENT
F 0 cr. IND 0
PREREQUISITE: Must be in final year of engineering program.
Student participation in engineering program assessment. Requirement to complete the Fundamentals of Engineering (FE) examination.

ENGR 580 SPECIAL TOPICS
F 1-4 cr. SEM Maximum 4 cr.
PREREQUISITE: Doctoral standing.
Courses not required in any curriculum, including experimental offerings of visiting professors, trial offerings of new courses, or one-time offerings of current topics.

ENGR 590 MASTER'S THESIS
F,S 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.

ENTO Engineering
College of Engineering (406) 994-2272

ENTO 100G INSECTS AND SOCIETY
S 3 cr. LEC 2 RCT 1
Ways in which research and advances in technology in the areas of pest management and control has influenced the lives of people throughout the world. Focus will be on the concept of insects as major factors affecting the areas of the world where humans can live, the crops and animals humans can produce, and the general quality of life on the planet. The effects of human cultures on concepts of pest management will also be explored.

ENTO 204N INSECT BIOLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: One of the following: BIOL 100, BIOL 101, or BIOL 102.
General biology of insects including principles of morphology, physiology, behavior, ecology, and control. Includes identification of major orders and common families.

ENTO 400 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 cr.
PREREQUISITE: Doctoral standing. Emphasis on dissemination of engineering research with cross-disciplinary communication and collaboration.

ENTO 490 SEMINAR ON DEMAND
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.

PREREQUISITE: Senior standing in Science of Engineering. Continuation of ENGR 401.

ENGR 402 MULTIDISCIPLINARY DESIGN II
S 1-3 cr. LEC
ENTO 514 BEHAVIORAL ECOLOGY
S alternate years, to be offered 2000 4 cr. LEC 3
LAB 1
PREREQUISITE: ENTO 204 and one of the following: BIOL 100, BIOL 101, or BIOL 102.

Management of insects and other pests via an integration of control strategies. Emphasis on chemical, cultural, and biological control; host plant resistance; sampling; use of economic principles; and new biotechnological developments in pest management. ID and biology of key insect pests.

ENTO 432 INSECT IDENTIFICATION
S alternate years, to be offered 2001 4 cr. LEC 2
LAB 2
PREREQUISITE: ENTO 204N and one of the following: BIOL 100, BIOL 101, or BIOL 102.
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.

ENTO 470 INDIVIDUAL PROBLEMS
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.

ENTO 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.

ENTO 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS,Su 1 - 2 cr.RCT May be repeated. Max 4 cr.
COREQUISITE: ENTO 490.

Classroom instruction associated with directed undergraduate research/creative activity projects.

ENTO 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS,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.

ENTO 500 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.

ENTO 510 INSECT ECOLOGY
S alternate years, to be offered 2001 4 cr. LEC 2
LAB 1
PREREQUISITE: BIOL 100 and one of the following: STAT 410, STAT 412.

Influence of biotic and abiotic factors on insect population and community dynamics. Emphasis on life table analysis, r and k-selection, sampling theory, ecological methods, simulation modeling, and use of ecological theory in pest management.

ENTO 514 BEHAVIORAL ECOLOGY
F alternate years, to be offered 2000 5 cr. LEC 3
PREREQUISITE: One of the following: BIOL 303, BIOL 405, BIOL 405, ENTO 516.

Functional and evolutionary aspects of the behavior of insects and vertebrates, concentrating on the structure and tests of present-day theory; optimal foraging theory, habitat selection, mating systems, parental investment, game theory and social behavior.

ENTO 516 BIOSYSTEMATICS
F alternate years, to be offered 2001 3 cr. LEC 2
LAB 1
PREREQUISITE: One of the following: ENTO 452, BIOL 230, BIOL 415, BIOL 418, BIOL 419, BIOL 453, BIOL 454, BIOL 456.


ENTO 580 INSECT PHYSIOLOGY
F alternate years, to be offered 2000 5 cr. LEC 3
PREREQUISITE: ENTO 204 and one of the following: BIOL 312, BIOL 402, BIOL 411, BIOL 413, BIOL 430, ENTO 301, ENTO 492, ENTO 514, or ENTO 525.

Principles of insect physiology and insect physiologic ecology; digestive, respiratory, and circulatory processes, neurophysiology, endocrinology, reproductive systems, muscular systems and locomotion, defensive mechanisms, thermoregulation and water balance.

ENTO 582 INSECT MORPHOLOGY
S alternate years, to be offered 2002 2 cr. LEC 1
LAB 1
PREREQUISITE: ENTO 204 and one of the following: BIOL 510, BIOL 403, ENTO 401, ENTO 492, ENTO 510, ENTO 514, ENTO 516, or ENTO 525.
The principles of insect morphology and the evolutionary principles behind the diversity of form and function of the major insect and arthropod groups.

ENTO 570 INDIVIDUAL PROBLEMS
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.

ENTO 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.

ENTO 590 MASTER'S THESIS
FS,Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's standing.

ENVE 555 HAZARDOUS WASTE MANAGEMENT
S 3 cr. LEC 3
PREREQUISITE: ENVE 580 (Bioremediation) or previous graduate level courses in environmental engineering.

Examination of the technologies, regulations, political and environmental impacts of hazardous wastes. Management approaches are developed through fundamental studies of case histories.

ENVE 580 ENVIRONMENTAL ENGINEERING PROCESSES
F 2 cr. LEC 2
PREREQUISITE: CE 340.

Physical, chemical, and biological processes in water quality management.

ENVE 561 ENVIRONMENTAL ENGINEERING REACTOR THEORY
F 2 cr. LEC 2
PREREQUISITE: CE 340.

Theory and mathematics of reactors commonly used in water and wastewater operations.

ENVE 562 WATER TREATMENT PROCESSES & DESIGN
S 3 cr. LEC 3
PREREQUISITE: ENVE 560, ENVE 561.

Principles, theory, and practice of water treatment plant design.

ENVE 563 WASTEWATER TREATMENT PROCESSES & DESIGN
S 3 cr. LEC 3
PREREQUISITE: ENVE 560, ENVE 561.

Principles, theory, and practice of wastewater treatment plant design.

ENVE 564 ENVIRONMENTAL ENGINEERING APPLICATIONS LABORATORY
F 3 cr. LAB 3
COREQUISITE: Graduate standing or equivalent.

The laboratories will be modular units based on environmental engineering application areas such as bioremediation, water and wastewater treatment, and biofilm systems. Students will learn analytical methods for determining chemical and biological components and will become familiar with laboratory and pilot scale reactors. Where appropriate, students will cooperate with field investigations.

ENVE 565 CHEMICAL SENSORS AND INSTRUMENTATION FOR ENVIRONMENTAL BIOTECHNOLOGY
S alternate years, to be offered 2002 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 organized in the Microsensors Laboratory located at the Center for Biofilm Engineering.

ENVE 566 FUNDAMENTALS OF BIOFILM ENGINEERING
S 3 cr. LEC 3
PREREQUISITE: MATH 225.

Development of quantitative descriptions of processes of microbial growth, diffusive and convective solute transport, and cell attachment and detachment. Integration of these processes in...
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| **ESCI 111N PHYSICAL GEOLOGY**  
F,Su 4 cr. LEC 3 LAB 1  
Examination of minerals and rocks, geologic time, plate tectonics, earthquakes and volcanoes, rock deformation and mountain building, ocean floors, geophysics, earth resources, and planetary geology. |
| **ESCI 112N PHYSICAL GEOLOGY**  
F 1 cr. LEC 1  
PREREQUISITE: Junior standing, ENGL 121, CS 150.  
Library research and writing techniques in Earth Science. Bibliography and Index of Geology. |
| **ESCI 440 GROUND-WATER RESOURCES**  
S 5 cr. LEC 3  
PREREQUISITE: Junior standing, CS 150, MATH 170 or MATH 182; CHEM 132, PHYS 205, ESCI 111 and ESCI 112.  
The relationship between ground-water and other parts of the hydrologic cycle: ground-water availability, movement, chemistry, exploration, geology, and aquifer tests. The ground-water resource in terms of regional supply and human use and intervention. |
| **ESCI 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**  
ESCI, GEOL, MATH, STAT, or other majors, CR or SD 1-10 cr. IND. May be repeated. |
Terrestrial plains landscape interpretation. Topics include glaciation (till, outwash, lakes and landforms, drainage reversals of the Missouri); stratigraphic, structural, and landscape history of the unglaciated Plains; K-12 science education through landscapes.

ESCI 516 NORTHERN ROCKY MOUNTAIN LANDSCAPES
Su 2 cr. SEM 1 LAB 1
PREREQUISITE: Introductory geology (ESCI 111), introductory physical geography; two years K-12 teaching experience. 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.

ESCI 517 ELECTRONIC HYDROLOGY
Su alternate years, to be offered 2001 2 cr. SEM 2
PREREQUISITE: ESCI 511, ESCI 112; secondary teaching certification plus two years teaching experience; access to the world wide web linked with telnet. Recommended ESCI 511 or ESCI 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.

ESCI 519 HYDROLOGY OF STREAMS AND LAKES
F alternate years, to be offered 2001 3 cr. SEM 3
PREREQUISITE: Introductory geology/physical geography; two years K-12 teaching experience; recommended ESCI 516, and a basic course in physics.
Streams lakes in the mountains and plains: drainage basic 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).

ESCI 576 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.

ESCI 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.

ESCI 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 5 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.

ESCI 589 GRADUATE CONSULTATION
F,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.

ESCI 590 MASTER'S THESIS
F,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's 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 1100 S. 6th (across the street from Hannon Hall). Please contact the A.C.E. Language Institute director for a complete list of classes and registration information.

F&WL
Fish and Wildlife Management
Department of Biology
(406) 994-4548
F&WL 201 INTRODUCTION TO FISH & WILDLIFE
F 1 cr. SEM 1
PREREQUISITE: Registered in Fish & Wildlife Option in Biology.
An introduction to the issues, ethics, challenges, and opportunities associated with management of wildlife and fisheries. For Fish and Wildlife Majors.

F&WL 201C FISH & WILDLIFE TOPICS
S 2 cr. LEC 3 LAB 1
PREREQUISITE: BIOL 100 or BIOL 101.
An in-depth review of the scientific literature concerning the theory and practice of contemporary fishery management emphasizing ecology, life history, fish population sampling and manipulation and multiple use concepts.

F&WL 401C FISH & WILDLIFE TOPICS
S 2 cr. LEC 1 LAB 1
PREREQUISITE: F&WL 301.
An in-depth review of the scientific literature concerning the theory and practice of contemporary fishery management emphasizing ecology, life history, fish population sampling and manipulation and multiple use concepts.

F&WL 501 PRINCIPLES OF FISH & WILDLIFE MANAGEMENT
S 3 cr. LEC 3
PREREQUISITE: BIOL 100 or BIOL 101.
Principles and application of fisheries and wildlife management.

F&WL 502 ANALYSIS OF POPULATION & HABITAT DATA
F alternate years, to be offered 2001 3 cr.
LEC 2 LAB 1
PREREQUISITE: Completion of, or concurrent enrollment in a four-hundred level statistics course.
Study of the theory and methods of sampling and analyzing population and habitat data for vertebrates. Estimation of population size, survival, recruitment, habitat selection and home range with contemporary software packages. Computer lab.

F&WL 504 WILDLIFE-HABITAT RELATIONSHIPS
S alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOL 303, F&WL 301 and graduate standing.
An exploration of current understanding of the relationships between wildlife populations and communities and characteristics of the landscape they occupy. A cooperative learning laboratory focuses on the evaluation and management of wildlife habitat on local lands.

F&WL 510 FISHERIES MANAGEMENT
F 4 cr. LEC 2 LAB 2
PREREQUISITE: BIOL 404, BIOL 415, F&WL 301.
An in-depth review of the scientific literature concerning the theory and practice of contemporary fishery management emphasizing ecology, life history, fish population sampling and manipulation and multiple use concepts.

F&WL 511 ADVANCED STREAM ECOLOGY
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: BIOL 303, BIOL 404.
Overview of physical and biological interactions in streams and how these are affected by man's activities.

F&WL 515 FISHERIES HABITAT MANAGEMENT
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
Techniques of protection, restoration, and improvement of habitats required recreationally, commercially, or culturally important fishes and associated organisms.

An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

F&WL 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,Su 1 - 2 cr. May be repeated. Max 4 cr.
COREQUISITE: F&WL 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

F&WL 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,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.

F&WL 501 BIRD MANAGEMENT
S 4 cr. LEC 3 LAB 1
PREREQUISITE: BIOL 419, F&WL 301.
An in-depth review of the scientific literature concerning the theory and practice of contemporary management of bird populations with emphasis on population ecology, population monitoring and habitat management.

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 1100 S. 6th (across the street from Hannon Hall). Please contact the A.C.E. Language Institute director for a complete list of classes and registration information.

F&WL 502 ANALYSIS OF POPULATION & HABITAT DATA
F alternate years, to be offered 2001 3 cr.
LEC 2 LAB 1
PREREQUISITE: Completion of, or concurrent enrollment in a four-hundred level statistics course.
Study of the theory and methods of sampling and analyzing population and habitat data for vertebrates. Estimation of population size, survival, recruitment, habitat selection and home range with contemporary software packages. Computer lab.

F&WL 504 WILDLIFE-HABITAT RELATIONSHIPS
S alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOL 303, F&WL 301 and graduate standing.
An exploration of current understanding of the relationships between wildlife populations and communities and characteristics of the landscape they occupy. A cooperative learning laboratory focuses on the evaluation and management of wildlife habitat on local lands.

F&WL 510 FISHERIES MANAGEMENT
F 4 cr. LEC 2 LAB 2
PREREQUISITE: BIOL 404, BIOL 415, F&WL 301.
An in-depth review of the scientific literature concerning the theory and practice of contemporary fishery management emphasizing ecology, life history, fish population sampling and manipulation and multiple use concepts.

F&WL 511 ADVANCED STREAM ECOLOGY
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: BIOL 303, BIOL 404.
Overview of physical and biological interactions in streams and how these are affected by man's activities.

F&WL 515 FISHERIES HABITAT MANAGEMENT
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Graduate standing or consent of instructor.
Techniques of protection, restoration, and improvement of habitats required recreationally, commercially, or culturally important fishes and associated organisms.

An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.
FIN 450 REAL ESTATE AND INVESTMENT
On Demand 3 cr. LEC 3
PREREQUISITE: BUS 351.

To prepare students for careers in real estate, construction lending, real estate valuation, acquisition and asset management, and market research. Much of the course material is also applicable to personal financial planning.

FIN 453 MANAGERIAL FINANCE
F 3 cr. RCT 3
PREREQUISITE: FIN 352.
Incorporation of the effects of uncertainty into the concepts of finance. Focus is on managerial decision-making in a capitalist environment and a global economy.

FIN 455 INVESTMENTS
F 3 cr. RCT 3
PREREQUISITE: BUS 352.
Investment principles, practices, analysis, and policies.

FIN 456 INVESTMENTS MANAGEMENT
S 3 cr. RCT 3
PREREQUISITE: FIN 455.
Individual projects are used for in-depth study of the characteristics of stocks, bonds, and other investments with emphasis on specific selection processes.

FIN 457 FINANCIAL INSTITUTIONS AND MARKETS I
F 3 cr. LEC 3
PREREQUISITE: BUS 352.
Builds upon basic financial principles by developing a sound understanding of why financial institutions and markets exist, what they do, and how financial risk is managed most effectively. Focus on applied "real world" analysis of financial institution risk, market operation, and products.

FIN 458 FINANCIAL INSTITUTIONS AND MARKETS II
S 3 cr. LEC 3
PREREQUISITE: FIN 457.
Concepts of managerial finance are applied to the internal operations of financial institutions with in-depth banking simulation. Builds on FIN 457 through exploration of increasingly complex financial markets and products such as foreign exchange, futures, options, swaps, and other derivative securities.

FIN 469 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: FIN 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

FIN 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS 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.

FIN 495 INCENTIVE Salaried Employees
S 3 cr. LEC 3
PREREQUISITE: BUS 352.
Concepts of financial management and incentive compensation for salaried employees.

FIN 496 INCENTIVE Commission Employees
F 3 cr. LEC 3
PREREQUISITE: BUS 352.
Concepts of financial management and incentive compensation for commission employees.

FIN 497 INCENTIVE Sales Representatives
S 3 cr. LEC 3
PREREQUISITE: BUS 352.
Concepts of financial management and incentive compensation for sales representatives.

FIN 498 INCENTIVE Managers
F 3 cr. LEC 3
PREREQUISITE: BUS 352.
Concepts of financial management and incentive compensation for managers.

FIN 499 INCENTIVE Executives
S 3 cr. LEC 3
PREREQUISITE: BUS 352.
Concepts of financial management and incentive compensation for executives.

FIN 570 INDIVIDUAL PROBLEMS
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.

FIN 580 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as 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.

GENS
General Studies
(406) 994-3532

GENS 101V FRESHMAN CORE SEMINAR
FS 3 cr. LEC 1 RCT 2
PREREQUISITE: First year General Studies 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 verbal requirement of the core curriculum. This course may not be repeated.

GENS 102 CAREER CONNECTIONS
S 1 cr. SEM 1
Course is designed to assist students in the selection of a major in accordance with their interests and abilities. Special section for students interested in health professions. Small group format.

GENS 270 INDIVIDUAL PROBLEMS
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of the Director of General Studies.

Directed study on an individual basis.

GENS 280 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.

GENS 460 GENERAL STUDIES PEER LEADERSHIP
FS 3 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 GENs 101V Freshman Core 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.
Course Descriptions

GENS 470 INDIVIDUAL PROBLEMS
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of the Director of General Studies.
Directed study on an individual basis.

GENS 480 SPECIAL TOPICS
On Demand 1 - 3 cr.
PREREQUISITE: Course prerequisites as determined for each offering.
Coursed 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.

GEOG Geography
Department of Earth Sciences
(406) 994-3331

GEOG 105G WORLD REGIONAL GEOGRAPHY
F,S,Su 3 cr. LEC 3
Resumed of major world regions; their cultures, populations, resources, utilization of land; emphasis on regions outside Anglo-America.

GEOG 203G 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.

GEOG 210 WEATHER AND CLIMATE
S 3 cr. LEC 3
PREREQUISITE: ESCI 112.
The climates of the continents, and their classification, characteristics and interrelationships with other factors of the physical and human environment.

GEOG 211 MAP SKILLS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: GS 150.
Introduction to fundamental principles, concepts, and quantitative methods of modern cartography, with emphasis on thematic map design. Laboratory exposure to techniques of hand drafting and computer mapping in cartography.

GEOG 234 GEOGRAPHICAL PLANNING
S 5 cr. LEC 3
PREREQUISITE: GEOG 105 or GEOG 201.
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.

GEOG 250 SPECIAL TOPICS
On Demand 1 - 3 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.
Coursed 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.

GEOG 302 BIOGEOGRAPHY
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: GEOG 210 or BIOL 503.
Factors affecting the geography of plants and animals in space and time.

GEOG 305 INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: GS 150 and GEOG 211.
Introduction to fundamental principles and functions in GIS and application of geographical analysis within GIS. Laboratories provide 'Hands On' exposure to GIS packaging and application of geographic questions.

GEOG 315 CULTURAL GEOGRAPHY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: GEOG 201.
American cultural landscape evolution; origins and diffusions of American culture traits; evolution of American culture regions.

GEOG 323 WESTERN WATER POLICY AND PLANNING S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: GEOG 211 or GEOG 100.
Water resource issues, policies, and planning in the Western United States. Primary focus on evolution of Federal and state control over surface waters, surface water law, Montana solutions for pressing water problems, and the planning process for individual water projects.

GEOG 331 URBAN GEOGRAPHY
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: GEOG 201 or GEOG 234.
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.

GEOG 332 ECONOMIC GEOGRAPHY
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: GEOG 201.
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.

GEOG 400 SEMINAR
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Junior standing as determined for each offering.
Topics at the upper division level not covered in regular courses. Students participate in preparing and presenting discussion material.

GEOG 401 HISTORICAL GEOGRAPHY
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: GEOG 201.
Past geographies of North America. Political, cultural, economic, and urban evolution of North American regions from the colonial era to 1900.

GEOG 405C GEOGRAPHIC THOUGHT
S 3 cr. LEC 3
PREREQUISITE: Senior standing in Geography program.
A senior capstone course for the geography major. The exploration of the history of geographic thought; the emergence and evolution of modern academic and applied geography. Contemporary trends and issues in geography.

GEOG 406 Geographic Research Methods
F alternate years, to be offered 2002 4 cr. LEC 2 LAB 2
PREREQUISITE: GEOG 305, STAT 216.
COREQUISITE: STAT 217.

GEOG 409 UNDERGRADUATE RESEARCH/Creative Activity Instruction
F,S 1 - 2 cr. RCT May be repeated. Maximum 4 cr.
COREQUISITE: GEOG 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

GEOG 410 REMOTE SENSING
On Demand 3 cr. LEC 2 LAB 1
PREREQUISITE: STAT 216 and STAT 217.
Introduction to collecting, mapping, and analysis of spectral digital data. Lectures and labs cover the electromagnetic spectrum, energy/matter interactions, remote sensing devices, spectral data collection, image restoration, enhancement, mapping, and analysis.

GEOG 411 ADVANCED GEOGRAPHIC INFORMATION SYSTEMS AND GEOGRAPHICAL ANALYSIS
S alternate years, to be offered 2002 3 cr. LEC 2 LAB 1
PREREQUISITE: GEOG 305.
GIS methods for managing and describing error links with modeling and spatial and statistical analysis. Operational and management issues arising from scientific application of GIS to resource management.

GEOG 415 MOUNTAIN GEOGRAPHY
F 4 cr. LEC 2 LAB 2
PREREQUISITE: ESCI 112 or BIOL 101 and STAT 216. Senior standing - restricted entry required.
Local, regional, and global importance of mountains. Geomorphology, climatology, plants and animals of mountain environments, and their relationship to human activities.

GEOG 451 GEOGRAPHY INSTRUCTION
F,S,Su 1 - 2 cr. LAB
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 emphasis applies active learning concepts in a geography laboratory context.

GEOG 470 INDIVIDUAL PROBLEMS
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.

GEOG 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.

GEOG 481 REGIONAL GEOGRAPHY
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Two of the following: ESCI 112, GEOG 105, or GEOG 201.
A topical and regional analysis of related political subdivisions or other geographical areas. Course may be taken twice if regional emphases differ.

GEOG 489 UNDERGRADUATE RESEARCH/Creative Activity Instruction
F,S 1 - 2 cr. RCT May be repeated. Maximum 4 cr.
COREQUISITE: GEOG 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.
GEOL 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FASu 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.

GEOL 501 GIS AND ENVIRONMENTAL MODELING
S alternate years, to be offered 2001 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.

GEOL 505 SETTLEMENT GEOGRAPHY
S alternate years, to be offered 2001 3 cr. SEM 3
PREREQUISITE: Graduate standing.
Settlement history and contemporary land use in the trans-Mississippi west. Evolution of cultural landscapes in the Mountainous West.

GEOL 508 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.

GEOL 590 INVERTEBRATE PALEONTOLOGY
F alternate years, to be offered 2000 3 cr. LEC 3
Analysis of the invertebrate fossil record and the role of invertebrates in terrestrial ecosystems. Emphasis is on the morphology, phylogeny, and life habits of invertebrate taxa, and the paleoecology of invertebrate communities.

GEOL 606 IGNEOUS PETROLOGY
S 3 cr. LEC 2 LAB 1
PREREQUISITE: GEOL 204.
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. Required field trips and field trip fee.

GEOL 608 METAMORPHIC PETROLOGY
F 3 cr. LEC 2 LAB 1
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.

GEOL 609 SEDIMENTATION AND STRATIGRAPHY
S 4 cr. LEC 3 LAB 1
PREREQUISITE: GEOL 210, GEOL 307, MATH 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.

GEOL 640 VOLCANOLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: GEOL 306.
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 field trip and field trip fee.

GEOL 645 GLACIAL GEOLOGY
S alternate years, to be offered 2000 3 cr. LEC 1 LAB 1 SEM 1
PREREQUISITE: ESCI 307
In-depth study of the processes of glaciation and the resulting landforms. Includes class and library readings, quantitative laboratory exercises and modelling, and field examination of features of mountain and continental glaciation.
Course Descriptions

GEOL 451 GEOLOGY INSTRUCTION
FS, 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.

GEOL 470 INDIVIDUAL PROBLEMS
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.

GEOL 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.

GEOL 489 UNDERGRADUATE RESEARCH/CREATIVITY INSTRUCTION
FS, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: GEOL 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

GEOL 490 UNDERGRADUATE RESEARCH/CREATIVITY
FS, 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.

GEOL 508 SEDIMENTOLOGY
F alternate years, to be offered 2000, 2002 3 cr. LEC 2 LAB 1
PREREQUISITE: GEOL 509.
Facies models for terrestrial and marine depositional environments and their application to interpreting the stratigraphic record.

GEOL 510 IGNEOUS GEOCHEMISTRY
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: GEOL 506, 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.

GEOL 515 STRUCTURAL GEOLOGY
F alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
PREREQUISITE: GEOL 515.
Advanced topics in structural geology. Topics and emphasis may change with each offering.

GEOL 570 INDIVIDUAL PROBLEMS
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.

GEOL 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.

GEOL 581 QUATERNARY ENVIRONMENTS
S alternate years, to be offered 2002 3 cr. LEC 2 RCT 1
PREREQUISITE: ESCI 507.
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 landforms.

GEOL 585 APPLIED GEOLOGICAL HYDROLOGY
F alternate years, to be offered 2000 3 cr. LEC 2 LAB 1
PREREQUISITE: Graduate standing or ESCI 440.
Application of ground-water principles to ground-water resource, contamination and remediation problems.

HDCF Human Development, Child Development/Family Science
Department of Health and Human Development
(406) 994-3241

HDCF 115 INTRODUCTION TO TEXTILES AND CLOTHING
F 5 cr. LEC 3
Exploration of the apparel industry. Areas such as garment analysis, textile, and apparel production; promotion and retailing; appearance and behavior; and care of textile products will be analyzed.

HDCF 188 CONSUMER DECISIONS
S 3 cr. LEC 3
Focus on consumer issues and strategies for understanding and functioning in today's complex marketplace from a consumer perspective.

HDCF 190S LIFESPAN HUMAN DEVELOPMENT
F 3 cr. LEC 3
Major life transitions of relationship formation (i.e. dating and mate selection), marriage, parenthood, death, divorce, and remarriage. Communication, conflict resolution, and problem solving stressed.

HDCF 270 INDIVIDUAL PROBLEMS
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.

HDCF 271 PARAPROFESSIONAL EXPERIENCE
FS, Su 1 cr. LAB 1 May be repeated.
PREREQUISITE: Sophomore standing in major, HDCF 160, HHD 172.
Participation in a professional work situation related to career choice.

HDCF 280 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.

HDCF 510 QUANTITATIVE PLANNING IN THE TEXTILE AND APPAREL INDUSTRY
F alternate years, to be offered 2000 5 cr. LEC 2 LAB 1
PREREQUISITE: HDCF 138 and completion of math core.
This course introduces the basic retail mathematics and employs practical applications of basic quantitative methods employed in the textile and apparel industry. Special attention will be given to computer applications employed in the retail sector.

HDCF 513 THE TEXTILE AND CLOTHING INDUSTRY IN A GLOBAL ECONOMY
S 5 cr. LEC 3
To introduce the social, political, and economic issues impacting the structure and function of the textiles and clothing industry throughout the world. Consideration of the process of initiating, maintaining, and expanding small or family-owned businesses.
### Course Descriptions

**HDCF 314 DRAPING AND FLAT PATTERN DESIGN**  
F 3 cr. LAB 3  
**PREREQUISITE:** HDCF 115, HDCF 213, and HDCF 219  
Patternmaking with an emphasis on the independence of draping and flat pattern skills. Emphasis on problem solving in selecting and implementing appropriate techniques.

**HDCF 315 COMPUTER-AIDED DRAFTING IN APPAREL PRODUCT DESIGN**  
S 3 cr. LEC 1 LAB 2  
**PREREQUISITE:** HDCF 217, HDCF 219, HDCF 314, TE 290  
Development of beginning level computer skills as a base for continued use of those skills across the textiles and clothing program. Consideration of the role of computer-aided design by designers or by promoters of textile and clothing products.

**HDCF 316 VISUAL MERCHANDISING**  
F 3 cr. LEC 1 LAB 2  
**PREREQUISITE:** HDCF 213, HDCF 217, HDCF 219  
Creative, hands-on approach to the study of visual merchandising with focus on how to use effective images in advertising and marketing clothing-related products. Focus on providing students with skills needed to create 3-D merchandise presentations that are effective both as a selling tool and as an appropriate image for a store.

**HDCF 317 CULTURAL EXPRESSIONS OF APPEARANCE**  
F 3 cr. LEC 3  
**PREREQUISITE:** Social Science core.  
Analysis of perceptions of clothing and the body at personal, interpersonal, group/organizational, and cultural levels. Emphasis on appearance as a major component of nonverbal messages within a wide range of settings.

**HDCF 318 THEORIES AND SKILLS FOR HELPING RELATIONSHIPS**  
S 3 cr. LEC 3  
**PREREQUISITE:** Junior standing.  
An introduction to the various counseling theories, skills, and modalities. An overview of the helping profession. Development of interpersonal and professional skills for working with others.

**HDCF 333 PROGRAM PLANNING IN FAMILY AND CONSUMER SCIENCE**  
S 3 cr. LEC 2 LAB 1  
**PREREQUISITE:** ED CI 360 and at least 20 hours in subject area.  
A broad look at the philosophy and organization of Family and Consumer Sciences education programs. Students will design and implement long-range and short-range educational plans. Students will work with local and state organizations such as 4-H, FCCLA, and adult education.

**HDCF 337 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's time, money, marital, and child-rearing responsibilities.

**HDCF 338 PERSONAL AND FAMILY FINANCE I**  
F 3 cr. LEC 3  
**PREREQUISITE:** HDCF 138 or permission of instructor.  
Planned use of financial resources to meet the goals of individuals and families throughout the life cycle. Course includes time value of money concepts, credit use, budgeting, risk management, investment planning, retirement, and estate planning.

**HDCF 339 PERSONAL AND FAMILY FINANCE II**  
S 3 cr. LEC 3  
**PREREQUISITE:** HDCF 338.  
In-depth analysis for individuals and families in risk management, retirement planning, estate planning, and investment and portfolio management.

**HDCF 342 FAMILY FINANCIAL COUNSELING**  
F 3 cr. LEC 2 LAB 1  
**PREREQUISITE:** HDCF 338, HDCF 339, or permission from instructor.  
The course reviews management principles and concepts as applied to individuals and families. Counseling practices are introduced and applied to individuals and families who are facing financial difficulties. Case studies and role playing will be incorporated into course materials.

**HDCF 343 STRATEGIES FOR WORKING WITH ADULTS**  
S 3 cr. LEC 2 LAB 1  
**PREREQUISITE:** One of the following: FSY 100, ECDC 200, or HDCF 150.  
By examining personality types and learning styles, students will learn to match interaction strategies to their own content, audience, and organizational constraints. An emphasis is placed on active teaching and learning using adult education theory. The use of technology is emphasized.

**HDCF 344 CONTEMPORARY HOUSING TOPICS AND ISSUES**  
F 3 cr. LEC 2 LAB 1  
**PREREQUISITE:** HDCF 138 or permission from instructor.  
A survey course of housing issues from families and consumers. Among the topics to be covered are: housing design for human needs, affordability and availability issues, safety issues, and demographic influences on housing choices.

**HDCF 350 EARLY CHILDHOOD CLASSROOM MANAGEMENT**  
F 3 cr. LEC 2 LAB 1  
**PREREQUISITE:** HDCF 160, HDCF 271  

**HDCF 353 CURRICULUM IN EARLY CHILDHOOD EDUCATION**  
S 4 cr. LEC 2 LAB 2  
**PREREQUISITE:** HDCF 160, HDCF 271, HDCF 350  
Curriculum planning, implementation, and evaluation in early childhood settings. Laboratory experience in an early childhood setting from birth to age 8 is required.

**HDCF 356 EXCEPTIONAL NEEDS 0-21**  
F,S 3 cr. LEC 5  
**PREREQUISITE:** HDCF 336 or permission of instructor; HDCF 150 or ED CI 208 or ED CI 209 for Education majors.  
History and attitudes regarding handicapping conditions; exceptionality in a family, school and community context; legal requirements of PL 94-142 and subsequent amendments; categories of exceptionality; appropriate identification and intervention techniques.

**HDCF 357 EXCEPTIONAL NEEDS LABORATORY**  
F 1 cr. LAB 1  
**PREREQUISITE:** HDCF 356.  
Direct experience with children and young adults with special needs in infant-preschool settings, public schools (K-12), and community-based settings.

**HDCF 360 HUMAN DEVELOPMENT: ADULT AND AGING**  
S 3 cr. LEC 3  
**PREREQUISITE:** HDCF 160 and HDCF 260 for majors.  
Focus on the adult stages of the life span and families with adult children; issues include intergenerational relationships; gender differences in individual, family, and career development; and the demographic and economic consequences of an aging population.

**HDCF 371 RESEARCH METHODS**  
F,S 3 cr. LEC 3  
**PREREQUISITE:** University math core and junior standing.  
Basic social science research principles and application to solution of health and human development problems. Emphasis on types of abstracting, research design, and the research process.

**HDCF 372 PROGRAM EVALUATION**  
F,S 1 cr. LEC 3  
**PREREQUISITE:** HDCF 371.  
Provide a working knowledge of process and outcome evaluation techniques used to assess programs in health and human development. The course is designed to develop a conceptual basis for conducting program evaluations and enable the student to actually implement program evaluations for private and public organizations.

**HDCF 400 SEMINAR**  
On Demand 1 cr. SEM 1 Maximum 4 cr.  
**PREREQUISITE:** Senior standing and on demand. Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting class materials.

**HDCF 416 PRODUCT DEVELOPMENT**  
S 3 cr. LEC 1 LAB 2  
**PREREQUISITE:** HDCF 213, HDCF 219, HDCF 313, HDCF 314.  
Integration of quality assurance issues with product development processes at the design, production, merchandising, promotion, buying, and consumer-use levels. Consideration of various target markets with their use in situations for selecting design process.

**HDCF 417 CLOTHING THROUGH THE AGES**  
S 3 cr. LEC 3  
**PREREQUISITE:** HDCF 115, HDCF 213, HDCF 219, HDCF 313, HDCF 314, HDCF 315.  
A historical analysis of the evolution of clothing with focus on the interrelationship of visual effect with social trends. Exploration of textile development and application of historical information to modern clothing design will be included. Course taught on-line.

**HDCF 425 FAMILY LAW AND PUBLIC POLICY**  
F 3 cr. LEC 3  
**PREREQUISITE:** HDCF 263 or permission of instructor.  
An in-depth review of current laws and policies impacting families and a careful examination of the impact of public policy on family behaviors and activities including marriage, divorce, child bearing and rearing, property rights, and inheritance.
HDCF 429 SMALL BUSINESS OPERATIONS
In HHD
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: HDCF 138 or HDCF 510.
This course introduces basic finance, accounting, marketing, and management concepts for owning and operating a successful small family-owned business. Special attention is given to small, family-owned businesses involving areas of study in health and human development.

HDCF 447 FAMILY LIFE EDUCATION
S alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
PREREQUISITE: HDCF 463.
Students will gain an understanding for the general philosophy and broad principles of family life education in conjunction with the ability to plan, implement, and evaluate such educational programs. This course will be taught in accordance with the guidelines from the National Council of Family Relations for becoming a Certified Family Life Educator. Course taught on-line.

HDCF 454 PRACTICUM IN EARLY CHILDHOOD TEACHING
F,S 3 - 8 cr. LAB Maximum 8 cr.
PREREQUISITE: HDCF 160, HDCF 271, HDCF 350, HDCF 352 and screening required.
Supervised experience in programs for young children. Students will be responsible for planning, presenting, supervising, and evaluating early childhood activities in a child development laboratory setting.

HDCF 455 ADMINISTRATION OF HUMAN SERVICE PROGRAMS
ES 3 cr. LEC 3
PREREQUISITE: HDCF 271, senior standing.
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 facility and equipment, staff supervision, budget, community relations, and evaluation.

HDCF 458 ASSESSMENT AND INTERVENTION
ES 4 cr. LEC 3 LAB 1
PREREQUISITE: HDCF 250, HDCF 356, senior standing.
Models of assessment; knowledge, application, and interpretation of formal and informal assessment instruments; formal report writing; CST, IEP, and IFSP procedures. Linking assessment with appropriate intervention for children with developmental delays, learning and behavioral differences, and specific "handicapping conditions."

HDCF 459 CHEMICAL DEPENDENCY TREATMENT
F 3 cr. LEC 3
PREREQUISITE: Senior standing.
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 463 FAMILY STRESS AND CRISIS
FS 5 cr. LEC 3
PREREQUISITE: HDCF 268 and HDCF 319, HDCF 371 and junior standing.
Family's response to stressful circumstances such as changing gender roles, violence, abuse, illness, divorce, financial catastrophes, and death; resources for intervention in family systems, and stress and crisis theories will be examined.

HDCF 464 SEXUALITY, GENDER ROLES AND FAMILIES
S 3 cr. LEC 3
PREREQUISITE: HDCF 263, HDCF 371 and junior standing.
Impact of socialization, genetics, and biological factors on gender roles; sexual attitudes and behavior across the life span within the family setting. Communication differences between the sexes explored.

HDCF 468C ETHICS IN FAMILY AND CONSUMER SCIENCES
On demand 2 cr. LEC 2
PREREQUISITE: Junior standing.
An overview of moral philosophy and a specific look at ethical issues faced by professionals in family and consumer sciences. An emphasis is on helping students develop skills in advocating their own positions on pertinent ethical issues.

HDCF 470 INDIVIDUAL PROBLEMS
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.

HDCF 474C SENIOR SEMINAR-PROFESSIONAL ISSUES
FS,Su 4 cr. LEC 1 LAB 5
PREREQUISITE: HDCF 371, Senior standing.
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 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.

HDCF 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS,Su 1 - 5 cr. RCT May be repeated. Max 4 cr.
PREREQUISITE: HDCF 450.
Classroom instruction associated with directed undergraduate research/creative activity projects.

HDCF 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS,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.

HDCF 500 SEMINAR
FS 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.

HDCF 515 DEVELOPING CONSUMER PRODUCTS
On Demand 3 cr. LEC 3
PREREQUISITE: HDCF 416 or HDPE 420.
A systems approach to selecting design, textile and fit components of products relative to end use.

Emphasis on developing apparel and textile products with attention to quality specifications and user needs.

HDCF 517 SOCIOCULTURAL AND AESTHETIC ASPECTS OF APPEARANCE
On Demand 5 or cr. LEC 3
PREREQUISITE: HDCF 317 or SOC 401.
An observer perspective on the study of sociocultural and aesthetic aspects of appearance. Consideration of trends in appearance research across this century with emphasis on current findings.

HDCF 554 HUMAN DEVELOPMENT IN A SOCIAL CONTEXT
F 5 cr. RCT 3
PREREQUISITE: Graduate standing.
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.

HDCF 555 PERSPECTIVES IN CHILD AND ADOLESCENT DEVELOPMENT
S alternate years, to be offered 2002 3 cr. RCT 3
PREREQUISITE: Graduate standing.
Current research, issues and trends in child and adolescent development are examined.

HDCF 563 INDIVIDUALS & FAMILIES IN SOCIAL CONTEXT
F 5 cr. RCT 3
PREREQUISITE: Graduate standing.
Influence of culture, ethnicity, religion, social class, gender roles, and violence upon relationships in courtship, marital, and family systems. Current socioeconomic changes and trends affecting individuals, especially in a family context are examined.

HDCF 570 INDIVIDUAL PROBLEMS
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.

HDCF 572 PROFESSIONAL PRACTICUM
ES,Su 6 cr. LAB Maximum 6 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
FS,SSu 1 - 4 cr. IND, Maximum 6 cr.
PREREQUISITE: Graduate standing.
A research or professional project on 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 576 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.

HDCF 580 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Upper division courses and others as determined for each offering.
HDCO 460 STUDENT LEADER TRAINING
F 2 cr. LEC 1 RCT 1
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 465 STUDENT ASSISTANT TRAINING
F 1 cr. RCT 1
PREREQUISITE: Resident Assistant status; restricted entry.
Course 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 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 historical aspects of counseling professions, professional counseling roles, professional organizations, consultation models, professional preparation standards, and credentialing. It will also introduce appropriate ethical codes for conduct and study case studies representing ethical dilemmas a counselor may face in schools, agencies, and private practice.

HDCO 503 PROFESSIONAL ISSUES IN MARITAL AND FAMILY COUNSELING
F 1 cr. RCT 1
PREREQUISITE: Graduate standing in counseling program.
This course will address professional and ethical issues as they apply specifically to marriage and family therapists. Group discussion and a variety of hands-on experiences will provide the student with numerous opportunities to obtain and apply ethical and professional knowledge.

HDCO 504 PROFESSIONAL ISSUES IN MENTAL HEALTH COUNSELING
F 1 cr. RCT 1
PREREQUISITE: Graduate standing in counseling program.
Exploration of professional issues including: philosophy, identity, organizations, training, credentialing, ethics, research, financing, politics, treatment settings, populations, laws, administration, and evaluation as applied specifically to mental health counseling.

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 AND GUIDANCE PROGRAMS
Su 3 cr. LEC 3
PREREQUISITE: Graduate standing in counseling program.
The development and organization of guidance services in primary, secondary and agency settings; guidance program responsibility to special students; emphasis on philosophy, organization/procedures, faculty, administrator and personnel involvement.

HDCO 508 CHILD, FAMILY AND MARITAL COUNSELING
Su 3 cr. LEC 2 LAB 1
PREREQUISITE: Graduate standing in counseling program.
This course will acquaint the student with a wide range of counseling theories used in the diagnosis and treatment of children and families and an emphasis on approaching presenting problems from a system's theoretical base. Various forms of therapy will be presented along with suggestions as to how each can be applied to treatment of children, premarital and marital couples, and entire families to include family of origin. Case management and consultation with families, school systems, and other professionals will also be presented.

HDCO 510 COUNSELING THEORIES
F 3 cr. LEC 2 LAB 1
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 511 COUNSELING SKILLS LAB
F 1 cr. LAB 1
PREREQUISITE: Graduate standing in counseling program.
COREQUISITE: HDCO 510
Practice and application of basic counseling skills across a variety of professional settings. Students will experience the role of client as well as counselor.

HDCO 520 GROUP COUNSELING THEORY & METHODS
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 522 GROUP COUNSELING
Su 2 cr. RCT 2
PREREQUISITE: Graduate standing in counseling program.

HDCO 521 COUNSELING SKILLS LAB
F 3 cr. LEC 2 LAB 1
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
F 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-BASED 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 551 APPRAISAL OF INDIVIDUAL & SYSTEMS
Su 3 cr. LEC 2 LAB 1
PREREQUISITE: EDCL 402, Graduate standing in counseling program.
Study includes 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 569 ADVANCED FAMILY COUNSELING
On Demand 5 cr. LEC 2 LAB 1
PREREQUISITE: HDCO 510, Graduate standing in counseling program.
Examination of sexual issues and the counseling process. Examination of foundations needed to respond to clients' sexual concerns.

HDCO 558 CAREER COUNSELING
Su 5 cr. LEC 2 LAB 1
COREQUISITE: Graduate standing in counseling program and permission of instructor.
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 from elementary school through retirement. The student will also be introduced to the impact social issues have on work, leisure and families.

HDCO 564 CONCEPTUALIZATION & APPRAISAL OF MENTAL DISORDERS
S 3 cr. LEC 2 LAB 1
PREREQUISITE: Graduate standing in counseling program.
Conceptual understanding of mental disorders within physiological developmental, familial, and social/cultural contexts. Use of the DSM testing and mental status examinations in appraisal and differential diagnosis of mental disorders. Exploration of treatment options, including medications. Current research examined.

HDCO 565 MARTIAL AND RELATIONSHIP COUNSELING
F 3 cr. LEC 2 RCT 1.
PREREQUISITE: HDCO 508, graduate standing in counseling program and permission of instructor.
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 COUNSELING METHODS FOR TREATMENT OF MENTAL DISORDERS
S 3 cr. LEC 2 LAB 1
PREREQUISITE: HDCO 502, HDCO 508, HDCO 510, 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, theory-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, graduate standing in counseling program and permission of instructor.
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 570 INDIVIDUAL PROBLEMS
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.

HDCO 571 PROFESSIONAL COUNSELING PRACTICUM
F,S,Su 3 cr. LAB 3 Max repeat 15 cr.
PREREQUISITE: HDCO 508 or HDCO 510, 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
F,S,Su 1 - 5 cr. LAB
PREREQUISITE: HDCO 571 or HDCO 572, 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,Su 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing in counseling program.
A research or professional project or 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.

HDCO 576 INTERNSHIP
F,Su 2 - 12 cr. IND
PREREQUISITE: HDCO 571 or HDCO 572, 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.

HDCO 580 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 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 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, consent of instructor and Dean of Graduate Studies.
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,Su 5 cr. TUT
PREREQUISITE: Graduate standing in counseling program 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.

HDCO 590 MASTER'S THESIS
F,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Graduate standing in counseling program and consent of instructor.
A course covering basic concepts of human nutrition as they relate to health and food consumption at different stages of the life cycle. Nutritional assessment and dietary modifications used in health and disease.

HDFN Human Development, Food/Nutrition
Department of Health and Human Development
(406) 994-4001

HDFN 200 CLINICAL NUTRITION FOR NURSING
F 1 cr. LEC 1
PREREQUISITE: CHEM 121 or CHEM 131, HDFN 221 or consent of instructor.
Principles and application of dietary modifications used in health and disease. Course is designed for pre-nursing students.

HDFN 201 INTRODUCTION TO NORMAL & CLINICAL NUTRITION
F 3 cr. LEC 3
PREREQUISITE: CHEM 121 or CHEM 131.
COREQUISITE: BIOL 210 or BIOL 211.
A course covering 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.

HDFN 221N HUMAN NUTRITION
S 5 cr. LEC 3
PREREQUISITE: CHEM 121 or CHEM 131.
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.

HDFN 226 FOOD SCIENCE I
S 5 cr. LEC 3
PREREQUISITE: CHEM 121 or CHEM 131, HDFN 221.
Principles of food composition, preparation, selection, and storage with special reference to physical and chemical changes which occur during normal food handling. Includes a brief introduction to menu planning.

HDFN 227 FOOD SCIENCE I LAB
S 2 cr. LAB 2
COREQUISITE: HDFN 226.
Practical experiences which illustrate the principles of ingredient functionality, methods of preparation, preservation, and storage utilizing knowledge from HDFN 226.

HDFN 230 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.

**HDFN 321 NUTRITION IN THE LIFECYCLE**  
F 3 cr. LEC 3  
**PREREQUISITE:** HDFN 221.  
Nutritional needs and health concerns during the different stages of life: pregnancy, lactation, infancy, preschool years, middle childhood, adolescence, adulthood, and later maturity. Special reference to agencies offering nutrition services.

**HDFN 322 FOOD SYSTEMS: PRODUCTION & PROCUREMENT**  
F 3 cr. LEC 3  
**PREREQUISITE:** HDFN 227, computer competency or CS 150.  
Principles of quantity food production, delivery systems and procurement that emphasizes menu development, recipe standardization, TQM, cost control, and purchase specifications/orders. Safety, sanitation, and technical operations in food service. Applied computer-assisted management.

**HDFN 323 FOOD SYSTEMS LAB**  
F 2 cr. LAB 2  
**COREQUISITE:** HDFN 322.  
Hands-on experience in a variety of quantity food production and delivery systems: college, catering, school lunch, hospital, extended care, seniors lunch, and Meals on Wheels. Out of town field trip required. Application principles in HDFN 322.

**HDFN 324 FOOD SYSTEMS: MANAGEMENT**  
S 3 cr. LEC 3  
**PREREQUISITE:** BUS 301 or HDFN 322 and HDFN 323.  
Principles of management and organization principles in food service: communications, decision making, motivation, work performance, leadership, recruitment, selection, and training. Policies and procedures, performance evaluation and actions, labor control, labor relations, position descriptions, and budget. Special emphasis is placed on creative problem solving.

**HDFN 351 COMMUNITY NUTRITION**  
S 2 cr. LEC 2  
**PREREQUISITE:** HDFN 321.  
Factors in the community influencing nutritional status, techniques to assess community nutritional needs, and methodology for planning, implementing, and evaluating community nutrition programs. Major community nutrition project completed for a public or private agency.

**HDFN 400 SEMINAR**  
On Demand 1 cr. SEM 1 Maximum 4 cr.  
**PREREQUISITE:** Senior standing.  
Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

**HDFN 401 NUTRITIONAL ASSESSMENT AND COUNSELING**  
F 2 cr. LEC 1 LAB 1  
**PREREQUISITE:** HDFC 319 and HDFN 321.  

**HDFN 411 NUTRITION FOR SPORTS AND EXERCISE**  
F 2 cr. LEC 2  
**PREREQUISITE:** HDFN 221, BCHM 122, BIOL 210 or BIOL 211.  

**HDFN 421 NUTRIENT METABOLISM I**  
F 5 cr. LEC 5  
**PREREQUISITE:** HDFN 221, BCHM 340, BIOL 208, with grade "C" or better in each course.  
Digestion, absorption, and metabolism of macronutrients; regulation of macronutrient metabolism; and changes that occur in metabolism under different physiologic conditions will be discussed.

**HDFN 425 MEDICAL NUTRITION THERAPY**  
S 4 cr. LEC 4  
**PREREQUISITE:** HDFN 401, HDFN 421, with a "C" or better in each course.  
Examination of metabolic and physiological changes in selected conditions and implications for medical nutrition therapy.

**HDFN 426 MEDICAL NUTRITION THERAPY LABORATORY**  
S 1 cr. LAB 1  
Application of principles of clinical nutrition. Supervised practice in a hospital for one week under the supervision of a registered diettitian (may require relocation for one week).

**HDFN 427 FOOD SCIENCE II - EXPERIMENTAL FOODS**  
F 2 cr. LEC 2  
**PREREQUISITE:** HDFN 227, STAT 217, HDFC 371, CS 150 or computer competency; and either CHEM 215 or CHEM 312, with grade "C" or better in each course.  
Theory and application of basic food science research design, interpretation of data, and reporting of data in a research paper.

**HDFN 428 FOOD SCIENCE II - EXPERIMENTAL FOODS LAB**  
S 2 cr. LAB 2  
**PREREQUISITE:** Junior standing, consent of instructor, and approval of department head.  
Directed research and study on an individual basis.

**HDFN 429 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**  
FS,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.  
**COREQUISITE:** HDFN 490.  
Classroom instruction associated with directed undergraduate research/creative activity projects.

**HDFN 450 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY**  
FS,Su 1 - 6 cr. IND May be repeated. Max 18 cr.  
Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis.

**HDFN 500 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.

**HDFN 511 NUTRIENT METABOLISM IN RESPONSE TO EXERCISE**  
F 3 cr. LEC 3  
**PREREQUISITE:** BIOL 207 or BIOL 208, HDFN 411, BCHM 122.  
The aim of this course is to examine the elements of nutrient metabolism that are affected by exercise. Specific goals are to examine carbohydrates, amino acids, lipids, vitamins, and minerals from perspectives such as utilization during exercise and recovery from exercise, how exercise changes the need for each of the nutrients, the need for nutrient balance, how specific conditions alter nutrient metabolism in response to exercise.

**HDFN 514 NUTRITION AND DISEASE**  
F alternate years, to be offered 2000 3 cr. LEC 3  
**PREREQUISITE:** BCHM 340, BIOL 207, BIOL 208, HDFN 425, HDFN 426.  
This course will investigate the contribution of carbohydrate, protein, fat, and other nutrient pathophysiology to the development and treatment to major human diseases.

**HDFN 521 METABOLIC ROLES OF NUTRIENTS**  
S 3 cr. LEC 3  
**PREREQUISITE:** HDFN 421, BCHM 442.  
Homeostatic integration of the macro and micro nutrients in the human cell and in various organ systems.

**HDFN 523 NUTRITION FOR PREGNANT WOMEN, INFANTS, AND YOUNG CHILDREN**  
On demand 3 cr. LEC 3  
**PREREQUISITE:** A 200-level nutrition course; "anatomy and physiology" or consent of instructor. Graduate standing or seniors by petition. Homoeostatic integration of the macro and micro nutrients in the human cell and in various organ systems.

**HDFN 524 NUTRITION FROM EARLY CHILDHOOD TO YOUNG ADULT**  
On demand 2 cr. LEC 2  
**PREREQUISITE:** A 200-level nutrition course; "anatomy and physiology" or consent of instructor. Graduate level or seniors by petition. The nutritional needs, requirements, and issues of young children, adolescents, and early adulthood will be presented through lectures, discussion, and case studies. An emphasis will be placed on the development and prevention of obesity, eating disorders, and chronic diseases within these age groups.
HDHN 525 NUTRITION FOR OLDER ADULTS
On Demand 2 cr. LEC 2
PREREQUISITE: A 200-level nutrition course; "anatomy and physiology" or consent of instructor.
Graduate standing or seniors by petition.
Nutritional needs, requirements and issues experienced by older adults will be addressed. Other topics include medical conditions with nutritional implications, aging process, effects of physical activity and food choices and habits of older adults.

HDHN 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.

HDHN 570 INDIVIDUAL PROBLEMS
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.

HDHN 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
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.

HDHN 585 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.

HDHN 588 SPECIAL TOPICS
On Demand 1 - 4 cr. IND 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.

HDHN 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr.LEC
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.

HDHN 590 MASTER'S THESIS
FSu 1 - 10 cr. IND
PREREQUISITE: Master's standing.
Directed graduate research/creative activity.

HDHL Human Development, Health
Department of Health and Human Development
(406) 994-3241

HDHL 106 DRUG HEALTH ISSUES FOR EDUCATORS
FS 3 cr. LEC 2 RCT 1
Drug education and health concerns for educators of school-aged children. Covers topics required by Office of Public Instruction for health-related teacher education.

HDHL 221 FIRST EMERGENCY RESPONSE
FS 1 cr. LEC 1
PREREQUISITE: Concurrent enrollment in HDHL 222.
American Red Cross first aid procedures and skills, including certification in community C.P.R. and responding to emergencies.

HDHL 222 FIRST EMERGENCY RESPONSE LAB
FS 1 cr. LAB 1
Practical application of procedures, skills, and safety for responding for an emergency.

HDHL 230 DRUGS AND SOCIETY
FS 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
FS 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 270 INDIVIDUAL PROBLEMS
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.

HDHL 276 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 280 SPECIAL TOPICS
On Demand 1 - 4 cr. IND 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.

HDHL 502 DISEASE AND LIFESTYLE
S 3 cr. LEC 3
PREREQUISITE: BIOL 207, BIOL 208 with a "C" or better in each course, or consent of instructor.
This course emphasizes the physiological and epidemiological relationships between nonmodifiable (e.g., physical activity, nutrition) and the incidence of chronic disease. Topics emphasize current research and health trends in the United States.

HDHL 402 FIRST AID INSTRUCTOR LAB
On Demand 1 cr. LAB 1
PREREQUISITE: HDHL 221, HDHL 222 or current American Red Cross advanced first aid and CPR certification.

HDHL 410 HUMAN RESPONSE TO STRESS
F 3 cr. LEC 3
PREREQUISITE: PSY 100, junior standing.
Analysis of human response to stress in relation to a variety of biopsychosocial factors; techniques for managing stress are also investigated.

HDHL 440C PRINCIPLES OF EPIDEMIOLOGY
S alternate years, to be offered 2001 3 cr. LEC 2 RCT 1
PREREQUISITE: STAT 216 and a research methods course.
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 450C PROGRAM PLANNING AND EVALUATION IN HEALTH
F 3 cr. LEC 2 RCT 1
PREREQUISITE: PSY 100 and SOC 101 or consent of instructor.
Senior capstone course. Community health program planning and evaluation with emphasis on applications in Montana communities.

HDHL 450 NEAR-DEATH EXPERIENCE
On Demand 3 cr. LEC 3
PREREQUISITE: PSY 100, junior standing.
A study of the near-death experience research and its implications for death and dying; applications of research findings for one's personal and professional lives.

HDHL 451 HEALTH AND HEALING
FSu on demand 3 cr. LEC 3
PREREQUISITE: PSY 100.
Health and healing deals with psychoneuroimmunology (PNI) and the mind-body connection in relation to human health and well being. The course covers the relation of PNI to the physical body systems of anatomy, physiology, histology, and biochemistry, and surveys the scope of complementary and alternative therapies related to wellness variables from a multicultural perspective. Consumer awareness as to how and when to select alternative approaches and critiques of legitimate and ineffective therapies are covered.

HDHL 470 INDIVIDUAL PROBLEMS
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.

HDHL 475C SENIOR SEMINAR-PROFESSIONAL ISSUES
FSu 1 cr. LEC 1
COREQUISITE: HHD 476 and consent of instructor.
Senior capstone course for community health majors and prephysical therapy majors. Establishing a professional identity and transitioning to a career in the field of human services.

HDHL 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.
HDPE 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: HDHL 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

HDPE 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS,Su 1 - 6 cr. RCT May be repeated. Max 12 cr.
Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis.

HDHL 40 LA VARSITY ATHLETICS
F 1 cr. LAB 1
Maximum repeat

EXPERIENCE
The basic fundamentals and techniques in the sport of football which is determined in action on the football field.

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.

HDPE 184 VARSITY ATHLETICS
FS 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.

The application of instructional theories in teaching health enhancement. The student will develop knowledge and practice in teaching styles, teaching strategies, and teaching skills in a variety of health enhancement activities.

HDPE 204 ETHICS IN SPORTS AND HEALTH ENHANCEMENT
S 2 cr. LEC 2
Foundations of moral reasoning and ethical behavior in health enhancement, sports, and health education.

HDPE 210 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 the MSU "Young at Heart" exercise program for seniors.

HDPE 220 BASIC HEALTH CARE IN SPORT & EXERCISE
F 3 cr. LEC 3
A course in the principles and procedures of health care for the participants of sports, intended for coaches, teachers, athletic trainers, and players.

HDPE 222 FOUNDATIONS OF EXERCISE SCIENCE
S 3 cr. LEC 3
The aim of this course is to integrate the subdisciplines of exercise science (functional anatomy, biomechanics, exercise physiology, motor control, and exercise psychology) from the perspectives of definitions, basic science, and application to health, fitness, and athletic performance.

HDPE 224 METHODS OF TEACHING MOVEMENT EXPLORATION
S 3 cr. LEC 2 LAB 1
Practice skills in music fundamentals; teaching and learning folk, square, social, and various types of rhythmic activities.

HDPE 225 SKI INSTRUCTOR TRAINING
F 1 cr. LEC 1
PREREQUISITE: Demonstrate advanced skiing ability.
This course is designed for the student interested in becoming a ski instructor by providing both theoretical and practical experience in the teaching of skiing.

HDPE 267 INTRODUCTION TO COACHING
FS 2 cr. LEC 2
Introductory coaching course which will cover basic information from the beginning level in the American Coach Effectiveness Program.

HDPE 270 INDIVIDUAL PROBLEMS
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.

HDPE 280 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be permitted by the 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.

HDPE 313 NEUROLOGICAL BASIS FOR OLDER ADULTS
S 3 cr. LEC 1 LAB 1
COREQUISITE: EDSD 365
The application of instructional theories in teaching health enhancement. The student will develop knowledge and practice in teaching styles, teaching strategies, and teaching skills in a variety of health enhancement activities.

HDPE 314 HEALTH ENHANCEMENT FOR ATYPICAL POPULATIONS
S 2 cr. LEC 2
PREREQUISITE: BIOL 207
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 315 NEUROLOGICAL BASIS OF HUMAN MOVEMENT
F alternate years, to be offered 2001 2 cr. LEC 2
PREREQUISITE: BIOL 209,BIOL 210 and upper division standing or consent of instructor.
This course presents the structure and function of the central and peripheral nervous systems as they relate to both reflexive and voluntary movement.

HDPE 317 BASKETBALL COACHING THEORY
F alternate years, to be offered 2001 2 cr. LEC 2
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 alternate years, to be offered 2000 2 cr. LEC 2
PREREQUISITE: HDPE 267.
A working knowledge of soccer coaching tactics and techniques.

HDPE 319 VOLLEYBALL COACHING THEORY
S alternate years, to be offered 2001 2 cr. LEC 2
PREREQUISITE: HDPE 267.
A working knowledge of volleyball coaching tactics and techniques.

HDPE 320 BIOMECHANICS FOR NONSCIENCE MAJORS
F 4 cr. LEC 3 LAB 1
PREREQUISITE: BIOL 207, Math core.
A general sport and exercise biomechanics course designed for health enhancement and health promotion students covering mechanics of human motion, mechanics of musculoskeletal system, and qualitative analysis of movement. Emphasis is on the application of mechanics to evaluation of sports performance.

HDPE 322 EXERCISE PHYSIOLOGY
F 4 cr. LEC 3 LAB 1
PREREQUISITE: BIOL 207, BIOL 208, and STAT 216 with grade of "C" or better in each course, or permission of instructor.
Topics include factors and mechanisms involved with causing changes and adaptations in the physiological responses associated with training and participating in strength and endurance sports and activities. Lectures and labs emphasize explaining common observations and practices from the physiological viewpoint.
HDPE 325 BIOMECHANICS
FOR SCIENCE MAJORS
S 4 cr. LEC 5 LAB 1
PREREQUISITE: MATH 170, BIOL 207, STAT 216 or permission of instructor.
A general sport and exercise biomechanics course designed for exercise science students covering mechanics of human motion, mechanics of musculoskeletal system, and qualitative analysis of movement. Emphasis on critical thinking and application of biomechanics to clinical and research settings.

HDPE 361 TESTS AND MEASUREMENT
S 2 cr. LEC 2
PREREQUISITE: EDCI 360.
COREQUISITE: EDCI 360.
Evaluation techniques in the wellness environment: experiences in administration and interpretation of tests in sport skills, fitness, and wellness components with appropriate statistical analysis.

HDPE 362 TRACK & FIELD THEORY
F 2 cr. LEC 1 LAB 1
PREREQUISITE: HDPE 267, HDPE 155.
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. A "Learn by Doing" approach used in the lab.

HDPE 367 COACHING APPLICATION
ES 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 410 INTERNATIONAL PERSPECTIVE OF HISTORY AND PHILOSOPHY IN SPORT, AND PHYSICAL EDUCATION
F 3 cr. LEC
PREREQUISITE: Junior standing.
Analysis of historical, philosophical and contemporary cultural forces and value orientation in physical education, health education, and sport.

HDPE 415 MANAGEMENT IN HEALTH ENHANCEMENT AND FITNESS
S 3 cr. LEC 3
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
S 3 cr. SEM 3
PREREQUISITE: PSY 100 or consent of instructor.
The study of the theoretical models of exercise adaption and adherence with emphasis on the process of behavioral intervention and the numerous psychological factors related to prolonged exercise and performance.

HDPE 430 INSTRUCTIONAL DESIGN AND ADMINISTRATION OF HEALTH ENHANCEMENT CURRICULA
F 2 cr. LEC 2
PREREQUISITE: Upper division standing and acceptance into the professional teacher education program, or consent of instructor.
A conceptual and practical approach to the design, implementation, and maintenance of various curricula for future teachers.

HDPE 435 SPORTS REHABILITATION
F 3 cr. LEC 3
Basic science and clinical concepts in returning injured athletes to competition. Relationship of mechanism of injury, healing process, and concepts of exercise necessary to recondition athletes will be presented. Lab will focus on hands-on experience of various exercise modes.

HDPE 440 HEALTH AND FITNESS PROMOTION
S 3 cr. LEC 5
The investigation of current marketing strategies and procedures in health promotion programs.

HDPE 450C 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.
Students are familiarized with the hands-on training and theoretical background needed to competently assess levels of healthiness in an "apparently healthy" population. Lecture/lab content is structured to prepare students for taking the ACSM Health/fitness exam.

HDPE 467 ADVANCED CONCEPTS IN COACHING
ES 2 cr. LEC 2
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 Association (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 470 INDIVIDUAL PROBLEMS
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 475C SENIOR SEMINAR-PROFESSIONAL ISSUES
F,SU 1 cr. LEC 1
COREQUISITE: HDPE 476.
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 480 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 489 UNDERGRADUATE RESEARCH/CREATIVITY ACTIVITY INSTRUCTION
ES,SU 1-2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: HDPE 490.
Senior capstone course. Classroom instruction associated with directed undergraduate research/creative activity projects.

HDPE 490 UNDERGRADUATE RESEARCH/CREATIVITY ACTIVITY
ES,SU 1-6 cr. RCT May be repeated. Max 12 cr.
Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis.

HDPE 500 SEMINAR
ES 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.

HDPE 501 BEHAVIORAL HEALTH & FITNESS
F 3 cr. LEC 3
PREREQUISITE: HDPE 425 or graduate standing.
Epidemiological analysis or relationship between exercise and health. Study of behavioral models and strategies as related to health promotion.

HDPE 506 ADAPTED PHYSICAL EDUCATION: PROGRAM THEORY & APPLICATION
S 3 cr. LEC 3
PREREQUISITE: HDPE 314, graduate standing.
Theory and practice in assessment, program development and implementation in adapted physical education, physical fitness and recreation.

HDPE 512 RESEARCH DESIGN IN HEALTH AND HUMAN DEVELOPMENT
S 5 cr. LEC 3
PREREQUISITE: EDCI 402, graduate standing.
A study of the tools necessary to conduct research in the movement sciences and health fields. Includes the writing of a research proposal.

HDPE 520 HEALTH PROMOTION PROGRAMMING AND PLANNING
F 3 cr. LEC 3
PREREQUISITE: HDPE 415, graduate standing.
Advanced administration of sport, fitness and physical education programs, including marketing, management, law and finance. Analysis of the problems, functions and standards of Sport Administration.

HDPE 540 GRADUATE BIOMECHANICS
F alternate years, to be offered 2000 cr. LEC 3
PREREQUISITE: Graduate standing; undergraduate biomechanics and consent of instructor.
This course will review basic mechanical concepts as related to the human movement analysis. Students will investigate current topics related to the biomechanical analysis of human movement and will be introduced to a variety of methodological procedures in biomechanics research.

HDPE 545 GRADUATE EXERCISE PHYSIOLOGY
F 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 551 ELECTROCARDIOGRAPHY
S 3 cr. LEC 3
PREREQUISITE: HDPE 465 and consent of instructor.
Students will understand the physiological and electrical basis for the resting and exercise electrocardiogram. Class experiences will include proper lead placement and skin preparation, identification of common arrhythmias, and mechanistic interpretation of the 12-lead ECG.
HDPE 567 PROFESSIONAL ISSUES IN COACHING
S,Su 2 cr. LEC 2
PREREQUISITE: HDPE 267, HDPE 367 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 - i.e., prevention, care and rehabilitation of injuries, risk management in sport; sociological and psychological aspects of coaching; coaching the female athlete.

HDPE 570 INDIVIDUAL PROBLEMS
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.

HDPE 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
FS,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.

HDPE 576 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.

HDPE 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.

HDPE 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.

HDPE 590 GRADUATE CONSULTATION
FS,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.

HDPE 599 MASTER'S THESIS
FS,Su 1 - 10 cr. IND May be repeated.
PREREQUISITE: Master's standing.
Directed graduate research/creative activity.

HHD Health & Human Development

HHD 101 FITNESS FOR LIFE
FS 1 cr. LEC 1
The relationship between habitual exercise and health; the health-related components of fitness.

HHD 105 FITNESS FOR LIFE LAB
FS 1 cr. LAB 1
May be repeated for up to 3 credits.
COREQUISITE: HHD 101.
The application of fitness principles appropriate to specific physical activities.

HHD 108 AIKIKO FUNDAMENTALS
On Demand 1 cr. LAB 1
The fundamentals of Japanese Aikikido as taught by the World Aikido Headquarters will be explored.

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 111 BADMINTON
On Demand 1 cr. LAB 1
Fundamental skills, equipment, strategy, rules, and etiquette of Badminton.

HHD 113 BADMINTON
FS 1 cr. LAB 1
Continuation of basic skills stressing technique.

HHD 114 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 115 BADMINTON
FS 1 cr. LAB 1
Continuation of intermediate skills.

HHD 116 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 117 BADMINTON
FS 1 cr. LAB 1
Continuation of intermediate skills.

HHD 118 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 119 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 120 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 121 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 122 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 123 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 124 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 125 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 126 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 127 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 128 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 129 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 130 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 131 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 132 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 133 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 134 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 135 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 136 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 137 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 138 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 139 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 140 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 141 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 142 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 143 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 144 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 145 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 146 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 147 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 148 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 149 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 150 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 151 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 152 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 153 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 154 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 155 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 156 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 157 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 158 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 159 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 160 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 161 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 162 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 163 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 164 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 165 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 166 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 167 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 168 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 169 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 170 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 171 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 172 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 173 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 174 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 175 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.

HHD 176 BADMINTON
FS 1 cr. LAB 1
Continuation of advanced skills.
Further development of the forehead and backhand, groundstrokes, serve and volley. Advanced strokes and singles and doubles strategy.

**HHD 185 VOLLEYBALL**
On Demand 1 cr. LAB 1
Introduction to individual and team skills, rules, and strategy of volleyball.

**HHD 205 CAMPUS-COMMUNITY HEALTH ENHANCEMENT I**
F,Su 2 cr. LEC 1 LAB 1
PREREQUISITE: Freshman seminar or sophomore standing.

This course is an opportunity for second-year students to participate in campus and community health enhancement programs. This introductory level "experience" will focus on the student's "entry" into the health enhancement field by affiliating with campus health enhancement groups or community non-profit groups. In addition the course is structured so that the student's personal interests determine the area of study.

**HHD 205FG DANCE AS CULTURAL EXPRESSION**
S 5 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).

**HHD 207F DANCE APPRECIATION**
F 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.

**HHD 226 MODERN DANCE COMPOSITION**
F 2 cr. LEC 1 LAB 1
PREREQUISITE: HHD 124 or HHD 120
Improvisation experience based on the elements of dance, short studies on emotion, poetry, imagery and musical forms. Study of choreography forms and principles ending in a dance choreographed by the students.

**HHD 227 MODERN DANCE PRODUCTION**
S 3 cr. LAB 3 Maximum 9 cr.
PREREQUISITE: HHD 226
This course contains the materials which are needed in staging dance programs. Students will participate in the production of a dance performance.

**HHD 261 SKIING, CROSS COUNTRY**
S 1 cr. LAB 1
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 276 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.

**HHD 280 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.

**HHD 483 CAMPUS-COMMUNITY HEALTH ENHANCEMENT II**
F,Su 3 cr. LEC 1 LAB 2
PREREQUISITE: HHD 203, junior standing.
An opportunity for junior and senior students to participate in campus and community health enhancement programs. This advanced level "experience" will focus on professional development, and development of research interests in the health enhancement field by affiliating with campus health enhancement groups or community non-profit groups. The course is structured so that the student's personal interests determine the area of study.

**HHD 476 INTERNSHIP**
F,Su 2 - 12 cr. IND
PREREQUISITE: Consent of internship director in academic area.

**HHD 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**
F,Su 1 - 2 cr. IND May be repeated. Max 4 cr.
Classroom instruction associated with directed undergraduate research/creative activity projects.

**HHD 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY**
F,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.

**HIST History**
Department of History and Philosophy (406) 994-4395

**HIST 105H WESTERN CIVILIZATION TO 1600**
FS 4 cr. LEC 3 RCT 1
Survey of the ancient Near East, Greece, Rome, and the European world to the end of reformation. Emphasis on social, economic, and cultural history.

**HIST 107H WESTERN CIVILIZATION: FRENCH REVOLUTION TO PRESENT**
F 4 cr. LEC 3 RCT 1
Survey of European history from 1600 to the present.

**HIST 109HG MODERN ASIA**
F 4 cr. LEC 3 RCT 1
Survey of the social, political, and economic history of East Asia (China and/or Japan) in the 20th Century.

**HIST 110HG 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 1820's. The course puts special emphasis on the experiences of indigenous peoples, peasants, and women within larger political, social, and economic systems.

**HIST 115HG A HISTORY OF JAPAN**
S 3 cr. LEC 3
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.

**HIST 155H AMERICA AND THE WORLD BEFORE 1865**
FS 4 cr. LEC 3 RCT 1
European exploration, pre-Columbian Native Americans, the American Colonial, Revolutionary, Early National, Jacksonian, and Civil War periods, in the context of world history.

**HIST 156H AMERICA AND THE WORLD AFTER 1865**
FS 4 cr. LEC 3 RCT 1
Reconstruction after the Civil War, industrialization during the late 19th century, and the domestic and international transformation of the U.S. during the 20th century in the context of world history.

**HIST 280 SPECIAL TOPICS**
On Demand 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.

**HIST 305 MODERN MEXICO**
On Demand 3 cr. LEC 3
PREREQUISITE: Take one of the following: HIST 105, HIST 110 or HIST 119
Creation of Modern Mexico, Pre-Columbian, and Colonial Legacies; struggle over nation building since independence in 1821.

**HIST 311 EARLY AMERICA**
On Demand 3 cr. LEC 3
PREREQUISITE: HIST 155.
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.

**HIST 312 CIVIL WAR AND RECONSTRUCTION**
On Demand 3 cr. LEC 3
PREREQUISITE: HIST 155 or HIST 156.
Political, economic, and social developments leading to sectional division. Breakdown of political accommodation, Civil War, and Reconstruction.

**HIST 313 THE GILDED AGE TO 1940**
On Demand 3 cr. LEC 3
PREREQUISITE: HIST 155 or HIST 156.
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.

**HIST 316 HISTORY OF RUSSIA TO 1917**
On Demand 3 cr. LEC 3
PREREQUISITE: HIST 105 or HIST 107 and junior standing.
Emergence of Russia as a modern nation and developments which led to the Bolshevik Revolution.
HIST 518 HISTORY OF ANCIENT GREECE
On Demand 3 cr. LEC 3
Origins to Alexander the Great, with special attention to life in classical Athens. Emphasis on reading ancient sources in translation.

HIST 519 HISTORY OF ANCIENT ROME
On Demand 3 cr. LEC 3
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.

HIST 520 UNITED STATES SINCE 1940
On Demand 3 cr. LEC 3
Prerequisite: HIST 156. Political, cultural, and economic history of the U.S. since the end of World War II.

HIST 523 AGE OF ABSOLUTISM & REASON
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and one of the following: HIST 105 or HIST 107. Political, intellectual, and social history of Europe during the 17th and 18th centuries.

HIST 525 19TH CENTURY EUROPE
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and one of the following: HIST 105 or HIST 107. Events and forces in 19th century Europe from the Congress of Vienna to the outbreak of World War I. Social and intellectual ideas as well as political and economic events.

HIST 526 20TH CENTURY EUROPE
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and one of the following: HIST 105 or HIST 107. 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.

HIST 533 EARLY BRITAIN 1468-1714
On Demand 3 cr. LEC 3
Prerequisite: Sophomore standing and HIST 107. History of England, Scotland, Ireland, and Wales during the sixteenth and seventeenth centuries. Topics of study include the Reformation, Civil War, unification of Scotland and England, and rise of Britain as a world power.

HIST 534 MODERN BRITAIN
On Demand 3 cr. LEC 3
Prerequisite: Sophomore standing and one of the following: HIST 105 or HIST 107. The emergence and fall of Britain as a world power. Topics of study include the Industrial Revolution, the slow emergence of democracy in Britain, the role of the family in Victorian Britain, and the impact of the empire within Britain.

HIST 561 CIVILIZATION OF FRANCE
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and one of the following: HIST 105 or HIST 107. Survey of French culture from the Middle Ages to the modern era; an interdisciplinary course which focuses on historical, artistic, literary, and social developments.

HIST 562 MODERN GERMANY
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and one of the following: HIST 105 or HIST 107. An in-depth look at the economic, social, and political developments of modern Germany.

HIST 568 TWENTIETH CENTURY WAR: VIETNAM ERA
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and one of the following: HIST 105 or HIST 107. This course examines the geopolitical, ideological, social, and cultural processes that produced a half century of revolution and war in Vietnam.

HIST 571 EARLY MODERN JAPAN
On Demand 3 cr. LEC 3
Prerequisite: HIST 109 or HIST 115. Concentration on broad issues involved in the developments of the Tokugawa state.

HIST 572 JAPAN'S 19TH CENTURY
On Demand 3 cr. LEC 3
Prerequisite: HIST 109 or HIST 115. Explanation of the transformations of Japan from the feudal regime to the Tokugawa Shogunate to the modern state of the Meiji government.

HIST 574 MODERN CHINA
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and one of the following: HIST 105 or HIST 107. Social, political, and economic history of the People's Republic of China.

HIST 575 MODERN SOUTH ASIA
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and one of the following: HIST 105, HIST 107, HIST 109. Social, economic, political, and intellectual history of India, Pakistan, and Bangladesh during the 19th and 20th centuries.

HIST 401C SEMINAR IN HISTORICAL METHODOLOGY
On Demand 3 cr. SEM 3
Prerequisite: Senior standing. Exploration of historical methodologies and in light of contemporary historiography.

HIST 402 TRANS-MISSISSIPPI WEST
On Demand 3 cr. LEC 3
Prerequisite: HIST 155 or HIST 156. Exploration of major themes in the development of the American West, including conquest and settlement, economic development, racial and ethnic diversity, urbanization, and popular culture.

HIST 403 WOMEN IN THE U.S. & CANADIAN WEST
On Demand 3 cr. LEC 3
Prerequisite: HIST 155 or HIST 156 and HIST 408. 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.

HIST 404 MONTANA AND THE WEST
On Demand 3 cr. LEC 3
Prerequisite: HIST 155 or HIST 156. 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 unite Montana with the rest of the American West.

HIST 406 ANTI-COMMUNISM IN THE TRUMAN-EISENHOWER YEARS
On Demand 3 cr. SEM 3
Prerequisite: HIST 155 or HIST 156. An analysis of the ways the Truman and Eisenhower administrations dealt with anti-communism, with a focus on McCarthyism.

HIST 408 WOMEN IN AMERICA
On Demand 3 cr. LEC 3
Prerequisite: HIST 155 or HIST 156. 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.

HIST 409 JAPANESE WOMEN'S HISTORY
On Demand 3 cr. SEM 3
Prerequisite: HIST 109 or HIST 209. An explanation of women in Japanese history from ancient time to the present.

HIST 410 LATIN AMERICAN SOCIAL HISTORY
On Demand 3 cr. SEM 3
Prerequisite: Background in Latin American studies. Social history of Latin America from colonial times to the present with a focus on theories of economic development and social change, and on the experiences of various historical actors, especially peasants, workers, and women.

HIST 412 RACE AND CLASS IN AMERICA
On Demand 3 cr. LEC 3
Prerequisite: One of the following: HIST 110, HIST 155 or HIST 156. This course explores the history of race relations in Latin America, focusing on the traditional links between "race" and power. Topics include examinations of Indigenous, African, and European cultures/ethnicities, from the Conquest to the present day.

HIST 419 FAMILY, GENDER AND LAW IN ANCIENT GREECE AND ROME
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and HIST 105, HIST 318 or HIST 319. Marriage, family life, and the position of women from Homer to Saint Augustine. Special emphasis on private law. Reading and discussion of ancient sources in translation.

HIST 422 HISTORY OF THE AMERICAN CONSTITUTION
On Demand 4 cr. LEC 4
Prerequisite: HIST 155, HIST 156. Development of American Constitutional theory and practice.

HIST 425 PROTESTANT REFORMATION
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and one of the following: HIST 105 or HIST 107. The rise of Protestantism, 1500-1640, and its impact on European society. Emphasis on Germany and France.

HIST 424 CATHOLIC REFORMATION
On Demand 3 cr. LEC 3
Prerequisite: Junior standing and one of the following: HIST 105 or HIST 107. The rise of Protestantism, 1500-1640, and its impact on European society. Emphasis on Germany and France.
Exploration of Catholicism and its institutions during the 16th century. Focus on reaction to Protestantism and the establishment of the modern Roman Catholic Church. Includes discussion of the English Reformation.

**HIST 425 GENDER, SEXUALITY, AND SOCIAL CHANGE IN LATIN AMERICAN HISTORY**
On Demand 3 cr. SEM 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.

**HIST 426H THE RENAISSANCE**
On Demand 3 cr. LEC 3
PREREQUISITE: Junior standing and one of the following: HIST 105 or HIST 107.
Emphasis on the transition from medieval to early modern society in England, Italy, France, and Germany, 1300-1525.

**HIST 431 SCIENCE, TECHNOLOGY & SOCIETY: 1500-1800**
On Demand 3 cr. LEC 3
PREREQUISITE: Junior standing and one of the following: HIST 105, HIST 323, HIST 423, HIST 424.
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.

**HIST 432 MODERN SCIENCE**
On Demand 3 cr. LEC 3
PREREQUISITE: Junior standing and one of the following: HIST 105, HIST 323, HIST 325, or HIST 456.
The emergence of modern science in Europe and America. Topics of study include the relationships between science, gender, ethnicity, and race. Special attention will also be paid to the question of "totalitarian science" and "free science."

**HIST 447 HISTORY OF THE NORTH AMERICAN INDIAN**
On Demand 3 cr. LEC 3
PREREQUISITE: HIST 155.
Emphasis on white reaction to the American Indians and the effect of the European invasion on Indian culture.

**HIST 455 HISTORY OF AMERICAN TECHNOLOGY**
On Demand 3 cr. LEC 3
PREREQUISITE: Junior standing and HIST 155 or HIST 156.
Within the broad framework of assessing "the human prospect," the course will provide a historical understanding of the interpenetration of technology and culture. Readings, lectures, and films will address these issues from a variety of perspectives.

**HIST 456H AMERICAN THOUGHT AND CULTURE**
On Demand 3 cr. LEC 3
PREREQUISITE: Junior standing and HIST 155 or HIST 156.
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.

**HIST 457 MUSEUM HISTORY**
$ alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing.
The development of American museums and their relationship to other exhibitionary forms including wild west shows and world fairs. An introduction to theoretical arguments about the nature and function of cultural representations.

**HIST 460 EUROPEAN INTELLECT HISTORY**
On Demand 3 cr. LEC 3
PREREQUISITE: Junior standing and one of the following: HIST 105 or HIST 107.
The ideologies and major thinkers who have influenced European thought from the French Revolution to the present day.

**HIST 465 ECOLOGY AND NATURE IN JAPAN**
$ alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: HIST 109 or HIST 119.
Traces the role of images of nature and the natural environment in the formation of Japanese, political, cultural, and economic practice from ancient times to the present.

**HIST 466 UNITED STATES ENVIRONMENTAL HISTORY**
On Demand 3 cr. LEC 3
PREREQUISITE: HIST 156.
Survey of changing perceptions and uses of the natural world from the colonial era to the present.

**HIST 467 WOMEN IN ASIA**
$ 3 cr. LEC 3
PREREQUISITE: One of the following: HIST 105, HIST 107 or HIST 109, Junior standing.
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. Focus on the 19th and 20th centuries.

**HIST 470 INDIVIDUAL PROBLEMS**
On Demand 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.

**HIST 476 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.

**HIST 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.

**HIST 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**
F,S,Su 1-4 cr. IND
PREREQUISITE: Consent by instructor. May be repeated. Maximum 4 cr.
Consideration of historical thinking, the uses of evidence and historical methodology.

**HIST 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY**
F,S,Su 1-4 cr. IND
PREREQUISITE: Consent by instructor. May be repeated. Maximum 4 cr.
Consideration of historical thinking, the uses of evidence and historical methodology.

**HIST 495 THE AMERICAN WEST**
$ 3 cr. LEC 3
PREREQUISITE: HIST 402 or equivalent.
Directed readings and analysis of major problems in the history of the American West.

**HIST 499 MUSEUM HISTORY**
$ alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing.
The development of American museums and their relationship to other exhibitionary forms including wild west shows and world fairs. An introduction to theoretical arguments about the nature and function of cultural representations.

**HIST 500 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.

**HIST 505 HISTORY OF AMERICA BEFORE 1860**
F 3 cr. LEC 4
PREREQUISITE: HIST 311 or HIST 412.
Topics in the social, cultural, economic, and political history of Early America in the Atlantic world.

**HIST 505 U.S. HISTORY 1860 TO PRESENT**
F 4 cr. LEC 4
PREREQUISITE: Graduate standing.
Graduate research and analysis of important issues in recent American 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**
F 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**
F 3 cr. LEC 3
PREREQUISITE: HIST 402 or equivalent.
Directed readings and analysis of major problems in the history of the American West.

**HIST 540 HISTORICAL METHODS**
F 3 cr. LEC 3
Consideration of historical thinking, the uses of evidence and historical methodology.

**HIST 570 INDIVIDUAL PROBLEMS**
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.

**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 adviser and graduate committee.

**HIST 576 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 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.

HIST 588 PROFESSIONAL DEVELOPMENT
On Demand 1-5 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 coursework (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. 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.

HIST 590 MASTER'S THESIS
F,S,Su 1 - 10 cr. IND May be repeated.
PREREQUISITE: Master's standing.

HUM

Humanities

Department of History and Philosophy
(406) 994-4995

HUM 201H INTRODUCTION TO FEMINIST THEORIES AND METHODOLOGIES
F 3 cr. LEC 5
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 as a category of analysis.

HUM 204H 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 art, and technologies. Sexuality as paradigmatic image.

HUM 205H NATURE AND CULTURE
F alternate years, to be offered 2001 3 cr. LEC 2
RCT 1
The roots of the western world views of nature; the development of western scientific theories and technologies; gender, ethnicity, and class influences on descriptions of nature; and a survey of non-western views of nature and society.

HUM 280 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 301 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.

I&ME

Industrial and Management Engineering

Department of Mechanical and Industrial Engineering
(406) 994-2293

I&ME 145 INTRODUCTION TO INDUSTRIAL ENGINEERING
F 2 cr. LEC 2
Introduction to the field and profession of industrial engineering. Course exposes students to planning, designing, and managing the human-technical systems utilized in various industrial and service operations.

I&ME 146 INTRODUCTION TO INDUSTRIAL ENGINEERING LABORATORY
F 1 cr. LAB 1
COREQUISITE: I&ME 145.

I&ME 271 MICROCOMPUTERS IN INDUSTRY
F 5 cr. LEC 2 LAB 1
PREREQUISITE: CS 120 or equivalent.
COREQUISITE: ME 116 or equivalent.

I&ME 280 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.

I&ME 300 PROFESSIONAL PRACTICE AND RESPONSIBILITY
F 2 cr. SEM 2
PREREQUISITE: Junior standing in I&ME.
Transition to professional practice. Career planning, professional ethics, social responsibility, communications, job interviewing, and related professional topics.

I&ME 313 WORK DESIGN & ANALYSIS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: Junior standing, COM 110, ENGL 121, and for I&ME majors I&ME 145.

I&ME 325 ENGINEERING ECONOMY
F,S,Su 3 cr. LEC 3
PREREQUISITE: Junior standing, MATH 160 or greater, 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.

I&ME 351 LAW FOR ENGINEERING & ARCHITECTURE
On Demand 3 cr. LEC 3
PREREQUISITE: Junior standing.
Review of courts and procedure; torts, including product liability; criminal law, including Uniform Commercial Code and construction law; patents, copyrights, trademarks, and unfair competition; business organizations; real property; insurance; wills and trusts; generally, the review of legal principles as they may affect professional engineers and architects.

I&ME 354 CONCURRENT ENGINEERING
On Demand 3 cr. LEC 3
PREREQUISITE: Engineering or Technology Junior or Senior standing.
The business environment, process management, design process, manufacturability, life cycle designs, quality, compressing the design-to-market cycle, process integration, coordination and communication, world class design, manufacturing, and marketing.

I&ME 355 APPLIED ENGINEERING DATA ANALYSIS
E,F,Su 2 cr. LEC 2
PREREQUISITE: MATH 176 or MATH 182.
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.

I&ME 356 ENGINEERING PROBABILITY AND STATISTICS I
F 3 cr. LEC 3
PREREQUISITE: MATH 182, 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, probability and curve-fitting applications, and establishing hypotheses and statistical significance over engineering design specifications.

I&ME 357 ENGINEERING STATISTICS LAB
F 1 cr. LAB 1
PREREQUISITE: MATH 182, CS 120, junior standing, or instructor approval.
COREQUISITE: I&ME 356.
Laboratory experience emphasizing the design and analysis of engineering data. Includes applications software.

I&ME 358 PRINCIPLES OF OPERATIONS RESEARCH I
F 3 cr. LEC 3
PREREQUISITE: MATH 221 or MATH 294
Formulation of models and optimization techniques that facilitate engineering design decisions and evaluation of design effectiveness: resource allocation, transportation and multiple goals via network, linear, and integer programming with primal-dual emphasis.
Course Descriptions

I&ME 375 PRODUCTION INVENTORY COST ANALYSIS
S 3 cr. LEC 3
PREREQUISITE: One of the following: Math 170, MATH175, MATH 181.
Industrial cost systems, accounting processes, and cost estimation; cost analysis of manufacturing processes, economic decision making and uses of cost information in making product design and product line decisions.

I&ME 415 ERGONOMICS & SAFETY I
S 3 cr. LEC 3
PREREQUISITE: I&ME 315 or instructor consent.
Fundamentals of ergonomics and safety engineering. Topics include principles of anthropometry, biomechanics, work physiology, psychophysics, and engineered safety applied to common problems faced by engineers and industrial health professionals. Emphasis on design and analysis of occupational systems and consumer products which best fit job tasks or user requirements to human capabilities. Issues regarding regulatory environments (e.g., OSHA) are also covered.

I&ME 422 INTRODUCTION TO SIMULATION
F 3 cr. LEC 3
PREREQUISITE: CS 120 or equivalent, and I&ME 354.
Discrete and continuous simulation modeling methodology using a computer simulation language; random number generation, output analysis, validation, and verification; application to varied systems design and analysis problems. Cross-listed with CE 422.

I&ME 425 ENTREPRENEURSHIP AND ECONOMIC FEASIBILITY
F 3 cr. LEC 3
PREREQUISITE: I&ME 325 or consent of instructor.
In-depth analysis of managerial decision-making methods culminating in a comprehensive economic feasibility study. Emphasis on entrepreneurship, sensitivity analysis, cost-volume-profit analysis, taxation, and computer application. Applications are demonstrated in a design project.

I&ME 434 PROJECT AND ENGINEERING MANAGEMENT
F 3 cr. LEC 3
PREREQUISITE: I&ME 325 or consent of instructor.
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 are also explored.

I&ME 442C FACILITY AND MATERIAL HANDLING SYSTEMS DESIGN
F 3 cr. LEC 2 LAB 1
PREREQUISITE: I&ME seniors in their last full academic year.
COREQUISITE: I&ME 513 and I&ME 300.
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. Computer-aided analysis and design.

I&ME 444C SENIOR DESIGN PROJECT
S 2 cr. LEC 1 RCT 1
PREREQUISITE: I&ME 442 and I&ME 454.

I&ME 445C INDEPENDENT I&ME SENIOR DESIGN
S 1 cr. IND
COREQUISITE: Concurrent enrollment in I&ME 444C required.
Independent study associated with I&ME 444C.

I&ME 445 ENGINEERING PROBABILITY AND STATISTICS II
S 3 cr. LEC 3
PREREQUISITE: I&ME 354 and I&ME 355.
Identification, characterization, and analysis of variation in engineering data. Includes inferential statistics, goodness of fit, applications of non-parametric statistics, curve fitting, regression, and the design of engineering experiments. A team design project is required.

I&ME 458 PRODUCTION AND ENGINEERING MANAGEMENT
S 3 cr. LEC 3
PREREQUISITE: I&ME 364.
Introduction to organization and management theory.

I&ME 464 PRINCIPLES OF OPERATIONS RESEARCH II
S 3 cr. LEC 3
PREREQUISITE: I&ME 354 and I&ME 364.
Formulation of models and optimization techniques that facilitate engineering design decisions and evaluation of design effectiveness. Nonlinear programming algorithms including the Lagrange multiplier approach. Markov analysis of stochastic systems with transient/steady-state emphasis and sequential optimization via dynamic programming.

I&ME 470 INDIVIDUAL PROBLEMS
On Demand 1-5 cr. IND
PREREQUISITE: Junior standing, consent of instructor and approval of department head.
Directed research and study on an individual basis.

I&ME 471 COMPUTER INTEGRATED MANUFACTURING
S 3 cr. LEC 3 LAB 1
PREREQUISITE: I&ME 271, ME 255, or consent of instructor.
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 "off the shelf" software emphasizing creativity in the control of industrial machines.

I&ME 477 QUALITY ASSURANCE
S 3 cr. LEC 3
PREREQUISITE: I&ME 354 or I&ME 350 or consent of instructor.

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.

I&ME 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.

I&ME 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1-2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: I&ME 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

I&ME 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,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.

I&ME 501 ADVANCED DESIGN & CONTROL OF MANUFACTURING SYSTEMS
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: I&ME 445 OR I&ME 474, AND I&ME 564.
Analysis and design of modern manufacturing systems; material control, scheduling, facilities location and layout, material handling, production control; models, algorithms, and computerized design and analysis software.

I&ME 509 SYSTEMS SIMULATION
S alternate years, to be offered 2002 5 cr. LEC 3
PREREQUISITE: CS 120, I&ME 354; I&ME 422 and consent of instructor.
Systems exhibiting randomness are modeled and statistically analyzed using a state-of-the-art simulation language. Simulation of details is emphasized for the purpose of improving the composition and response behavior of real-world systems over extended time periods.

I&ME 513 ERGONOMICS & SAFETY II
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: I&ME 413 and I&ME 357 or I&ME 584 (or equivalent).
Advanced topics and methods in ergonomics and human factors engineering. Basic and applied research issues in ergonomics and safety are explored with emphasis on problem solving through designed experimentation with proper assessment methods and instrumentation technologies.

I&ME 525 ECONOMIC & MULTIATTRIBUTE ANALYSIS OF ADVANCED MANUFACTURING SYSTEMS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: I&ME 495.
Economic analysis and multiattribute methods to support the decision making process as applied to analysis of advanced manufacturing and non-manufacturing systems.
Course Descriptions

I&ME 534 DESIGN & DECISION SUPPORT SYSTEMS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: I&ME 364 or equivalent, CS 120 or equivalent.
Computer aided design and decision making; system hardware and software architectures; data management, models, search, and user interface requirements; engineering and management applications.

I&ME 540 LOGISTICS AND SUPPLY CHAIN MANAGEMENT
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: I&ME 445, I&ME 364, CS 120 or equivalent and 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.

I&ME 548 PLANNING AND SCHEDULING
On Demand 3 cr. LEC 3
PREREQUISITE: MATH 221 or I&ME 364, CS 120, and consent of instructor.
Introduction to planning and scheduling problems; formulation, objectives, and constraints; manual and computer scheduling methods; general purpose scheduling algorithms; industrial applications.

I&ME 554 APPLICATION & DESIGN OF INDUSTRIAL EXPERIMENTS
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: I&ME 354.
Statistical analysis applied to experiments in engineering and industry. Experimental designs and analyses for a wide variety of problems especially applicable to engineering design, ergonomic analysis, and quality improvement.

I&ME 558 MANAGERIAL FORECASTING & DECISION ANALYSIS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: I&ME 354, CS 120.
Introduction to time series analysis through classical approaches such as regression, decomposition, exponential smoothing, and the Box-Jenkins Technology. Applications emphasized in concepts, tools, and methods. Included are AI/chaos theory approaches designed for managers to test real applications for making decisions.

I&ME 567 OPTIMIZATION TECHNIQUES
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: I&ME 364.
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.

I&ME 570 INDIVIDUAL PROBLEMS
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.

I&ME 571 ADVANCED MANUFACTURING AUTOMATION
F alternate years, to be offered 2001 3 cr. LEC 2 LAB 1
PREREQUISITE: I&ME 471.
Applications and performance evaluation of automated manufacturing systems focusing on productivity improvement. Numerical control machines, flow line analysis, computer aided manufacturing applications, group technology, flexible manufacturing systems, industrial robotics.

I&ME 574 MANAGEMENT ENGINEERING SYSTEMS
F alternate years, to be offered 2000 3 cr. SEM 3
PREREQUISITE: I&ME 458 or equivalent, and instructor approval.
Students will explore various facets of designing effective organizational and management systems. Topics will include: open systems theory, socio-technical systems theory, technology and innovation management, Japanese management practices, and quality organizations. Students will complete an independent research project in addition to course readings and in-class discussion.

I&ME 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F,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.

I&ME 576 INTERNSHIP
On Demand 1 - 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.

I&ME 577 QUALITY ASSURANCE & VARIABILITY REDUCTION
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: I&ME 477 and consent of instructor.
Theory, applications, and case studies in quality assurance and reliability. Topics include variability reduction, Total Quality Management. Quality function deployment; Shainin, Shewhart, and Taguchi techniques; sequential experimentation; and other experimental designs are emphasized. A capstone course design project is required.

I&ME 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.

I&ME 589 GRADUATE CONSULTATION
F,Su 1 - 4 cr. IND Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.
Directed research and study on an individual basis.

ICS Intercultural Studies
Office of International Programs
(406) 994-4031

ICS 270 INDIVIDUAL PROBLEMS
On Demand 1 - 5 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 290 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.

ICS 404G 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 470 INDIVIDUAL PROBLEMS
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.

ICS 490 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 499 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,Su 1 - 6 cr. IND May be repeated. Max 4 cr.
COREQUISITE: ICS 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

ICS 499 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,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.

INTD Interior Design
School of Architecture
(406) 994-4255

INTD 457 INTERIOR DESIGN V
On Demand 5 cr. LEC 2 STU 3
PREREQUISITE: INTD 356.
Large multifunction design problems are given that require an increased understanding of programming and an efficient design process. Complete synthesis of design, function, and building systems integration is expected.
Course Descriptions

INTD 458 SENIOR PROJECT
On Demand 7 cr. STU 7
PREREQUISITE: INTD 457.
An interior design project chosen by the student and subject to approval by senior project advisor and coordinator. Advanced study, research, and data collection leading to the development of the graphic and three dimensional materials required to illustrate the design process and the project solution. Pasting grade of C or better is required.

INTD 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1-2 cr. RCT May be repeated. Max 4 cr.
Corequisite: INTD 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

INTD 490 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.

JS
Justice Studies
Department of Sociology and Anthropology
(406) 994-4201

JS 101S INTRODUCTION TO JUSTICE STUDIES
F,S,Su 3 cr. LEC 3
Introduction to justice theories and practices. Philosophical and sociological examination of crime and justice systems.

JS 206 SOCIAL CONTROL AND JUSTICE
F,S 3 cr. LEC 3
Prerequisite: JS 101.
Examination of social control practices. Various theoretical frameworks are utilized to understand and evaluate these practices.

JS 211 COMMUNITY CORRECTIONS
F alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: JS 101.
The theory and practice of community-based corrections. Focus is placed on probation and parole services for both adults and juvenile delinquents.

JS 250 JUVENILE DELINQUENCY AND JUSTICE
S alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: JS 101.

JS 250 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.

JS 251 PUNISHMENT AND JUSTICE
S 3 cr. LEC 3
Prerequisite: JS 101, Math core, Junior standing.
Examination of philosophical and sociological theories of punishment. Critical analysis of the distribution of punishment across different socioeconomic groups in the U.S. Historical and contemporary prison issues are explored.

JS 313 PRINCIPLES OF LAW AND PROCEDURES
F 3 cr. LEC 3
Prerequisite: JS 101, Math core.
This course introduces the student to fundamental American legal principles as developed in both the civil and criminal law. In addition, the student will gain a basic understanding of key issues in the application and development of contemporary legal procedures.

JS 319 LAW AND SOCIETY
S 3 cr. LEC 3.
Prerequisite: SOC 101, JS 101, Math core.
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.

JS 521 OCCUPATIONAL AND CORPORATE CRIME
S alternate years, to be offered 2001 3 cr. LEC 3
Prerequisite: JS 101 and Math core.
A sociological analysis of crimes committed by individuals within the work place and by corporations. Addressed are the extent of the problems, social costs, legal responses, and theoretical perspectives assessing the etiology of such crimes.

JS 540 COMPARATIVE JUSTICE
F 3 cr. LEC 3
Prerequisite: JS 101, Math core, Junior standing.
Analysis of justice theories and practices at individual, political, and cross-cultural levels, with an emphasis on political philosophy. Examination of the relationship between the state and the individual, and cross-cultural justice practices, both in the U.S. and other countries.

JS 400 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.

JS 401 VICTIMOLOGY
F alternate years, to be offered 2000 3 cr. LEC 3
Prerequisite: JS 101, SOC 101, Math core, and Junior standing.
The degree and type of participation of the victim in the development of crime and the way citizens can be victimized by the actual attempts of society to help them.

JS 411 CRIMINOLOGY
F alternate years, to be offered 2000 3 cr. LEC 3
Prerequisite: JS 101, SOC 101, Math core, and Junior standing.
The degree and type of participation of the victim in the development of crime and the way citizens can be victimized by the actual attempts of society to help them.

JS 415 TERRORISM
F alternate years, to be offered 2000 3 cr. LEC 3
Prerequisite: JS 101, Math core, Junior standing.
A review of the political, economic, and criminal justice implications of international and domestic acts of terrorism.

JS 420 QUALITATIVE METHODS AND ANALYSIS
F alternate years, to be offered 2000 3 cr. SEM 3
Prerequisite: JS 101, Math core, Junior standing.
Examination of the theory and practice of qualitative research. Political and ethical issues in qualitative research are explored, especially in relation to deviant/criminal populations. Students will complete a field research project.

JS 426 LAW AND INEQUALITY
F 3 cr. LEC 3
Prerequisite: JS 101, Math core, Junior standing.
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.

JS 441 FIELD WORK RESEARCH
F,S,Su 1-6 cr. IND
Prerequisite: Junior standing, SOC 318.
Corequisite: JS 476.
The preparation of a research project while engaged in field work practicum. Must be taken in conjunction with JS 476.

JS 470 INDIVIDUAL PROBLEMS
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.

JS 475 INTERNSHIP
F,S,Su 1-6 cr. IND
Prerequisite: Junior standing, SOC 318, consent of instructor, and approval of department head.
Corequisite: JS 441.
An individual assignment arranged with agency, business or other organization to provide guided experience in the field. Must be taken in conjunction with JS 441. See departmental qualification standards for internships.

JS 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.

JS 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1-2 cr. RCT May be repeated. Max 4 cr.
Prerequisite: SOC 318.
Corequisite: JS 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

JS 490 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.

JS 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.
LIBR 280 SPECIAL TOPICS
F,S,Su 2 cr. RCT 2
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.

LIBR 221 INFORMATION LITERACY
FS 2 cr. LEC 2
Information literacy involves the capacity to recognize when information is needed and the ability to locate, evaluate, and use it effectively. Students in this course will learn to find information of increasing degrees of complexity in print and electronic formats.

LIBR 280 SPECIAL TOPICS
On Demand 1 - 3 cr. Max 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.

LIBR 299 UNDERGRADUATE RESEARCH
COURSE/CREATIVE ACTIVITY INSTRUCTION
F,Su 1 - 2 cr. RCT may be repeated. Max 4 cr.
Students must be proficient with basic computer and file management skills.

LIBR 300 LAND RESOURCES SCIENCES
FIELD TRIP
F 1 cr. LEC 1 LAB 2
Preparation and participation in multi-disciplinary field trip covering many aspects of plant and soil science.

LRES 355 ENVIRONMENTAL CHEMISTRY
S alternate years, to be offered 2001 3 cr. LEC 1 LAB 1
Survey course covering biogeochemical processes important in soil, water, and atmospheric systems. Applications will focus on cycling of elements important in managed, natural, and contaminated systems. Problem solving, team projects, and discussion of current literature will be emphasized in laboratory/recitation.

LRES 357 GPS FUNDAMENTALS AND APPLICATIONS IN MAPPING
F 3 cr. LEC 1 LAB 1
Preparation: LRES 110 or equivalent.
The purpose of the Space Mission Design Seminar is to acquaint students, faculty, and staff with the space mission proposed by the Upper Midwest Aerospace Consortium, The Crop Explorer Research and Education Satellite (CERES) Mission: Primary Plant Assessment for Design Support.

LRES 415 MICROBIAL DIVERSITY,
ECOLOGY & EVOLUTION
S alternate years to be offered 2002 4 cr. LEC 3 LAB 1
Preparation: BCHM 540, MB 301 or consent of instructor.
The diversity of prokaryotic and eukaryotic 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. Cross listed with MB 415.

LRES 420 BIO AND MICROCLIMATOLOGY
S 5 cr. LEC 3
Preparation: LRES 201N or ESCI 112 and completion of Math and Natural Science Core.
Climate near the ground, energy and mass balances, sub-surface climates, microclimate modifications, and the effects of landscape, soil, and ground cover. Impacts and utilization of the climatic resources, agro-climate relations, plant phenology, agro-weather forecasts, and bioclimatic instrumentation.

LRES 421 HOLISTIC THOUGHT
AND MANAGEMENT
S 3 cr. LEC 3
Preparation: Junior standing.
Application of holism and systems thinking to land resource and human management issues. Use of Holistic Resource Management (HRM) problem solving model, including real-life management cases, in areas of environmental sciences and land resources.

LRES 425 ADVANCED REMOTE SENSING
S 3 cr. LEC 2 LAB 1
Preparation: LRES 325N or consent of instructor.
Advanced principles and applications in remote sensing, emphasizing digital image processing techniques. Spectral and spatial image enhancement, advance transformations, image classification, and change detection. Course emphasizes hands-on lab and project work.
AND SUSTAINABLE AGRICULTURE

LRFS 428C CROPPING SYSTEMS AND SUSTAINABLE AGRICULTURE
F alternate years, to be offered 2000 5 cr. LEC 3
PREREQUISITE: LRES 201N and either PS 541 or PS 542.

Senior capstone course. Conventional cropping systems in the Northern Plains are analyzed, integrating land management and crop production knowledge. Sustainable agriculture issues are raised and alternative management strategies are explored, emphasizing no-till and organic systems. Students will gain a solid understanding of crop diversity, including effects on nutrient and water cycling, crop pest management, and economic diversification. The role of cropping systems is discussed in relation to key societal issues, such as biotechnology, climate change and energy use efficiency. A term project enables students to conduct an in-depth analysis on a relevant agricultural sustainability issue of their choice.

LRFS 440C FIELD APPLICATIONS IN LAND RESOURCES AND ENVIRONMENTAL SCIENCES
Su 4 cr. LEC 1 LAB 5
PREREQUISITE: LRES major; Junior standing or consent of instructor.

Senior capstone course. Provides disciplinary and interdisciplinary knowledge, experiences, and skills related to Land Resource and Environmental Sciences. Field measurement and analysis techniques related to soils, plants, water, and microbiology. Integration and synthesis of fundamental processes and attributes that define ecosystems. Consideration of scientific, societal, and policy contexts.

LRFS 443 WEED ECOLOGY & MANAGEMENT
F 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOL 308, LRES 201N, MATH 170, PS 102, STAT 216

The principles of weed ecology including plant population demographics, biotic and abiotic regulating mechanisms, and plant community temporal and spatial dynamics in agroecosystems. 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.

LRFS 447 INVASIVE PLANT ECOLOGY AND MANAGEMENT
S 5 cr. LEC 5
PREREQUISITE: CHEM 192 and LRES 201N or consent of instructor.

To provide an in-depth understanding of ecologically-based and integrated rangeland weed management. The course addresses a major land resource issue in Montana and throughout the western U.S. Focus is on synthesizing science-based information into rangeland weed management plans.

LRFS 451 SOILS FIELD COURSE
F 2 cr. LAB 2
PREREQUISITE: LRES 201N.
COREQUISITE: LRES 454.

Field examination, description, and classification of landscapes and their soils; determination of soil use potential; field application of pedology, geology, and ecology to landscape management.

LRFS 452 SOIL AND ENVIRONMENTAL MICROBIOLOGY
S alternate years, to be offered 2001 5 cr. LEC 5
PREREQUISITE: CHEM 192, LRES 201N, and MB 301.

Microorganisms in soil environments, biochemical processes important to natural and disturbed ecosystems, nutrient cycling, transformation of inorganic and organic contaminants, and plant-microbe interactions.

LRFS 453 SOIL AND ENVIRONMENTAL PHYSICS
F alternate years, to be offered 2000 3 cr. LEC 2 LAB 1
PREREQUISITE: MATH 170 or equivalent, computer literacy, LRES 201N recommended.

Soil physical properties and processes governing distribution and transport of water, heat, and soluble chemicals. Topics include water content and potential, infiltration, surface energy balance, evaporation, temperature and heat flow, saturated and unsaturated water and chemical flow. Laboratory stresses measurements and analyses.

LRFS 454 SOIL CLASSIFICATION & PEDOLOGY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: LRES 201N.

Evaluating soils as they occur in natural and managed landscapes; soil-forming processes; profiles; morphology; geologic materials; microclimate; taxonomy; variability; sampling; estimated chemical properties; soil water, use, and potentials; soils of Montana, U.S., and world; and soil information systems.

LRFS 456 POLLUTION SCIENCE
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: LRES 555; suggested LRES 452, LRES 453, or equivalent.

Course will provide a brief review of fundamental biological, physical, and chemical processes that control chemical fate in soil and water systems, followed by applications important for specific point and nonpoint source pollutants. Examples include soil acidification, bioremediation of organic contaminants, land application of animal and sewage wastes, and trace element problems in agricultural and mining systems. Course format will include lectures in addition to individual and team problem solving.

LRFS 458 TEACHING APPLICATIONS IN LAND RESOURCES & ENVIRONMENTAL SCIENCES
F 1 cr. RCT 1
PREREQUISITE: LRES 201N and one of the following: LRES 355, LRES 452, LRES 453, or LRES 454.
Study and application of teaching philosophies and methods based on current literature through individual presentations and discussion groups. Leadership in course development project and documentation of teaching experience are required.

LRFS 459C SOIL SCIENCE CAPSTONE
S 5 cr. LEC 2 RCT 1
PREREQUISITE: LRES 454; and two of the following: LRES 355, LRES 452, LRES 453, LRES 455.

Senior capstone course. Integration of professional knowledge, applications, and ethics into problem-solving cases for real clients involved with agriculture and land resource management. Regular oral and written communication and research with clientele, resource experts, and team members culminate in a final presentation and product provided to clientele.

LRFS 460 SOIL REMEDIATION AND OVERBURDEN SCIENCE
S 5 cr. LEC 2
PREREQUISITE: LRES 201N or permission of instructor.

Introduction to processes such as mining and industrial contamination that drastically distort soil resources. Soil reconstruction and remediation methodologies that enable plant establishment and protect surface and ground-water resources.

LRFS 461 RESTORATION ECOLOGY
F 5 cr. LEC 2, LAB 1
PREREQUISITE: BIOL 101, and either ARNR 240 or BIOL 303.

This course will include a review of the effects of major disturbances on natural systems, and the effects of restoration amendments on system structure and function. The course will be taught from a plant ecology perspective and will include local and national case studies.

LRFS 470 INDIVIDUAL PROBLEMS
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.

LRFS 476 INTERNSHIP
On demand 2 - 3 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 the field.

LRFS 480 SPECIAL TOPICS
On Demand 1 - 4 cr. IND 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.

LRFS 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
ES,Su 1 - 2 cr. RCT May be repeated. Maximum 4 cr.
COREQUISITE: LRES 490.

Classroom instruction associated with directed undergraduate research/creative activity projects.

LRFS 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
ES 1 - 4 cr. IND
COREQUISITE: Junior or Senior standing and approval of instructor.

Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. USP scholarships or project support grants are available in many cases.

LRFS 500 SEMINAR
ES 1 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.

LRFS 515 MICROBIAL ECOLOGY
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: LRES 415.

The distribution and activity of microorganisms in natural microbial communities based on microbial physiology and physical, chemical and biological features of the microenvironment. A critical discussion of literature and approaches.

LRFS 517 ENVIRONMENTAL ISSUES IN AGRICULTURE
S alternate years, to be offered 2002 1 cr. LEC 1
PREREQUISITE: Graduate Standing.

Interactive class dealing with the scientific basis of environmental concerns. Issues pertinent to Montana, national and international agriculture are
researched and discussed in relation to regulatory
and/or policy decisions.

LRES 530 NATURAL RESOURCE LAW
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: none
The course will examine major natural resources
laws, emphasizing the federal model. A modified
case study approach will be used to review legisla-
tion and related court cases governing natural
resources, including water, minerals, timber, range,
wildlife, recreation, and wilderness.

LRES 542 ADVANCED NATURAL RESOURCE
ECOLOGY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: ARNR 240 or BIOL 303.
Readings and discussion on selected topics involv-
ing application of ecological concepts to natural
resource management. Course format based on case
studies and scientific literature.

LRES 543 AGROECOLOGY
S alternate years, to be offered 2002 3 cr. LEC 2
LAB 1
PREREQUISITE: BIOL 303, MATH 181, PS 318,
STAT 216.
Discussion of plant populations and community
ecology aspects in agroecosystems. Measuring plant
interference and assessing population interactions
associated with weeds and intercrops 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 agriculture.

LRES 550 WETLAND & RIPARIAN ECO SYSTEMS
F alternate years, to be offered 2001 3 cr. LEC 2
LAB 1
PREREQUISITE: LRES 352 or consent of instructor.
Description of plant populations and community
ecosystems. Relation to climate and location in the
landscape. Assessment, conservation, and restora-
tion of desired ecosystem functions. Emphasis on
western North America.

LRES 551 SOIL SCIENCE
S alternate years, to be offered 2002 3 cr. LEC 2
RCT 1
PREREQUISITE: BIOL 430 and LRES 351.
Chemical, physical and biological influences on
phytoavailability of soil nutrients and their plant
nutrition relations.

LRES 552 ADVANCED SOIL AND
ENVIRONMENTAL MICROBIOLOGY
S alternate years, to be offered 2002 3 cr. LEC 2
LAB 3
PREREQUISITE: LRES 452 or instructor’s
permission.
Advanced laboratory course. Various bacteria are
isolated to pure culture. Emphasis on familiarizing
the advanced student with soil organisms not often
encountered in general microbiology laboratories.
Characterization is based on morphological, physio-
logical, and genetic traits.

LRES 553 SOIL & PLANT WATER
RELATIONSHIP
F alternate years, to be offered 2001 3 cr. LEC 2
LAB 1
PREREQUISITE: LRES 453 and BIOL/PS 430 re-
commended.
Status and transport of water in the soil-plant-
air纪念碑 continuum, including cellular and
whole plant water relations, root and plant
interactions with the environment, plant canopy
biophysics, measurements and instrumentation,
advanced current topics of particular interest.

LRES 554 SOIL-LANDSCAPE DYNAMICS
S alternate years, to be offered 2000 3 cr. LEC 2
LAB 1
PREREQUISITE: LRES 454.
Soil formation, pedogenic processes, weathering,
geologic materials, climate, vegetation, relief, time,
morphology, global variations, classification, uses,
natural soil landscapes, managed soil landscapes,
spatial variability, interactions, models, predictions,
estimations, inputs, transformations, translocations
and outputs.

LRES 555 SOIL AND WATER CHEMISTRY
S alternate years, to be offered 2001 3 cr. LEC 2
LAB 1
PREREQUISITE: CHEM 215, CHEM 228, LRES
201N or equivalent.
A thorough coverage of chemical processes
including complexation, precipitation dissolution,
sorption-desorption, partitioning, oxidation-reduc-
tion, and volatilization which are necessary for
understanding the fate and behavior of inorganic
and organic constituents in soils and natural waters.
Examples include the behavior of trace metals,
nutrient cycling, fate of organic contaminants and
characteristics of and wetland soils. Laboratory/recitation component includes experi-
ments to supplement important concepts in envi-
ronmental chemistry.

LRES 560 LAND REHABILITATION
REGULATION & PLANNING
S alternate years, to be offered 2002 3 cr. LEC 3
LAB 1
PREREQUISITE: LRES 460, LRES 461.
State and federal legislation and regulations con-
cerning land rehabilitation procedures, issues and
public attitudes. Land rehabilitation strategies,
preparation and execution, post-rehabilitation
management, regional planning and relationships
of rehabilitation to engineering aspects of drastically
disturbed landscapes.

LRES 562 LAND REHABILITATION FIELD
PROBLEMS
S alternate years, to be offered 2001 2 cr. LAB 2
PREREQUISITE: LRES 460, LRES 461.
Extended field trip to areas where land rehabilita-
tion is presently practiced. On-site meetings with
rehabilitation professionals in regulatory agencies
and industry to discuss current, real problems and
progress.

LRES 570 INDIVIDUAL PROBLEMS
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

LRES 575 PROFESSIONAL RESEARCH PAPER
On Demand 1-4 IND Maximum 6 cr.
PREREQUISITE: Graduate standing
An advanced research project with the following
topic areas: (1) development of a research project;
(2) literature review; (3) methodological develop-
ment; (4) data collection and analysis; and (5)
interpretation of results.

LRES 576 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 the field.

LRES 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.

LRES 589 GRADUATE CONSULTATION
F,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 coursework (and thesis,
if on a thesis plan), but who need additional faculty
or staff time or help.

LRES 590 MASTER’S THESIS
F,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master’s standing.

LRES 600 DOCTORAL THESIS
F,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

MAS
Military Aerospace Studies –
Air Force ROTC
Department of
Military Aerospace Studies
(406) 994-4022

MAS 110 FOUNDATIONS OF THE AIR FORCE I
F 1 cr. LEC 1
COREQUISITE: MAS 115.
A study of the organization and mission of the
U.S. Air Force with emphasis in oral/written
communication, and leadership.

MAS 111 FOUNDATIONS OF THE AIR FORCE II
S 1 cr. LEC 1
COREQUISITE: MAS 116.
Continuing study of the organization and mission
of the U.S. Air Force with emphasis in oral/written
communication, and leadership.

MAS 115 LEADERSHIP LABORATORY 115
F 0 cr. LAB 0
PREREQUISITE: Consent of instructor and
approval of department head.
COREQUISITE: MAS 110.
Laboratory exercises introduce: uniform wear,
dress and ceremonies, physical fitness training, and
military customs and courtesies.

MAS 116 LEADERSHIP LABORATORY 116
S 0 cr. LAB 0
PREREQUISITE: Consent of instructor and
approval of Department Head.
COREQUISITE: MAS 111.
Laboratory exercises introduce: uniform wear,
dress and ceremonies, physical fitness training, and
military customs and courtesies.

MAS 209 FIELD TRAINING, 5 WEEK
Su 3 cr. LAB 3
PREREQUISITE: Approval of Department Head.
Substitute for the General Military Course.
Selection during Fall or Spring semesters by head of
department. Conducted on an Air Force base.
Study of U.S. Air Force mission and organization, career opportunities, customs and courtesies, drill and ceremonies, survival, physical fitness training and small arms training.

**MAS 210 THE DEVELOPMENT OF AIR POWER I**  
F 1 cr. LEC 1  
**COREQUISITE:** MAS 215.  
Focuses on factors contributing to the development of air power from its earliest beginnings through the Korean war; the evolution of air power capabilities, functions, and doctrine, with emphasis in communication skills.

**MAS 211 THE DEVELOPMENT OF AIR POWER II**  
S 1 cr. LEC 1  
**COREQUISITE:** MAS 216.  
Continuing study of development of air power from the Vietnam conflict through present day, with emphasis in communication skills.

**MAS 212 FLIGHT GROUND SCHOOL**  
S 2 cr. LEC 2  
**PREREQUISITE:** This MAS course is available only through Extended Studies under separate registration.  
Basic required for learning to fly single-engine land type aircraft. Covers material tested on the FAA Private Pilot written exam, to include performance, the science of flight, meteorology, FAA regulations, navigation, and the physiology of flight.

**MAS 213 FLIGHT TRAINING**  
F 0 cr. LAB 0  
**PREREQUISITE:** MAS 212 and approval from instructor may be taken concurrently.  
Practical application of material taught in MAS 212. Flight training from an FAA approved flight school to include all that is required to achieve solo flight (14 hours flying). Students must pay for their own instruction.

**MAS 214 LEADERSHIP LABORATORY 214**  
F 0 cr. LAB 0  
**PREREQUISITE:** Consent of instructor and approval of department head.  
Laboratory exercises include group leadership problems, drill and ceremony, customs and courtesies, physical fitness training, and field training preparation activities.

**MAS 215 LEADERSHIP LABORATORY 215**  
F 0 cr. LAB 0  
**PREREQUISITE:** Consent of instructor and approval of department head.  
**COREQUISITE:** MAS 210.  
Laboratory exercises include group leadership problems, drill and ceremony, customs and courtesies, physical fitness training, and field training preparation activities.

**MAS 216 LEADERSHIP LABORATORY 216**  
F 0 cr. LAB 0  
**PREREQUISITE:** Consent of instructor and approval of department head.  
**COREQUISITE:** MAS 211.  
Laboratory exercises include group leadership problems, drill and ceremony, customs and courtesies, physical fitness training, and field training preparation activities.

**MAS 270 INDIVIDUAL PROBLEMS**  
On Demand 1-3 cr. IND  
**PREREQUISITE:** Consent of instructor and approval of the director.  
Directed research and study on an individual basis.

**MAS 280 SPECIAL TOPICS**  
On Demand 1-4 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 289 FIELD TRAINING, 4 WEEK**  
Su 2 cr. LAB 2  
**PREREQUISITE:** MAS 110, MAS 111, MAS 210, MAS 211 and junior standing.  
Required for all AFROTC cadets except those who have completed MAS 209. Orientation on an Air Force base, flying orientation, survival and small arms training, physical training, drill and ceremonies.

**MAS 310 AIR FORCE LEADERSHIP AND MANAGEMENT I**  
F 8 cr. LEC 5  
**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 316.  
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 0 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 5 cr. LEC 8  
**PREREQUISITE:** Approval of department head (for students not pursing a commission in the U.S. Air Force)  
**COREQUISITE:** MAS 415.  
Examination of need for national security, analyzes the evolution and formulation of the American defense policy, strategy, and joint doctrine; methods for managing conflict; overviews of regional security, arms control, and terrorism. Also focus on the military as a profession, officercy, 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 pursing 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 component includes advanced group leadership problems and commanding and supervising all cadet corps activities.

**MAS 466 LEADERSHIP LABORATORY 466**  
S 0 cr. LAB 0  
**PREREQUISITE:** Consent of instructor and approval of department head.  
**COREQUISITE:** MAS 411.  
Laboratory component includes advanced group leadership problems and commanding and supervising all cadet corps activities.

**MAS 470 INDIVIDUAL PROBLEMS**  
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.

**MATH**  
**Mathematics**  
Department of Mathematical Sciences  
(406) 994-3601

**MATH 085 PREALGEBRA**  
F,S,Su 1 cr. IND 1  
Topics include number systems, integers, fractions, decimals, percents, variable expressions, linear equations, and selected geometry topics. May be taken in combination with MATH 105, to be completed sequentially.

**MATH 103 INTRODUCTORY ALGEBRA**  
F,S,Su 3 cr. IND 3  
**PREREQUISITE:** MATH 085 or Math Placement Test within the past 12 months.  
Topics include linear equations and inequalities and their graphs, systems of linear equations and inequalities, exponents, polynomials, factoring, rational expressions, and square roots.

**MATH 105 ALGEBRA FOR COLLEGE STUDENTS**  
F,S,Su 3 cr. LEC 5  
**PREREQUISITE:** MATH 103 or Math Placement Test within the past 12 months.  
Topics include the concept of functions and exploration of various types of functions such as linear, rational and quadratic, selected conic sections, exponential and logarithmic functions, and other algebra topics.

**MATH 150 MATH FOR ELEMENTARY TEACHERS I**  
F,S,Su 4 cr. LEC 4  
**PREREQUISITE:** MATH 105 or Math Placement Test within the past 12 months.  
An introduction to problem solving, sets, functions, logic, numerations systems as a mathematical structure, introductory number theory, rational, and irrational numbers and probability for prospective elementary school teachers.

**MATH 151M MATH FOR ELEMENTARY TEACHERS II**  
F,S,Su 4 cr. LEC 4  
**PREREQUISITE:** MATH 150.  
Introductory geometry, constructions, congruence
and similarity, concepts of measurement, coordinate geometry, problem solving revisited, and computer applications for prospective elementary school teachers.

**MATH 150M LIBERAL ARTS MATHEMATICS**

F,Su 3 cr. LEC 3  
PREREQUISITE: MATH 103 or Math Placement Test within the past 12 months.  
Basic skills in applicable mathematics including linear and exponential models, financial mathematics, trigonometry and some elementary statistics.

**MATH 151M LANGUAGE OF MATH**  
FS 3 cr. LEC 3  
PREREQUISITE: MATH 103 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.

**MATH 160M PRECALCULUS**

F,S,Su 4 cr. LEC 4  
PREREQUISITE: MATH 181.  
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 integration, vector fields, line integrals, surface integrals, Green's Theorem, Stokes' Theorem, the Divergence Theorem.

**MATH 224M CALCULUS I**

F,S,Su 4 cr. LEC 4  
PREREQUISITE: MATH 182.  
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.

**MATH 225 FOUNDATIONS OF HIGHER MATHEMATICS**

F,S 3 cr. LEC 2 LAB 1  
PREREQUISITE: MATH 182.  
Reasoning and communication in mathematics, including logic, generalization, definition, proof, and the language of mathematics. Techniques that underlie mathematical justification and proof. Analysis of mathematical proof as it relates to the high school and middle school mathematics content.

**MATH 330 HISTORY OF MATHEMATICS**

S alternate years, to be offered 2003 3 cr. LEC 3  
PREREQUISITE: MATH 182.  
An introduction to the history of mathematics through investigation of mathematics of the ancient Greeks and additional selections from a list of topics that do not require advanced mathematical prerequisites: complex numbers and the solution of polynomial equations, analytic and projective geometry, analysis, number theory, noneuclidean and differential geometry, symmetry groups, Penrose tilings, the topology of surfaces, infinite cardinal numbers.

**MATH 348 ADVANCED CALCULUS II**

F 3 cr. LEC 3  
PREREQUISITE: MATH 347.  
Topics offered at the upper division level which are not covered in regular courses. Students participate in preparing and presenting material.

**MATH 416C MODERN ALGEBRA**

S 5 cr. LEC 3

**PREREQUISITE:** MATH 333.

Senior capstone course. The integers, integers modulo n, 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.

**MATH 420 GEOMETRY FOR THE MIDDLE GRADES**

S 3 cr. LEC 3

**PREREQUISITE:** MATH 362 or EDSD 381 or EDSD 387, or MATH 151 and MATH 151 and registered in the Elementary Education Math option.

This course will survey aspects of Euclidean geometry appropriate to middle school, explore the use of manipulative materials and computer technologies, and discussed pedagogical issues and national standards.

**MATH 424 ALGEBRAIC INVESTIGATIONS FOR THE MIDDLE GRADES**

Edu alternate years, to be offered 2000 5 cr. LEC 3

**PREREQUISITE:** MATH 356 and EDSD 361 or EDSD 371, or MATH 151 and MATH 151 and registered in the Elementary Education Math option.

Developing algebraic knowledge necessary to teach the new middle school mathematics curriculum will be the focus of this course. Investigating the underlying conceptual structure of algebraic topics including variables and patterns; functions; exponential and quadratic relationships, and algebraic reasoning.

**MATH 427 INTEGRATING MATHEMATICS AND SCIENCE THROUGH MODELING**

Su 3 cr. RCT 1 LAB 2 Distance format.

**PREREQUISITE:** At least junior standing in math or science education certification program or teacher certification and consent of instructor.

Generally taught via the Internet. This course focuses on the mathematical methods broadly labeled mathematical modeling - underlying scientific inquiry and discovery. Through hands-on exploration and reflection, students will examine topics such as historical connections between mathematics and science, empirical modeling, model validation, proportionality, and simulation.

**MATH 429C MATHEMATICAL MODELING FOR TEACHERS**

F 3 cr. LEC 3

**PREREQUISITE:** Junior or senior standing in mathematics education, or consent of instructor.

Senior capstone course. The use of pre-college mathematics to explore a variety of application areas. Overview of the modeling process, review of relevant technology, strategies to initiate modeling in the secondary classroom, modeling in the secondary curricula, and the classroom assessment of modeling activities.

**MATH 441 NUMERICAL LINEAR ALGEBRA & OPTIMIZATION**

F 3 cr. LEC 3

**PREREQUISITE:** MATH 221 and MATH 224.


**MATH 445C NUMERICAL SOLUTION OF DIFFERENTIAL EQUATIONS**

S 3 cr. LEC 3

**PREREQUISITE:** MATH 221 and MATH 225.


**MATH 449 APPLIED COMPLEX ANALYSIS**

S alternate years, to be offered 2001 3 cr. LEC 3

**PREREQUISITE:** MATH 221.

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.

**MATH 450 APPLIED MATHEMATICS I**

F alternate years, to be offered 2001 3 cr. LEC 3

**PREREQUISITE:** MATH 221 and MATH 225.

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.

**MATH 451 APPLIED MATHEMATICS II**

S alternate years, to be offered 2002 5 cr. LEC 3

**PREREQUISITE:** MATH 221, MATH 224, and MATH 225.

This is the second semester of a course that introduces modern methods in applied mathematics. Topics include 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.

**MATH 454 INTRODUCTION TO DYNAMICAL SYSTEMS I**

F alternate years, to be offered 2000 3 cr. LEC 3

**PREREQUISITE:** MATH 221, MATH 224, and MATH 225.


**MATH 455 INTRODUCTION TO DYNAMICAL SYSTEMS II**

S alternate years, to be offered 2001 3 cr. LEC 3

**PREREQUISITE:** MATH 221, MATH 224, and MATH 225.

Gradient systems, Poincare-Bendixon theory, Poincare' maps, structural stability and chaotic systems.

**MATH 470 INDIVIDUAL PROBLEMS**

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.

**MATH 476 INTERNSHIP**

On Demand 3 - 12 cr. IND

**PREREQUISITE:** MATH 225, 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.

**MATH 480 SPECIAL TOPICS**

On Demand 1 - 6 cr. IND

**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.

**MATH 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**

F, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.

**PREREQUISITE:** MATH 490.

Classroom instruction associated with directed undergraduate research/creative activity projects.

**MATH 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY**

F, 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.

**MATH 500 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.

**MATH 503 ADVANCED LINEAR ALGEBRA**

S 3 cr. LEC 3

**PREREQUISITE:** MATH 555 and consent of instructor.

Topics include abstract vector spaces, diagonalization, Schur's Lemma, Jordan canonical form and spectral theory for finite dimensional operators.

**MATH 504 ABSTRACT ALGEBRA**

S 3 cr. LEC 3

**PREREQUISITE:** MATH 416C or consent of instructor.

The theory of groups, rings and fields with particular emphasis on finite groups, polynomial rings and fields of characteristic zero.

**MATH 505 PRINCIPLES OF MATHEMATICAL ANALYSIS**

F 3 cr. LEC 3

**PREREQUISITE:** MATH 362 or consent of instructor.

Principles of analysis in Euclidean spaces and metric spaces.

**MATH 506 INTRODUCTION TO CALCULUS ON MANIFOLDS**

S alternate years, to be offered 2001 3 cr. LEC 3

**PREREQUISITE:** MATH 553 and MATH 362 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 deRham cohomology.

**MATH 511 GENERAL TOPOLOGY**

F 3 cr. LEC 3

**PREREQUISITE:** MATH 362 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.

**MATH 512 GEOMETRIC & ALGEBRAIC TOPOLOGY**

S alternate years, to be offered 2001 5 cr. LEC 3

**PREREQUISITE:** MATH 511 and consent of instructor.

Topics in continuous theory, topics in dimension theory, covering spaces and the fundamental group, simplicial complexes, topics in homology and cohomology theory.
MATH 516 THE LANGUAGE OF MATHEMATICS: AN ADVANCED PERSPECTIVE
Su alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.

The features of the language of mathematics, particularly as they apply to high school and middle school curricula. Includes grammar, syntax, vocabulary, synonyms, negation, sentence structure, paragraph structure, logic, and proof. Comparison of oral and written modes of communication.

MATH 517 ADVANCED MATHEMATICAL MODELING FOR TEACHERS
Su alternate years, to be offered 2001 3 cr. LEC 3
Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.

Generally taught via the Internet. Hands-on 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.

MATH 518 STATISTICS FOR TEACHERS
Su alternate years, to be offered 2001 2 cr. LEC 2
Distance format.
PREREQUISITE: Graduate standing in mathematics education, teaching endorsement in mathematics, or consent of instructor.

Generally taught via the Internet. Focus on stochastic concepts that arise in mathematics, education, including probabilistic underpinnings of statistics, measures of central tendency, variability, correlation, distributions, sampling, and simulation. Through a corequisite course offered currently on a MATH 500 basis, emphasis on inferential statistics and issues that relate to the teaching of statistics at the pre-college level, including methods and materials.

MATH 519 APPLICATIONS OF STATISTICS IN MATHEMATICS CLASSROOMS
Su alternate years, to be offered 2001 2 cr. LEC 2
Distance format.
PREREQUISITE: MATH 518 or consent of instructor.

Exploratory data analysis including experiments, surveys, measures of association and inferential statistics. Issues relating to the methods, materials, and teaching of statistics at the pre-college level will be discussed as well.

MATH 524 LINEAR ALGEBRA FOR TEACHERS
Su alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: MATH 224 or MATH 328, EDSD 361.

Algebraic systems, special matrices, determinants, vector spaces, linear programming with applications, graph theory, transportation, economics and engineering using computer software such as MATLAB.

MATH 525 DISCRETE MATHEMATICS FOR TEACHERS
Su alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MATH 224, EDSD 361.

A study of calculus reform and concepts from graphical, numerical and algebraic perspectives. Extensive use of activities and projects. Modeling and technology are incorporated throughout the course.

MATH 526 DISCRETE MATHEMATICS FOR TEACHERS
Su alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: MATH 256 or MATH 516, EDSD 361 or EDSD 371 or equivalent, and K-14 teaching experience.

Investigations of paradigm problems from the history of math.

MATH 527 GEOMETRY FOR TEACHERS
S alternate years, to be offered 2000 2 cr. LEC 3
Distance format.
PREREQUISITE: MATH 529, EDSD 861.

Geometry of transformations including Euclidean motions and similarity, projective geometry, geometric topology and geometry of inversion.

MATH 531 APPLICATIONS OF TECHNOLOGY IN THE CLASSROOM
F alternate years, to be offered 2000 1 cr. LEC 1
Distance format.
PREREQUISITE: Graduate standing or consent of instructor.

This course is required for students taking MATH 535.

This course provides teachers in the masters program the opportunity to learn the technology required for other courses in the masters program as well as the technology in their respective schools. Students do projects related to the application of technology in classrooms.

MATH 533 ADVANCED TEACHING STRATEGIES, MATH TOPICS & ISSUES IN MATHEMATICS EDUCATION
F alternate years, to be offered 2001 5 cr. LEC 3
PREREQUISITE: EDSD 361 or consent of instructor.

Advanced teaching strategies in the field of secondary and college level mathematics including instructional models, media, appropriate learning material, the changing curriculum of mathematics and the development of teaching units.

MATH 534 RESEARCH IN MATHEMATICS EDUCATION
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: EDCI 506.

Quantitative and qualitative research methodology in mathematics education. Review of the literature. Writing for publication and proposals.

MATH 535 TECHNOLOGY & THE TEACHING OF MATHEMATICS
F alternate years, to be offered 2000 2 cr. LEC 2
Distance format.
PREREQUISITE: Graduate standing or consent of instructor.

COREQUISITE: MATH 531. Applications of technology in mathematics classrooms.

Calculator, computer, CD-ROM and telecommunications (internet) technologies for K-14 mathematics education, software, curricular materials and online high performance computers, analysis of impact of technology on K-12 math curriculum. Emphasis on classroom implementation via-avis corequisite course.

MATH 544 PARTIAL DIFFERENTIAL EQUATIONS I
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MATH 362, MATH 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.

MATH 545 PARTIAL DIFFERENTIAL EQUATIONS II
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: MATH 544 and MATH 547.

Linear partial differential equations and the functions 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.

MATH 547 REAL ANALYSIS I
F 3 cr. LEC 5
PREREQUISITE: MATH 362 or MATH 505.


MATH 551 COMPLEX ANALYSIS
S 3 cr. LEC 3
PREREQUISITE: MATH 505.

Analytic functions and normal 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.

MATH 560 METHODS OF APPLIED MATHEMATICS I
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: MATH 451.


MATH 561 METHODS OF APPLIED MATHEMATICS II
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MATH 560.

Calculus of variations, Hamilton's principle, asymptotic and perturbation methods, transform techniques and scattering theory. Partial differential equations and Green's functions, separation of variables and transform methods.

MATH 570 INDIVIDUAL PROBLEMS
On Demand 1-5 cr. RCT/DIS/LAB
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.

Directed research and study on an individual basis.

MATH 571 INSERVICE MATHEMATICS EDUCATION
On Demand 1-5 cr. RCT/DIS/LAB
PREREQUISITE: Graduate standing and employment by sponsoring school organization.

An approved supervised group study of a mathematics education problem within a school supervised by an MSU faculty member which culminates in a high quality, special report, syllabus, blueprints, educational program, course of study or guide book to be filed with the appropriate school district and the Department of Mathematical Sciences.

MATH 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F,S,Su 1-4 cr. IND
Maximum 6 cr.
PREREQUISITE: MATH 562, 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.
MATH 576 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.

MATH 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.

MATH 581 NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS I
F 3 cr. LEC 3
PREREQUISITE: MATH 442.
Finite difference and finite element solution techniques for elliptic, parabolic, and hyperbolic partial differential equations, numerical linear algebra.

MATH 582 NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS II
S 3 cr. LEC 3
PREREQUISITE: MATH 581.
A continuation of topics from MATH 581.

MATH 584 FUNCTIONAL ANALYSIS I
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: MATH 547.
Banach spaces, fixed point theorems, Hilbert spaces, the Dirichlet principle, generalized Fourier series, and spectral theory.

MATH 585 FUNCTIONAL ANALYSIS II
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MATH 584.
The Hahn Banach theorem, variational principles, weak convergence, uniform boundedness theorem, the open mapping theorem and the implicit function theorem.

MATH 586 PROBABILITY THEORY
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MATH 547.

MATH 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 5 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.

MATH 589 GRADUATE CONSULTATION
ES, 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.

MATH 590 MASTER'S THESIS
ES, Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's standing.

MATH 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.

MATH 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.

MATH 595 DYNAMICAL SYSTEMS I
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MATH 508.
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.

MATH 596 DYNAMICAL SYSTEMS II
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: MATH 595.
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.

MATH 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.

MATH 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.

MATH 610 STRUCTURAL AND FUNCTIONAL ORGANIZATION OF COMPLEX BIOLOGICAL SYSTEMS I
F 3 cr. LEC 3
PREREQUISITE: College calculus and analytic geometry comparable to MSU'S MATH 125/185; two out of three of the following types of courses: 1. general chemistry comparable to MSU'S CHEM 121/122; 2. college physics comparable to MSU'S PHYS 201/202 or general and modern physics comparable to MSU'S PHYS 211/212; 3. general biochemistry comparable to MSU'S BCHM 340 or molecular and cellular biology comparable to MSU'S BIOL 102/402 or biophysics (not currently offered by MSU).

The core goal is to integrate understanding of the components of biological systems into quantitative models of the integrated, intact systems. This course will cover signal transduction, cellular organization, molecular motors, and the neural basis of learning and memory.

MB Microbiology
Department of Microbiology
(406) 994-2903

MB 100 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.

MB 101 MICROBIOLOGY IN TODAY'S WORLD
ES, Su 4 cr. LEC 3 LAB 1
Microbiology is a science with important applications. Examples of how microorganisms are relevant to the needs, activities, and success and failure of individuals and societies will be studied. Laboratory exercises introduce the scientific method and illustrate important microbiological principles.

MB 105N MOLECULES OF LIFE
S 3 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/benefits of biotechnology to society.

MB 110 INTRODUCTION TO BIOTECHNOLOGY
FS, Su 2 cr. LEC 2
Introduction to an ever growing industry. Course is designed to demonstrate the current significance of biotechnology. Course is a multi-lecturer series dealing with ethics, business, and scientific technology. Cross-listed with VTMB 101 and PS 101.

MB 201N INFECTIOUS DISEASES
ES, Su 3 cr. LEC 3
Course Descriptions

Introduction to the world of microorganisms; procaroyic cell structure, function and genetics; the immune response; etiology, pathogenesis, epidemiology, treatment and control of important infectious diseases of humans.

MB 351 GENERAL MICROBIOLOGY
F 4 cr. LEC 3 LAB 1
PREREQUISITE: BIOL 102.
COREQUISITE: CHEM 215 or CHEM 311.
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 immunology, epidemiology and public health, and biotechnology.

MB 352 AIDS DISEASE AND SOCIETY
F 2 cr. LEC 2
PREREQUISITE: One of the following courses: MB 101, MB 105, MB 201, MB 301, or BIOL 102, and have at least junior level standing. Alternatively by permission of the instructor.
AIDS has been called the defining illness of our time. This course will explain the biological basis of HIV infection and AIDS, discuss how this biology has affected our views of the disease, and assess the impact of the disease on society.

MB 355 MEDICAL BACTERIOLOGY
S 5 cr. LEC 3
PREREQUISITE: MB 301.
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.

MB 356 MEDICAL BACTERIOLOGY LABORATORY
S 2 cr. LAB 2
PREREQUISITE: or corequisite MB 350.
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.

MB 400C SEMINAR
F 5 cr. LEC 5
PREREQUISITE: MB 301 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.

MB 401 IMMUNOLOGY
F 5 cr. LEC 5
COREQUISITE: CHEM 215 or CHEM 311.
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.

MB 402 IMMUNOLOGY LABORATORY
F 1 cr. LAB 1
PREREQUISITE: MB 401 (may be taken as corequisite).
A laboratory study of basic and clinical immunology.

MB 403 Virology
S 4 cr. LEC 3 LAB 1
PREREQUISITE: BCHM 340.
Fundamentals of virology with emphasis on animal viruses. Consideration of the molecular aspects of structure, multiplication, and host response to viral infection. The laboratory emphasizes principles and laboratory applications of molecular virology.

MB 405 HEMATOLOGY
F 3 cr. LEC 3
PREREQUISITE: BIOL 102N, BIOL 207 or BIOL 208. MB 401 and BCHM 340 are recommended.
COREQUISITE: MB 406.
A study of the function, biochemistry, cell biology, and pathology of blood and its constituents.

MB 406 HEMATOLOGY LABORATORY
F 1 cr. LAB 1
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.

MB 407 MICROBIOLOGY INSTRUCTING
ES, Su 2 cr. LEC 2
PREREQUISITE: MB 350.
Instruction and practice in effective teaching methods; practice in preparing laboratory materials, assisting a class and grading.

MB 408 MEDICAL PARASITOLOGY
S 3 cr. LEC 2 LAB 1
Study of the biology, physiology, pathogenesis, diagnosis, and treatment of medically-important parasitic diseases.

MB 409 GENERAL PATHOLOGY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: BIOL 208, MB 301, or consent of instructor.
Patterns of cell and tissue response to injury and aging. Chemical, physical, and biological aspects of cell injury; acute and chronic inflammation, regeneration and repair; hemostasis; thrombosis, embolism, and infection; atherosclerosis; neoplasia.

MB 415 MICROBIAL DIVERSITY, ECOLOGY & EVOLUTION
S alternate years, to be offered 2002 4 cr. LEC 3 LAB 1
PREREQUISITE: MB 301, BCHM 340, or consent of instructor.
The diversity of procaroyic and eucaroyic 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. Cross-listed with LRES 415.

MB 420 MICROBIAL PHYSIOLOGY
F 5 cr. LEC 5
PREREQUISITE: BCHM 340, MB 301.
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.

MB 429 THE BIOLOGY OF HUMAN CANCER
S 3 cr. LEC 5
PREREQUISITE: MB 101 or BIOL 102, or MB 301.
Integration of subjects on the molecular biology, cell biology, and genetics of cancer with the clinical realities of classification, diagnosis, and treatment of the important human cancers. Major focus will be on the correlation between current molecular research and clinical medicine. Cross-listed with BIOL 429.

MB 438 APPLIED AND ENVIRONMENTAL MICROBIOLOGY
F 4 cr. LEC 3 LAB 1
PREREQUISITE: MB 301.
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.

MB 440 MEDICAL MYCOLOGY
F alternate years, to be offered 2001 4 cr. LEC 2 LAB 2
PREREQUISITE: BCHM 340 or equivalent.
Fungal structure, physiology and taxonomic considerations; disease and host-parasite relationships; procedures used to isolate and identify pathogenic fungi.

MB 449 MICROBIAL GENETICS
S 3 cr. LEC 3
PREREQUISITE: MB 301, BCHM 340.
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.

MB 450 RESEARCH METHODS IN MICROBIOLOGY
ES, Su 4 cr. LEC 3 LAB 1
PREREQUISITE: BIOL 301, BCHM 340.
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 radiotopes.

MB 460 CLINICAL LABORATORY SCIENCE
SUMMER PRACTICUM
Su 12-15 cr. LEC LAB
PREREQUISITE: To take this course, students must be accepted into the professional training program. MB 460 is a clinical laboratory science course which will be conducted at affiliate hospitals during the summer of a student's senior year. It includes student lecture and laboratory instruction in clinical immunohematology, clinical chemistry, clinical hematology, clinical hemostasis, clinical microscopy and urinalysis, clinical body fluids, transfusion techniques, and clinical microbiology.

MB 461 CLINICAL LABORATORY SCIENCE
PROFESSIONAL TRAINING
F 15-15 cr. LEC LAB
PREREQUISITE: MB 460.
MB 461 is the first semester of professional training at a clinical laboratory 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.
MB 462 CLINICAL LABORATORY SCIENCE PROFESSIONAL TRAINING II
S 12-15 cr. LEC LAB
PREREQUISITE: MB 461.
MB 462 is the second semester of professional training at a clinical laboratory 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.

MB 470 INDIVIDUAL PROBLEMS
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.

MB 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.

MB 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: MB 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

MB 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,S,Su 1-4 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.

MB 500 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 501 PRINCIPLES & TECHNIQUES OF ANIMAL EXPERIMENTATION
S alternate years, to be offered 2001 S cr. LEC 2 LAB 1
PREREQUISITE: MB 501.
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 525 ADVANCED IMMUNOLOGY
S alternate years, to be offered 2002 S cr. LEC 3
PREREQUISITE: MB 401.
Recent advances in immunochemistry, immunogenetics, immunopathology, molecular and cellular immunology.

MB 528 ADVANCED GENETICS
S alternate years, to be offered 2001 S cr. LEC 3
PREREQUISITE: MB 420 or equivalent.
Recent advances in microbial genetics with an emphasis on molecular genetics and eukaryotic gene expression.

MB 538 CELL AND MOLECULAR BIOLOGY
Su 3 cr. LEC 2 LAB 1
PREREQUISITE: MB 501, BCHM 540 or BIOL 402, or the equivalent, plus graduate standing or petition approval from the Dean of Graduate Studies.
Microorganisms are emphasized in this inquiry-based study of prokaryotic and eukaryotic cell and molecular biology. The course, designed for practicing science teachers in the MSSE degree program, provides rigorous treatment of topics including molecular phylogeny, cell structures, cell cycle, gene expression, and protein processing. Current literature discussions and the integrated laboratory cover molecular approaches for investigating complex cellular mechanisms and provide training in microbiological techniques essential to biotechnology. Individual projects include the design of new teaching activities for future classroom participation.

MB 539 INFECTIOUS AND IMMUNITY
F 3 cr. LEC 3
PREREQUISITE: MB 530, MB 401, or MB 403, or the equivalent. Graduate standing or petition approved from Dean of Graduate Studies.
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. Course offered by asynchronous, computer-mediated communication.

MB 570 INDIVIDUAL PROBLEMS
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 576 INTERNSHIP
S alternate years, to be offered 2001 S cr. LEC 3
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 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.

MB 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 coursework (and thesis) but who need additional faculty or staff time or help.

MB 590 MASTER'S THESIS
F,S,Su 1-10 cr. IND Maximum 20 crs.
PREREQUISITE: Master's standing.

MB 610 STRUCTURAL AND FUNCTIONAL ORGANIZATION OF COMPLEX BIOLOGICAL SYSTEMS
F 3 cr. LEC 3
PREREQUISITE: College calculus and analytic geometry comparable to MSU'S MATH 181/182 and two out of three of the following types of courses: 1. general chemistry comparable to MSU'S CHEM 131/132; 2. college physics comparable to MSU'S PHYS 211/212; 3. general biochemistry comparable to MSU'S BCHM 540 or molecular and cellular biology comparable to MSU'S BIOL 102/402 or biophysics (not currently offered by MSU).
The core goal is to integrate understanding of the components of biological systems into quantitative models of the integrated, intact systems. This course will cover signal transduction, cellular organization, molecular motors, and the neural basis of learning and memory.

MB 611 STRUCTURE AND MECHANISMS OF COMPLEX BIOLOGICAL SYSTEMS
S 3 cr. LEC 3
PREREQUISITE: Structural and Functional Organization of Complex Biological Systems
The core goal is to integrate understanding of the components of biological systems into quantitative models of the integrated, intact systems. This course will cover genomic analysis, prediction of protein folding, allosteric regulation and nitric oxide signaling and modeling in biology.

MB 690 DOCTORAL THESIS
F,S,Su 1-10 cr. IND Maximum 30 crs.
PREREQUISITE: Doctoral standing.

MBEH
Microbiology Environmental Health
Department of Microbiology
(406) 994-2903

MBEH 210 PRINCIPLES OF ENVIRONMENTAL HEALTH SCIENCE
F 3 cr. LEC 3
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, vectorborne 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.

MBEH 470 INDIVIDUAL PROBLEMS
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.

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 476 INTERNSHIP
On Demand 2 - 12 cr. IND
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
ME
Mechanical Engineering
Department of Mechanical and Industrial Engineering
(406) 994-2203

ME 101 INTRODUCTION TO MECHANICAL ENGINEERING
F 1 cr. LEC 1

The mechanical engineering profession, logical process of problem solving and design, professionalism, ethics.

ME 102 ENGINEERING COMPUTER APPLICATIONS
ES 1 cr. LAB 1.
PREREQUISITE: MATH 106; ME and MET majors only.
COREQUISITE: Concurrent enrollment or prior completion of ME 101 (or equivalent course).

Computer methodology, use of various computer software packages in mechanical engineering and mechanical engineering technology applications.

ME 115 ENGINEERING DESIGN GRAPHICS
ES 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 multi-view drawings, sections, and assemblies.

ME 116 ENGINEERING DESIGN GRAPHICS LABORATORY
ES 1 cr. LAB 1.
COREQUISITE: ME 115 or consent of instructor.

Hands-on laboratory experience in two dimensional computer-aided design (CAD) for engineering design graphics.

ME 117 MECHANICAL ENGINEERING DESIGN GRAPHICS
ES 1 cr. LEC 1.
PREREQUISITE: ME and MET majors only, or consent of instructor.

Introductory course developing freehand sketching and computer aided modeling techniques for mechanical engineering design graphics. Skills will be developed for sketching and interpreting dimensioned multi-view drawings, tolerancing, specifications, pictorials, and assemblies for mechanical designs.

ME 118 MECHANICAL ENGINEERING DESIGN GRAPHICS LABORATORY
ES 1 cr. LAB 1.
PREREQUISITE: ME and MET majors only, or consent of instructor.

COREQUISITE: ME 117, or ME 115 and consent of instructor.

Hands-on laboratory experience in three-dimensional and parametric constraint-based modeling for mechanical engineering design.

ME 250 MECHANICAL ENGINEERING MATERIALS
On Demand 3 cr. LEC 5
PREREQUISITE: CHEM 121 or CHEM 181.
COREQUISITE: MATH 176 for MET majors only, MATH 181 for ME majors.

Properties of metallic, ceramic, and polymeric materials as related to their structures. Material selection for engineering applications.

ME 251 ME MATERIALS SCIENCE LABORATORY
F or S 1 cr. LAB 1.
PREREQUISITE: ME majors only, ME 102.

NUMERICAL ANALYSIS

ME 255 MANUFACTURING PROCESSES
S 3 Cr. LEC 1.
PREREQUISITE: ME 250 or CH E 213.

Basic methods of processing materials to change shapes, dimensions, and finishes; special attention to attendant forces, temperature, and property changes.

ME 270 INDIVIDUAL PROBLEMS
On Demand 1-5 cr. IND 1-5 Maximum 6 cr.
PREREQUISITE: Consent of instructor and approval of department head.

Directed research and study on an individual basis.

ME 280 SPECIAL TOPICS
On Demand 1-4 cr. Maximum 12 cr.
PREREQUISITE: None required but some may be determined necessary by each offering department.

Coursed 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.

ME 315 ENGINEERING ANALYSIS
ES 4 cr. LEC 4
PREREQUISITE: MATH 224, MATH 225, EM 253.

Mathematical modeling of engineering systems, mathematical methods of engineering analysis including linear algebra techniques, approximation techniques for typical engineering problems.

ME 320 THERMODYNAMICS I
ES 3 cr. LEC 3
PREREQUISITE: MATH 224, EM 251.

Basic thermodynamic concepts, first and second laws, open and closed systems, properties of ideal and real substances, work, heat, irreversibility, and availability.

ME 321 THERMODYNAMICS II
ES 3 cr. LEC 3
PREREQUISITE: ME 320.

Vapor, gas power, and refrigeration cycles; mixtures and combustion.

ME 324 ENGINEERING THERMODYNAMICS
F S 2 cr. LEC 2
PREREQUISITE: MATH 176 or MATH 182, PHYS 205 or PHYS 211.

General treatment of the basic laws of thermodynamics and engineering applications with introduction to heat transfer for curricula not requiring ME 320/ME 321 series.

ME 326 FUNDAMENTALS OF HEAT TRANSFER
F S 4 cr. LEC 4
PREREQUISITE: MATH 225, EM 355, ME 320.
COREQUISITE: Concurrent enrollment in or prior completion of ME 315.

Mechanisms of energy transport due to a temperature difference in materials. Conduction, convection, and radiation formulations. Introduction to heat transfer equipment.

ME 341 INTRODUCTION TO MACHINE DESIGN
F or S 4 cr. LEC 3.
PREREQUISITE: ME 341, EM 252.

ME 342 CONCURRENT MECHANICAL DESIGN
F or S 3 cr. LEC 3.
PREREQUISITE: MATH 225, MATH 226, EM 253, ME 342.

Energy methods, Castigliano's theorem, static yield theories, design for fatigue, design of rotating shafts, materials selection.

ME 344 MECHANICAL COMPONENT DESIGN
F or S 3 cr. LEC 4
PREREQUISITE: ME 341, EM 252.

ME 345 MECHANICAL STRUCTURES
On Demand 3 cr. LEC 3.
PREREQUISITE: EM 252, EM 253, MATH 225, ME 102 or equivalent.

ME 355 COMPUTER-AIDED MANUFACTURING
On Demand 3 cr. LEC 2.
PREREQUISITE: ME 110 or ME 111, ME 255; CS 120 or some familiarity with computers and programming.

Numerical analysis of skeletal structures by the stiffness method including strain energy and Castigliano's theorem. Introduction to finite element method.

ME 360 MEASUREMENT AND INSTRUMENTATION
F S 5 cr. LEC 2.
PREREQUISITE: ME 110 or ME 111, ME 255; CS 120 or some familiarity with computers and programming.

Programming, operation, and application of computer-controlled manufacturing and assembly for product/process design including multi-axis CNC, robotics, and integrated manufacturing systems.

ME 366 MEASUREMENT SYSTEMS
F S 5 cr. LEC 2.
PREREQUISITE: EE 206 or EE 215.

ME 370 MEASUREMENT SYSTEMS
F 3 cr. LEC 1.
PREREQUISITE: EE 206 or EE 215.

Theory and application of transducers for mechanical measurements, and laboratory experience with measurement systems.

ME 403 MECHANICAL ENGINEERING DESIGN III
F S 3 cr. LEC 2.
PREREQUISITE: ME 320, EM 355.
COREQUISITE: Concurrent enrollment in or prior completion of ME 342.

Comprehensive introduction to the engineering design process with emphasis on formulating design
specifications, creativity, conceptual design, detail design, and communications.

ME 404C: MECHANICAL ENGINEERING DESIGN II
FS 2 cr. LEC 1 RCT 1
PREREQUISITE: ME 405 or consent of instructor, ME 360, ME 321, ME 326.
COREQUISITE: Concurrent enrollment in or prior completion of ME 445. Concurrent enrollment in ME 405C required.
Senior capstone design experience in Mechanical Engineering. Students, under the guidance of a faculty supervisor, solve real-world design problems.

ME 405C: INDEPENDENT ME DESIGN II
FS 2 cr. IND 2
COREQUISITE: Concurrent enrollment in ME 404C.
Independent study associated with ME 404C.

ME 411: ADVANCED ENGINEERING GRAPHICS AND COMPONENT SPECIFICATION
On Demand 3 cr. LEC 1 LAB 2
PREREQUISITE: ME 116 or ME 118, EM 253;
Instructor's consent for non-ME/MET majors.
Develop the ability to use solid and parametric modeling to design and document machine parts.

ME 426: DYNAMICS OF FLUIDS
On Demand 3 cr. LEC 3
PREREQUISITE: MATH 225, EM 335.
A study of fluid dynamics, including incompressible and compressible inviscid fluids, and viscous flow theory and application.

ME 430: THERMAL SYSTEM DESIGN
FS 3 cr. LEC 1 RCT 2
PREREQUISITE: ME 321, ME 326, or instructor approval.
COREQUISITE: Concurrent enrollment in or prior completion of ME 405.
Design and analysis of energy conversion and thermal systems. Energy conversion cycles and applications, heat transfer equipment design.

ME 445: MECHANICAL VIBRATIONS
FS 3 cr. LEC 3
PREREQUISITE: EM 252, EM 253, ME 315.
Vibration problems of single and multiple degree of freedom systems. Introduction to vibration of continuous bodies. Analysis of free and forced vibration problems. Effects of damping.

ME 448: DESIGN OF TOOLS
S 3 cr. LEC 3
PREREQUISITE: ME 341 or MET 340 or instructor approval.
Fundamentals of tool design, including tooling materials, workholding principles, jig design, fixture design, assembly tool design, design of tools for inspection and gauging, and tool fabrication techniques.

ME 450: METALLIC MATERIALS
On Demand 3 cr. LEC 3
PREREQUISITE: ME 250 or equivalent.
Advanced consideration of the structure and behavior of metals.

ME 451: WELDING, MACHINE, AND FABRICATION PRACTICES I
On Demand 3 cr. LEC 2 LAB 1
PREREQUISITE: ME 255, CH E 213 or ME 250;
junior standing and instructor consent for non-ME/EE majors.
Survey of welding and machine tool practices, including existing fabrication methods and their limitations.

ME 452: ADVANCED ENGINEERING MATERIALS
On Demand 3 cr. LEC 3
PREREQUISITE: ME 250 or CH E 213, MATH 225, EM 251.
Micro and macro properties of metals, polymers, ceramics, composite materials; elasticity of materials, plastic deformations; dislocations; high temperature behavior; creep; viscoelasticity; fracture; fatigue; selection of materials for design.

ME 454: REFRIGERATION AND HVAC
F 3 cr. LEC 3
PREREQUISITE: (ME 321, ME 326), or (ME 324, MET 325).
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.

ME 458: AIRCRAFT STRUCTURES
On Demand 4 cr. LEC 3 RCT 1
PREREQUISITE: ME 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.

ME 460: MECHANICAL ENGINEERING LABORATORY
FS 2 cr. LEC 2
PREREQUISITE: ME 321, ME 326, ME 560; or instructor approval.
Execution of engineering experiments.

ME 461: ME SENIOR LABORATORY
FS 5 cr. LAB 5
PREREQUISITE: ME 321, ME 326, ME 560; or consent of instructor.
COREQUISITE: Concurrent enrollment in or prior completion of ME 453.
Execution of engineering experiments.

ME 463: COMPOSITE MATERIALS
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: CH E 215.
Structure and properties of composite materials and design procedures for composite structures. Cross-listed with CH E 463.

ME 465: INTRODUCTION TO FINITE ELEMENT ANALYSIS
F 4 cr. LEC 3 RCT 1
PREREQUISITE: ME 326 or instructor approval.
COREQUISITE: Concurrent enrollment in or prior completion of ME 342.
Introduction to the finite element method emphasizing the fundamental principles of FEA. Various finite element formulations for applications to structural analysis, thermal/fluids analysis, and design. Practical computational experience using a commercial finite element computer code.

ME 470: INDIVIDUAL PROBLEMS
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.

ME 474: MECHANICAL ENGINEERING CONSULTATION
On Demand 1 - 5 cr. IND Maximum 9 cr.
PREREQUISITE: Sophomore standing in ME/MET curriculum and consent of supervising faculty.
Students enrolled in this class will provide technical support for selected ME/MET courses.

ME 476: INTERNSHIP
On Demand 1 - 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.

ME 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.

ME 489: UNDERGRADUATE RESEARCH/Creative Activity Instruction
FS, Su 1 - 2 cr. May be repeated. Max 4 cr.
COREQUISITE: ME 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

ME 490: UNDERGRADUATE RESEARCH/Creative Activity
FS, 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.

ME 500: 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 the discussion material.

ME 510: ADVANCED ENGINEERING ANALYSIS I
F 3 cr. LEC 3
PREREQUISITE: One of the following: ME 430, ME 326, EM 335.
Mathematical modeling of engineering systems, physical interpretation of ordinary and partial differential equations and methods of solution. This course is cross-listed with CH E 522.

ME 511: ADVANCED ENGINEERING ANALYSIS II
S 3 cr. LEC 3
PREREQUISITE: ME 510.
Analysis and numerical methods in engineering.

ME 520: ADVANCED THERMODYNAMICS
On Demand, 3 cr. LEC 3
PREREQUISITE: ME 321.
First and second laws of thermodynamics, uniform flow and general open systems, real gases, mixtures, reacting processes, phase and chemical equilibrium.

ME 521: STATISTICAL THERMODYNAMICS
On Demand 3 cr. LEC 3
PREREQUISITE: ME 520.
Kinetic theory of gases, distribution functions, thermodynamic properties in terms of partition functions, reactions, phase transition.

ME 525: CONDUCTION HEAT TRANSFER
F 3 cr. LEC 3
PREREQUISITE: ME 326.
COREQUISITE: ME 510.
Advanced topics in conduction heat transfer with emphasis on analytical techniques including
Course Descriptions

separation of variables, Duhamel's theorem, two-phase problems, and numerical techniques.

**ME 536 CONVECTION HEAT TRANSFER**
On Demand, 3 cr. LEC 3
PREREQUISITE: ME 526.
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.

**ME 537 RADIATION HEAT TRANSFER**
On Demand 5 cr. LEC 3
PREREQUISITE: ME 526.
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.

**ME 539 ADVANCED FLUID MECHANICS I**
S 5 cr. LEC 3
PREREQUISITE: EM 355 or CH E 322.
COREQUISITE: EM 525 or consent of instructor.
Review of conservation equations, laminar and turbulent internal flows, potential flows, and Stokes flow. This course is cross-listed with CH E 551.

**ME 540 ADVANCED MECHANICAL VIBRATIONS**
On Demand 3 cr. LEC 3
PREREQUISITE: ME 455.
Advanced topics in mechanical vibrations. Multidegree of freedom systems, continuous systems, generalized coordinates. Introduction to nonlinear vibrations.

**ME 550 FAILURE OF MATERIALS**
On Demand 3 cr. LEC 5
PREREQUISITE: One of the following: CH E 463, EM 415, ME 450.
Cross-listed. See CH E 550 for description.

**ME 551 ADVANCED COMPOSITE MATERIALS**
On Demand 3 cr. LEC 3
PREREQUISITE: CH E 463.
Cross-listed. See CH E 551 for description.

**ME 557 INDIVIDUAL PROBLEMS**
On Demand 5 - 3 cr. IND Maximum 5 cr.
PREREQUISITE: Adoption of department head and Dean of Graduate Studies.
Directed research and study on an individual basis.

**ME 559 RESEARCH OR PROFESSIONAL PAPER/PROJECT**
F, Su 1 - 4 cr. IND.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
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 of the Master of Science in Mechanical Engineering for non-thesis option students.

**ME 560 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.

**ME 561 ANATOMY (MICRO)**
S 5 cr. LEC 3
PREREQUISITE: WAMI medical student or consent of the Director of the WAMI Medical Program and Dean of the College of Graduate Studies.
Microscopic study of the structure and function of human cells, tissues and organs as a basis for understanding the alterations in structure and function seen in human disease.

**ME 561 CLINICAL PRECEPTORSHIP**
F 5 cr. LEC 4
PREREQUISITE: WAMI medical student or consent of the Director of the WAMI Medical Program and Dean of the College of Graduate Studies.
Dissection study of the anatomy of the human thorax, abdomen, pelvis and perineum. The course integrates a detailed study of adult anatomical features, innervations, blood supplies, and lymphatics with basic embryonic development, both normal and abnormal.

**ME 561 MECHANISMS IN CELLULAR PHYSIOLOGY**
F 4 cr. LEC 4
PREREQUISITE: WAMI medical student or consent of the Director of the WAMI Medical Program and Dean of the College of Graduate Studies.
Physiological mechanisms in excitable tissues, transporting epithelium and other organ systems; excitation and conduction, junctional, transport signal transduction, sensory reception and epithelial transport. Integration of physiological mechanisms within and between organ systems.

**ME 561 INTRODUCTION TO CLINICAL MEDICINE I**
F 2 cr. LEC 1 LAB 2
PREREQUISITE: WAMI medical student.
Communication skills and interview techniques to form the basis for the doctor-patient relationship and for the skill of communicating with patients.

**ME 561 MOLECULAR & CELLULAR BIOLOGY**
F 5 cr. LEC 4 RCT 1
PREREQUISITE: WAMI medical student or consent of the Director of the WAMI Medical Program and Dean of the College of Graduate Studies.
Coordinated course covering classical molecular and cellular biochemistry and molecular genetics. Metabolic interrelationships as they occur in the individual are stressed and related to disturbances in disease states.

**ME 561 CLINICAL PRECEPTORSHIP**
F 1 cr. LAB 1
PREREQUISITE: WAMI medical student.
Opportunity to gain personal experience with primary care medical practice by observation of selected physicians in the Bozeman area.

**ME 562 CELL & TISSUE RESPONSE TO INJURY**
S 4 cr. LEC 2 RCT 1 LAB 1
PREREQUISITE: WAMI medical student or consent of the Director of the WAMI Medical Program and Dean of the College of Graduate Studies.
INFECTIOUS DISEASES AND CHEMOTHERAPY
MEDS 521 NATURAL HISTORY OF INFECTIOUS DISEASES AND CHEMOTHERAPY
S 5 cr. LEC S 2 cr. RCT 1 LAB 1
PREREQUISITE: WAMI medical student or consent of the Director of the WAMI Medical Program and Dean of the College of Graduate Studies.

MEDS 522 INTRODUCTION TO CLINICAL MEDICINE II
S 2 cr. LEC 1 LAB 1
PREREQUISITE: WAMI medical student.
Continuation of communication skills. The medical history is introduced and instruction in data collection begins. Screening physical examination, further experience and instruction in the medical history, the problem-oriented medical record.

MEDS 523 IMMUNOLOGY & HUMAN DISEASE
F 2 cr. LEC 1 LAB 1
PREREQUISITE: WAMI medical student or consent of the Director of the WAMI Medical Program and Dean of the College of Graduate Studies.
Mechanisms of humoral and cell mediated immunity. Immunological mechanisms of cell and tissue injury. Immune mechanisms in human resistance to disease and in immunological diseases.

MEDS 525 MEDICAL RESEARCH METHODS
S 1 cr. RCT 1
PREREQUISITE: WWAMI Medical student.
Surveying medical literature; development of research ideas; institutional review; data presentation and analysis; statistical concepts; critical interpretation of data; writing scientific reports.

MEDS 531 HEAD & NECK ANATOMY
S 4 cr. LEC S 2 LAB 2
PREREQUISITE: WAMI medical student or consent of the Director of the WAMI Medical Program and Dean of the College of Graduate Studies.
Gross anatomy of head and neck. Relation of head and neck anatomy to disease of the nasal passages, throat, eyes and oral cavity. Relation to physical examination (including skull, pharynx, and larynx).

MEDS 532 NERVOUS SYSTEM
S 6 cr. LEC 4 LAB 2
PREREQUISITE: WAMI medical student or consent of the Director of the WAMI Medical Program and Dean of the College of Graduate Studies.
Integrated approach to the normal structure and function of the human nervous system, basic neurophysiological 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 I
F 3 cr. LEC S 3
PREREQUISITE: WAMI medical student or consent of the Director of the WAMI Medical Program and Dean of the College of Graduate Studies.
Overview of conceptual systems and models of behavior, normality and abnormality, environment and social learning, conditioning, learning in the autonomic nervous system, catecholamines and behavior, illness behavior, feelings, emotion and cognition, physician-patient interaction and disease and techniques of behavior change.

MEDS 570 INDIVIDUAL PROBLEMS
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of the Director of the WAMI Medical Program and Dean of Graduate Studies.
Directed research and study on an individual basis.

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.

MET Mechanical Engineering Technology
Department of Mechanical and Industrial Engineering
(406) 994-9203

MET 101 INTRODUCTION TO MECHANICAL ENGINEERING TECHNOLOGY
F 1 cr. LEC
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.

MET 215 MACHINING TECHNOLOGY AND INDUSTRIAL SAFETY
F 3 cr. LEC 1 LAB 2
PREREQUISITE: ME 118 or equivalent; or TE 230 for non-majors.
Introduction to the 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.

MET 251 MATERIALS SCIENCE LAB
F 1 cr. LAB 1
PREREQUISITE: MET majors only; non-majors require instructor approval.
COREQUISITE: ME 250 or CH E 213.
Specific hands-on experience with material properties experiments that parallel the lecture portion of ME 250 or CH E 213. 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).

MET 256 MANUFACTURING PROCESS LABORATORY
S 1 cr. LAB 1
PREREQUISITE: MET majors only; non-majors require instructor approval.
COREQUISITE: ME 255.
Hands-on application of the fundamentals of basic manufacturing processes.

MET 270 INDIVIDUAL PROBLEMS
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.

MET 280 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.

MET 515 WELDING TECHNOLOGY I
S 3 cr. LEC 1 LAB 2
PREREQUISITE: ME 118 or equivalent; or TE 230 for non-majors.
Introduction to modern welding technology and metallurgy. An overview of the most common processes in use. Detailed examination of metallurgy and materials properties as related to welding processes. Welding specification and symbology is introduced as well as modern welding code usage. Specific hands-on experiences included in laboratory.

MET 517 WELDING TECHNOLOGY II
F 3 cr. LEC 1 LAB 2
PREREQUISITE: MET 515.
In-depth examination of welding technology as it applies to engineering-related activities. Weldment specification and symbology, non-destructive and destructive evaluation techniques, welding code usage, and weldability and environmental issues are covered. Specific hands-on experience included in laboratory.

MET 525 HEAT TRANSFER FOR ENGINEERING TECHNOLOGY
S 4 cr. LEC S 3 LAB 1
PREREQUISITE: ME 324 or equivalent; EM 351.
COREQUISITE: ME 560.
Study of the basic mechanisms of heat transfer and its applications. Introduction to equipment that utilize these mechanisms.

MET 540 MECHANISMS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: EM 215, MATH 176, CS 120.
COREQUISITE: ME 255.
Introduction to mechanisms and machine elements used in the design and synthesis of mechanical devices. Specific hands-on experiences in laboratory.

MET 401 MECHANICAL ENGINEERING TECHNOLOGY SENIOR SEMINAR
F 1 cr. SEM 1
PREREQUISITE: MET 101 and senior standing.
A seminar course focusing on career path development. Students will meet with current industry professionals to discuss specific careers, as well as meet with freshman students to share undergraduate experiences.

MET 455 MACHINE DESIGN
S 4 cr. LEC 3 LAB 1
PREREQUISITE: MET 340, or instructor approval.
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.

MET 455 HEATING, VENTILATION, AND AIR CONDITIONING LAB
F 1 cr. LAB 1
PREREQUISITE: ME 360, MET majors only; non-majors require instructor approval.
COREQUISITE: ME 454.
Laboratory experiences enforcing topics covered in ME 454.
Course Descriptions

MET 456C MECHANICAL ENGINEERING TECHNOLOGY CAPSTONE EXPERIENCE I
F 2 cr. RCT 1 LAB 1.
PREREQUISITE: BUS 201, I&M 350, MET 325 or instructor consent, MET 445, (for MET majors only).
COREQUISITE: I&M 325, I&M 434.
First course in senior capstone sequence in mechanical engineering technology. Students, under the guidance of faculty supervisors, design, plan, and schedule a product for fabrication/manufacturer.

MET 457C MECHANICAL ENGINEERING TECHNOLOGY CAPSTONE EXPERIENCE II
F 2 cr. RCT 1 LAB 1
PREREQUISITE: MET 215, MET 315, MET 456, (for MET major only).
Second course in senior capstone sequence. Manufacturing, scheduling, and construction of the project initiated.

MET 465 BUILDING SYSTEMS
F 3 cr. LEC 3
PREREQUISITE: PHYS 206 and junior standing.
A survey of the systems and equipment for water supply, sanitation, fire protection, electrical service, heating and air conditioning of buildings.

MET 470 INDIVIDUAL PROBLEMS
On Demand 1 - 3 cr. IND Minimum 6 cr.
PREREQUISITE: Junior standing, consent of instructor, and approval of department head.
Directed research and study on an individual basis.

MET 476 INTERNSHIP
On Demand 1 - 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.

MET 477 QUALITY CONTROL LAB
S 1 cr. LAB 1
PREREQUISITE: MET majors only or consent of instructor.
COREQUISITE: I&M 477.
The companion laboratory course to I&M 477 for MET students. This course will emphasize and reinforce the concepts and techniques discussed in I&M 477 through a structured series of hands-on laboratory exercises.

MET 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.

MET 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: MET 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

MET 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
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.

MGMT Management
College of Business
(406) 994-4421

MGMT 102 INTRODUCTION TO BUSINESS
On Demand 3 cr. LEC 2 RCT 1
PREREQUISITE: Restricted to freshmen and sophomores.
Introduction to functional areas of business and their interrelationships. Exploration of various career paths in business.

MGMT 202 SUPERVISION & LEADERSHIP
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.

MGMT 211 INTRODUCTION TO QUANTITATIVE MODELS FOR BUSINESS
On Demand 3 cr. LEC 3
PREREQUISITE: STAT 216.
Uses and limitations of statistical techniques with management, marketing, and financial applications.

MGMT 245G CULTURAL DIMENSIONS OF INTERNATIONAL BUSINESS
S 3 cr. LEC 3
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.

MGMT 260G INDIVIDUAL PROBLEMS
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.

MGMT 280 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.

MGMT 300 MANAGERIAL ANALYSIS AND ACTION I
S 3 cr. LEC 3
PREREQUISITE: BUS 301.
COREQUISITE: BUS 361.
Part of an integrated, three-course sequence which will build knowledge and skills appropriate for the challenges faced by managers. This course will deal with such operations, first-line supervision issues as human resources, team building, leadership, ethics, technology, and law.

MGMT 300 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.

MGMT 402 LEADERSHIP IN BUSINESS ORGANIZATIONS
F 3 cr. LEC 3
PREREQUISITE: BUS 301 or permission of the instructor.

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.

MGMT 411 COMPUTER APPLICATIONS
On Demand 3 cr. LEC 3
PREREQUISITE: BUS 311.
Business applications for computers. Accounting inventory, planning, and financial analysis are among the topics covered. End-user programming and prototyping will be emphasized.

MGMT 412 SYSTEMS AND DESIGN
S 3 cr. LEC 3
PREREQUISITE: BUS 311.
Study of methods and tools a system analyst uses in development of information systems. Decision-making process of managers used as basis for analysis. Design done on networked microcomputers. Final solutions presented orally, written, and on Web.

MGMT 431 MANAGERIAL SUPPORT SYSTEMS
F 3 cr. LEC 3
PREREQUISITE: BUS 311.
Theory, application and development of information systems to support managerial decision making in semi-structured and unstructured situations. Databases, spreadsheet, expert system, and/or collaborative software application to decision problems. Cases and project assignments.

MGMT 433 MANAGING QUALITY & PRODUCTIVITY
On Demand 3 cr. LEC 3
PREREQUISITE: BUS 311.
An 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.

MGMT 460 BUSINESS TUTORIAL
F 3 cr. LEC 1 SEM 2
PREREQUISITE: BUS 301 and junior standing in Business.
To provide upper-division business student an experience in leadership and mentoring. Students participate in all readings and discussion of BUS 101V, with individual faculty in instructional activities including discussion, facilitation, and assessment of oral and written presentations. Students are required to attend BUS 101.01 (1 hour lecture) and weekly instructional team meetings (1 hour seminar) and the twice-weekly seminar section (1 hour each) to which they are assigned.

MGMT 461 SMALL BUSINESS EXPERIENCE
On Demand 3 cr. RCT 3
PREREQUISITE: BUS 222, BUS 301, BUS 341, BUS 351, and senior standing.
Introduction to small business problems and applications. Students study the opportunities and problems of actual organizations and present the owner-managers with analyses and recommendations.
MGMT 463 ENTREPRENEURSHIP
F 3 cr. RCT 3
PREREQUISITE: BUS 222, BUS 301, BUS 351.
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.

MGMT 464 INTERNATIONAL MANAGEMENT
S 5 cr. LEC 3
PREREQUISITE: BUS 301 and senior standing.
Description of the challenges which the global context poses to people who manage businesses. Examination of the elements of international environment and illustration of their effects on management practices and how management deals with those forces.

MGMT 465 INTERNATIONAL PRACTICUM
On Demand 1-12 cr. IND
PREREQUISITE: By application.
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.

MGMT 466 MANAGERIAL ANALYSIS AND ACTION II
F 3 cr. LEC 3
PREREQUISITE: BUS 311, BUS 331, BUS 351, and MGMT 366.
Part of an integrated, three-course sequence which will build knowledge and skills appropriate for the challenges faced by managers. This course will deal with issues faced by middle managers at the functional level of the organization.

MGMT 467 MANAGERIAL ANALYSIS AND ACTION III
S 3 cr. LEC 3
PREREQUISITE: MGMT 466.
Part of an integrated, three-course sequence which will build knowledge and skills appropriate for the challenges faced by managers. This course will deal with issues faced by executives at the strategic business unit level of the organization.

MGMT 468 BUSINESS, ETHICS AND ENVIRONMENT
S 3 cr. LEC 3
PREREQUISITE: Senior standing or permission of the instructor.
Role of business in solving and causing current problems is examined in the context of our nation and the world. An analytical, problem-solving approach will be used to model operating and ethical issues. Varied perspectives on these issues will be presented.

MGMT 470 INDIVIDUAL PROBLEMS
On Demand 1-5 cr. IND Maximum 6 cr.
Directed reseach and study on an individual basis.

MGMT 472 LEGAL AND SOCIAL FRAMEWORK OF BUSINESS REGULATION
F 3 cr. LEC 3
PREREQUISITE: BUS 361 or consent of instructor.
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.

MGMT 475 MANAGEMENT PRACTICUM
FS 3 cr. RCT 3
PREREQUISITE: MGMT 360 and permission of instructor.
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.

MGMT 476 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.

MGMT 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.

MGMT 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
Corequisite: MGMT 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

MGMT 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS, 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.

MGMT 505 THE STRATEGIC MANAGEMENT OF TECHNOLOGICAL INNOVATION
On Demand or F 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.

MGMT 570 INDIVIDUAL PROBLEMS
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.

MGMT 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.

MKTG 241SALES
On Demand 3 cr. LEC 3
Principles of sales for nonbusiness majors. Focus is on selling in retail and service environment. This course may not substitute for any required business course.

MKTG 242SG INTRODUCTION TO GLOBAL MARKETS
FS 3 cr. LEC 3
Historical perspective on international trade, typical mechanisms for international trade and their strengths and weaknesses, international marketing environment and regulations, currency issues, factors affecting success and failure in international marketing, case studies. This course may not substitute for any required business course.

MKTG 250 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.

MKTG 342 MARKETING RESEARCH
F 3 cr. LEC 3
PREREQUISITE: STAT 216, STAT 217.
Corequisite: BUS 341.
The application of scientific research methods to marketing problems. The emphasis is on survey design and data analysis for market segmentation studies.

MKTG 345 CONSUMER BEHAVIOR
S 3 cr. LEC 3
PREREQUISITE: MKTG 342.
Application of behavioral sciences to understanding human behavior in the market place. Emphasis on culture and subculture, social class, reference group, family, attitudes, perception, motivation, personality, and learning theory on consumer and marketing management decisions.

MKTG 346 PROFESSIONAL SELLING
S 3 cr. LEC 3
PREREQUISITE: BUS 341.
Personal selling techniques applied to outside sales. Sales organization including structure, training, motivation, and compensation. Evaluation of sales goals and individual performance.

MKTG 400 SEMINAR
On Demand 1 cr. SEM 1
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.

MKTG 441 INTERNATIONAL MARKETING
S 3 cr. LEC 3
PREREQUISITE: BUS 341.
**Course Descriptions**

**Department of Modern Languages and Literatures**

(406) 994-4448

**ML**

**Modern Languages**

**ML 480 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.

**ML 488 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.

**MLA**

Modern Languages, Arabic

Department of Modern Languages and Literatures

(406) 994-4448

**MLA 101 ELEMENTARY MODERN STANDARD ARABIC**

F 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.

**MLF**

Modern Languages, French

Department of Modern Languages and Literatures

(406) 994-4448

**MLF 101 ELEMENTARY FRENCH II**

F,S,Su alternate years 4 cr. RCT 4

PREREQUISITE: 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.

**MLF 102G ELEMENTARY FRENCH**

F,S,Su alternate years 4 cr. RCT 4

PREREQUISITE: MLF 101 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.

**MLF 219G INTERMEDIATE FRENCH**

F,S 3 cr. RCT 3

PREREQUISITE: MLF 102, 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-level readings and discussions. Increased emphasis on written communication.

MLF 220G-FRENCH LANGUAGE & CULTURE
S,S,F,S, 3 cr. RCT 3
PREREQUISITE: MLF 219
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.

MLF 501-HISTOIRE CIVILISATION
S alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: MLF 320
Survey of French culture from the Middle Ages to modern era; focus on historical, artistic, literary, and social developments. Taught in French.

MLF 502-LA FRANCE AUJOURD'HUI
S alternate years, to be offered 2002 3 cr. RCT 3
PREREQUISITE: MLF 320
The French personality today in social, cultural, and political settings. Taught in French.

MLF 506H-FROM REFLECTION TO REVOLUTION
S alternate years, to be offered 2002 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.

MLF 551-ADVANCED GRAMMAR & COMPOSITION
F alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: MLF 320
Intensive review of French grammar to increase proficiency in various forms of written expression including business correspondence, problems of translation, and short essays.

MLF 552-ADVANCED CONVERSATION & PHONETICS
F alternate years, to be offered 2002 3 cr. RCT 3
PREREQUISITE: MLF 320
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.

MLF 401-FRENCH LITERATURE I
F alternate years, to be offered 2002 5 cr. RCT 5
PREREQUISITE: MLF 219
Survey of French literature from the Middle Ages through the 18th century. Taught in French.

MLF 402-FRENCH LITERATURE II
F alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: MLF 320
Survey of French literature of the 19th and 20th centuries. Taught in French.

MLF 450C-SEMINAR-FRENCH LITERATURE AND CULTURE
S 3 cr. SEM 3
PREREQUISITE: MLF 401 or MLF 402
Senior capstone course. The study of Francophone literature and culture. Taught in French.

MLF 480-UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1-2 cr. RCT 3
May be repeated. Max 4 cr.
PREREQUISITE: Consent of instructor.
A survey 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 from 1832 to the present. All readings and discussion in English, with additional readings in German for majors and minors.

MLF 515-SURVEY GERMAN LITERATURE
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MLF 220
A survey of representative works of German literature from selected literary periods.

MLF 520-CONTEMPORARY GERMAN LITERATURE
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: MLF 220
Literary and cultural analysis of German literary production in the twentieth century.

MLG 101 ELEMENTARY GERMAN I
F,S,Su alternate years 4 cr. RCT 4
PREREQUISITE: 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.

MLG 102G ELEMENTARY GERMAN II
F,S,Su alternate years 4 cr. RCT 4
PREREQUISITE: MLG 101 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.

MLG 219HC INTERMEDIATE GERMAN
F,S 3 cr. RCT 3
PREREQUISITE: MLG 102, 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.

MLG 220G-GERMAN LITERATURE & CULTURE
F,S 3 cr. RCT 3
PREREQUISITE: MLG 219
Designed to follow the third semester review of grammar and basic skills. Taught through a series of carefully selected readings in German literature and culture. The course is designed to provide the basis for writing essays and reports and developing advanced language skills.

MLG 301 GERMAN CULTURE & CIVILIZATION
S alternate years, to be offered 2003 3 cr. LEC 3
PREREQUISITE: MLG 220
A survey of some of the great figures and periods of German art, literature, music, and public life in German-speaking countries which have made significant contributions to world civilization from 1832 to the present. All readings and discussion in English, with additional readings in German for majors and minors.

MLG 315-UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1-2 cr. RCT 3
May be repeated. Max 4 cr.
PREREQUISITE: Consent of instructor.
A survey 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 from 1832 to the present. All readings and discussion in English, with additional readings in German for majors and minors.

MLG 350 ADVANCED GRAMMAR CONVERSATION COMPOSITION I
F alternate years, to be offered 2000 3 cr. RCT 3
PREREQUISITE: MLG 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.

MLG 351 ADVANCED GRAMMAR CONVERSATION COMPOSITION II
F alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: MLG 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.

MLG 360H FAUST IN GERMAN TRADITION
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: MLG 515 or consent of instructor.
An examination of the German Faust figure in pursuit of knowledge. This theme is explored through the texts of Luther, Goethe, Lessing, and Mann. All readings and discussion in English.

MLG 410 LINGUISTICS-PHONETICS
S alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: MLG 220
An overview of significant linguistic concepts which contribute to an understanding of Modern German. Also a practical study of German sounds—their pronunciation, combination, and representation by written symbols. Contrastive linguistic study, German-English, for teaching application.

MLG 450C-SEMINAR-GERMAN LITERATURE AND CULTURE
S 3 cr. SEM 3
PREREQUISITE: MLG 301, MLG 315, or MLG 320.
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.

MLG 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1-2 cr. RCT 3
May be repeated. Max 4 cr.
PREREQUISITE: Consent of instructor.
A survey of some of the great figures and periods of German art, literature, music, and public life in
MLJ
Modern Languages, Japanese
Department of Modern Languages and Literatures
(406) 994-4448

MLJ 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.

MLJ 102G INTERMEDIATE JAPANESE II
S 4 cr. RCT 4
PREREQUISITE: MLJ 101 or placement interview with instructor
Continuation of MLJ 101. Expansion of cultural knowledge.

MLJ 219G INTERMEDIATE JAPANESE
F 3 cr. RCT 3
PREREQUISITE: MLJ 102 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.

MLJ 219U INTENSIVE JAPANESE
S 3 cr. RCT 3
PREREQUISITE: MLJ 219 or placement interview with instructor
Continuation of MLJ 219. 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.

MLJ 301 PREMODERN JAPANESE CIVILIZATION
F alternate years, to be offered 2000 3 cr. RCT 3
PREREQUISITE: ENGL 121 or consent of instructor
Multidisciplinary study of Japanese history, literature, art, and religion from earliest times to the mid-nineteenth century. All readings and discussions in English. No knowledge of Japanese necessary.

MLJ 301H INTRODUCTION TO JAPANESE LITERATURE
F alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: ENGL 121W or consent of instructor
Survey of masterpieces of poetry, drama, and narrative from earliest times to the 20th century. All readings and discussions in English. No knowledge of Japanese necessary.

MLJ 320 CLASSICAL JAPANESE LITERATURE
S alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: MLJ 315 or consent of instructor
Poetry, drama, and narrative from earliest times to mid-nineteenth century. Readings and discussions in English. No knowledge of Japanese necessary.

MLJ 321 MODERN JAPANESE LITERATURE
S alternate years, to be offered 2002 3 cr. RCT 3
PREREQUISITE: MLJ 315 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.

MLJ 360 THE TALE OF GENJI
S alternate years, to be offered 2002 3 cr. RCT 3
PREREQUISITE: MLJ 315 or consent of instructor
Intense encounter with the greatest work of Japanese literature, written by a female aristocrat ca. 1000. Also provides insight into society and politics of early Japan. All readings and discussions in English. No knowledge of Japanese necessary.

MLJ 361 TEXT & CINEMA
F alternate years, to be offered 2000 3 cr. RCT 3
PREREQUISITE: MLJ 315 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.

MLS
Modern Languages, Spanish
Department of Modern Languages and Literatures
(406) 994-4448

MLS 101 ELEMENTARY SPANISH I
F 4 cr. RCT 4
PREREQUISITE: Offered on a rotating basis with French and German in the 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.

MLS 102G ELEMENTARY SPANISH II
S 3 cr. RCT 3
PREREQUISITE: MLS 101 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.

MLS 219G INTERMEDIATE SPANISH
F 3 cr. RCT 3
PREREQUISITE: MLS 102, 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.

MLS 220G SPANISH LANGUAGE & CULTURE
S 3 cr. RCT 3
PREREQUISITE: MLS 219
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.

MLS 501 SPANISH CULTURE & CIVILIZATION
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MLS 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.

MLS 502 LATIN AMERICAN CULTURE & CIVILIZATION
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: MLS 220
Readings, lectures and discussions in Spanish. This course examines the historical, social, and ideological aspects of modern Latin American culture. Taught in Spanish.

MLS 520 SURVEY OF SPANISH LITERATURE
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: MLS 220
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.

MLS 521 CONTEMPORARY LATIN AMERICAN LITERATURE
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MLS 220
An examination of the major authors, works, and literary movements of the 19th and 20th centuries as Latin American literature has come of age and established its independence from Spanish peninsular influences. Taught in Spanish.

MLS 550 INTENSIVE GRAMMAR REVIEW
F alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: MLS 220
In-depth review of problem areas in grammar and complete review of the verb system. This class is designed to provide prospective teachers and advanced students with an understanding of the function of grammar from the perspective of applied linguistics.

MLS 551 ADVANCED ORAL AND WRITTEN COMPOSITION
S alternate years, to be offered 2002 3 cr. RCT 3
PREREQUISITE: MLS 550
Development and refinement of advanced writing skills, intensive practice in expository and imaginative composition, review of idiomatic expressions, and vocabulary expansion.

MLS 360H DON QUIXOTE & THE WESTERN TRADITION
F alternate years, to be offered 2003 3 cr. LEC 3
PREREQUISITE: Junior standing
Cervantes masterpiece examined as both a revolutionary romantic manifesto and as a text which represents a lesson in the prudential morality of the counter-reformation. All reading and discussion are in English. No knowledge of Spanish is necessary.

MLS 410 SPANISH PHONETICS
F alternate years, to be offered 2000 3 cr. RCT 3
PREREQUISITE: MLS 220
A practical study of Spanish sounds - their production, combination, description, and representation by written symbols. Contrastive linguistic study, Spanish-English, for teaching application.

MLS 454C SEMINAR MODERN HISPANIC LITERATURE
S 3 cr. SEM 3
PREREQUISITE: MLS 501 or MLS 502 or MLS 520 or MLS 521.
Senior capstone course. An in-depth examination of the most important Hispanic works and authors of the 19th and 20th centuries. Taught in Spanish.
Course Descriptions

MLS 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: MLS 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

MLS 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,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.

MRC Mountain Research Center
Mountain Research Center
(406) 994-5178

MRC 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.

MRC 500 SEMINAR
F S 1 - 3 cr. SEM 1 - 3
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 montane ecosystems. Participation required of all graduate students enrolling for multidisciplinary study in the Mountain Research Center.

MRC 580 SPECIAL TOPICS
On Demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: Graduate status or seniors by petition.
Explores interactions between the natural (i.e., nonhuman) and human processes that drive mountain ecosystems. Weekly lectures present current research on relevant topics. Required of all graduate students enrolling for multidisciplinary study in the Mountain Research Center.

MSG 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
Directed undergraduate research/creative activity projects.

MSG 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,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.

MSG 200 LEADERSHIP MANAGEMENT AND LIFE SKILLS
F 2 cr. LEC 1 LAB 1
An introduction to leadership aspects of management, including the roles of military commanders, staffs, and non-commissioned officers. Discussion on life skills including time management, resources available, and health and fitness. Laboratory component is required which includes physical fitness training, and other outdoor skills.

MSG 201 ADVANCED LEADERSHIP CONCEPTS AND COMMUNICATION SKILLS
S 2 cr. LEC 1 LAB 1
The development of written and oral communication skills. An advanced look at leadership principles. Laboratory component is required and includes the operation of military radios and telephones, and a continued emphasis on physical fitness training.

MSG 203 AMERICAN MILITARY HISTORY
F 3 cr. LEC 2 LAB 1
The study of the evolution of the American Military, with concentration on the principles of war, and the war experience. Study of significant battles throughout our history of warfare which includes a field trip to a historical battleground.

MSG 204 BASIC ROTC SUMMER CAMP
Su 5 cr. LAB 3
Practical application of basic knowledge required of an army officer. Subject matter parallels 100 and 200 level courses. Satisfies prerequisites for advanced course in lieu of the basic course.

MSG 270 INDIVIDUAL PROBLEMS
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 280 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 301 SMALL UNIT TACTICS AND METHODS OF INSTRUCTION
F 3 cr. LEC 2 LAB 1.
PREREQUISITE: MSG 100, MSG 101, MSG 201, MSG 200, or MSG 204.
Small unit tactics, land navigation, weapons and communications systems. Methods of instruction to develop the student’s ability to organize, prepare, and conduct training. Practical exercises stress oral, written, and hand-on skills. A lab component including a field trip is required.

MSG 302 PREPARATION FOR ADVANCED CAMP
S 3 cr. LEC 2 LAB 1
PREREQUISITE: MSG 301.
Advanced exercise in skills developed in MSG 301. Duties and responsibilities of junior leaders. Preparation for advanced camp. A lab component including a field trip is required.

MSG 303 MILITARY SCIENCE ADVANCED CAMP
Su 5 cr. LEC 2 LAB 1
PREREQUISITE: MSG 302.
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
S 3 cr. LEC 2 LAB 1
PREREQUISITE: MSG 302, approval of instructor.
Study of the functions and relationship between command staff positions to include written and oral communications skills. Military professional ethics; role and responsibility of the Armed Forces in American society. Leadership through counseling. 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. Preparation for transition from college student to commissioned officer in the Army. A lab component is required.

MSG 403 MILITARY CONTRACTS, DISPUTES AND CLAIMS
S 1 cr. LEC 1
PREREQUISITE: Junior standing.
Study of military contracts, disputes, and claims. Emphasis on construction contracts, bids, and estimates. Students will learn procurement procedures for equipment and supplies along with legal responsibilities of contract officer.

MSG 405 TECHNICAL WRITING
S 1 cr. LEC 1
PREREQUISITE: Junior standing.
Study of military technical writing and the Army style. Emphasis on preparing military correspondence and operational orders.

MSG 470 INDIVIDUAL PROBLEMS
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.

MSG 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.

MSG 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: MSG 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

MSG 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,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.

MTA
Media and Theatre Arts
Department of Media and Theatre Arts
(406) 994-2484
Course Descriptions

MTA 101F FILM IN AMERICA
F,Su 3 cr. LEC 1 LAB 1
Survey of the development of the motion pictures as an art form, an industry, and a social force during the 20th century.

MTA 105 UNDERSTANDING MOVIES, TELEVISION & VIDEO
F,S 3 cr. RCT 3
An understanding of motion pictures, video art and television practice through study of principles of concept and production. Will include assignments to view and critique selected examples, and the completion of a short film.

MTA 105F UNDERSTANDING PHOTOGRAPHY
F,S,Su 3 cr. LEC 2 LAB 1
An introductory application of basic photographic theory and visual principles, including camera operation, use of B&W darkroom, and photographic assignments.

MTA 104F UNDERSTANDING THEATRE
F 3 cr. LEC 1 RCT 2
An exploration of the history of the theatre arts, beginning in Greece in the 5th century B.C. through contemporary American theatre.

MTA 218FG INTERNATIONAL FILM & TELEVISION
S, Su 3 cr. LEC 1 RCT 1 LAB 1
A close analysis and interpretation of the social function and cultural value of film and television in other countries by comparative approaches, with emphasis on the period since World War II.

MTA 222 LIGHTING TECHNIQUE AND DESIGN
F 3 cr. LEC 1 RCT 2
PREREQUISITE: MTA 101F, MTA 102, MTA 103F, MTA 104F, MTA 218FG.
An introduction to aesthetics and technical principles of lighting with attention to basic instruments and a lighting board. The opportunity for an exercise in lighting design will be provided.

MTA 232 ACTING I
F 3 cr. LEC 1 RCT 2
PREREQUISITE: MTA 101F, MTA 102, MTA 103F, MTA 104F, MTA 218FG.
An introduction to the basic skills of acting through acting exercises and individual projects, including a unit for acting for the camera.

MTA 251 WRITING
F 3 cr. RCT 3
PREREQUISITE: MTA 101F, MTA 102, MTA 103F, MTA 104F, MTA 218FG.
Experience in techniques and concepts of writing for motion picture and video production.

MTA 253 DIRECTING
S 3 cr. LEC 2 LAB 1
PREREQUISITE: MTA 101F, MTA 102, MTA 103F, MTA 104F, MTA 218FG.
An examination of the theory and practice of directing and working with actors, for film, television, and theatre.

MTA 254 SOUND
S 3 cr. LEC 2 LAB 1
PREREQUISITE: MTA 101F, MTA 102, MTA 103F, MTA 104F, MTA 218FG.
Experience in sound recording and reproduction, emphasizing equipment operation and creative concepts.

MTA 255 CINEMATOGRAPHY/VIDEOGRAPHY
F 3 cr. LEC 2 LAB 1
PREREQUISITE: MTA 101F, MTA 102, MTA 103F, MTA 104F, MTA 218FG.
Experience in motion picture and video production, emphasizing exterior filming and remote video recording.

MTA 260 INTRODUCTION TO DIGITAL PHOTOGRAPHY
S 4 cr. LEC 2 LAB 1 RCT 1
PREREQUISITE: MTA 264, MTA 265.
An introduction to digital photography and theory of bit-mapped digital imaging; image capture via scanning and digital cameras, image design, processing, printing and press, and reproductive processes for darkroom and camera, emphasizing quality of output and its relationship to digital imaging.

MTA 261 SCENIC DESIGN
S 3 cr. LEC 2 LAB 1
PREREQUISITE: MTA 101F, MTA 102, MTA 103F, MTA 104F, MTA 218FG.
An introductory course in design and technical aspects of scenic design for theatre, film, and video. Lectures on basic stage terminology; types and styles of scenery, tools and materials used in technical theatre practices with practical application through laboratory exercises.

MTA 263 STAGE MAKEUP AND COSTUME DESIGN THEORY
S alternate years, to be offered 2002 3 cr. RCT 2 LAB 1
PREREQUISITE: MTA 104F.
Theory and practical experience in various aspects of makeup for stage, screen, and studio, integrated with basic costume design theory.

MTA 264 INTERMEDIATE BLACK AND WHITE PHOTOGRAPHY
F 4 cr. LEC 2 LAB 1
PREREQUISITE: MTA 103F.
Theory and application of image control in B&W via the Zone System. Introduction to the view camera and studio procedures; basic lighting techniques, portraiture, and visual problem solving.

MTA 265 COLOR PHOTOGRAPHY ONE
F 4 cr. LEC 2 LAB 2
PREREQUISITE: MTA 103F.
An introduction to visual principles of color and technical qualities of color materials; problem solving using color transparency, color negative, and color print materials. Critical evaluation and exploration of color visual language.

MTA 266 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.

MTA 293 EARLY HISTORY OF PHOTOGRAPHY
5 alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: MTA 103F.
The visual and technical evolution of photography within the cultural context. Personalities, ideas, and style of individual photographers are explored. Prehistory to 1913.

MTA 304 RECENT HISTORY OF PHOTOGRAPHY
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MTA 103F.
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.

MTA 319 NON-SILVER PHOTOGRAPHY
S alternate years, to be offered 2002 4 cr. LEC 1 LAB 2 RCT 1
PREREQUISITE: MTA 264 and MTA 265.
Image creation through the use of historical and contemporary nonsilver processes. Gum printing, and Palladium/Platinum printing are featured. Extensive aesthetic decision making and exploration of these processes are incorporated.

MTA 321 ADVANCED ACTING
S alternate years, to be offered 2001 3 cr. RCT 3
PREREQUISITE: MTA 222.
The development of advanced acting techniques through improvisational exercises and performing scenes from plays with an emphasis on character development and script analysis.

MTA 333 PRODUCTION OPERATIONS AND TECHNIQUES
F,S,Su 1-3 cr. END Maximum 12 cr.
PREREQUISITE: One of the following: MTA 102, MTA 103, or MTA 104.
Practical experience associated with production and research projects in motion pictures, television/video, photography, and theatre. May include rehearsal or performance activity. (May be taken by sophomores with written permission of an advisor and the Department Head.)

MTA 341 PORTRAITSURE
F alternate years, to be offered 2001 3 cr. LEC 1 LAB 1 RCT 1
PREREQUISITE: MTA 264 and MTA 265.
Advanced theory and practice using all film formats in B&W and color. Emphasis on the creative aspects of photographing people on location and in the studio.

MTA 342 FICTIONAL PHOTOGRAPHY
S 4 cr. LEC 2 LAB 1 RCT 1
PREREQUISITE: MTA 264 and MTA 265.
Advanced photographic theory and practice in studio conditions using B&W and color. Emphasis given to creative aspects of artificial lighting and staged subject matter in all camera formats.

MTA 343 NON-FICTION PHOTOGRAPHY
S 4 cr. LEC 2 LAB 1 RCT 1
PREREQUISITE: MTA 264 and MTA 265.
The applied study of photography as a narrative medium, emphasizing the practices and uses of non-fiction, editorial and essays.

MTA 344 EXPERIMENTAL PHOTOGRAPHY
F 3 cr. LEC 1 LAB 1 RCT 1
PREREQUISITE: MTA 264 and MTA 265.
The applied study of experimental photographic techniques for darkroom and camera, emphasizing contemporary image-making methods.

MTA 345 COLOR PHOTOGRAPHY TWO
F alternate years, to be offered 2000 4 cr. LEC 2 LAB 1 RCT 1
PREREQUISITE: MTA 264 and MTA 265.
Further applied study of color visual theory and the control of materials for color photographic expression. Emphasis is on large format and the use of color negative and print materials and color transparencies.
MTA 472C MOTION PICTURE/TV/VIDEO/THEATRE SENIOR PRODUCTION
FS 2 cr. LEC 2 May be repeated.
COREQUISITE: MTA 474.
Senior capstone course. A final series of television planning, video production projects, stage production, or the production of a complete motion picture.

MTA 473C PHOTOGRAPHY SENIOR PRODUCTION
FS 1 cr. LEC 1 May be repeated.
PREREQUISITE: Senior standing in the photography option.
COREQUISITE: MTA 473.
Senior capstone course. Independent production of a significant body of work in photography; extensive production combined with group critique and faculty consultation.

MTA 474 INDEPENDENT MOTION PICTURE/TV/VIDEO/THEATRE SENIOR PRODUCTION
FS 3 cr. IND 3
COREQUISITE: MTA 472C.
Independent programming or production supporting MTA 472C.

MTA 475 INDEPENDENT PHOTOGRAPHY SENIOR PRODUCTION
FS 4 cr. IND 4
COREQUISITE: MTA 475C.
Independent production work supporting MTA 475C.

MTA 476 CAREER INTERNSHIP
FS, Su 2-12 cr. IND
PREREQUISITE: Junior standing and one of the following: MTA 255, MTA 261, MTA 264.
An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

MTA 480 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.

MTA 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS, Su 1-2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: MTA 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

MTA 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS, 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.

MTA 570 INDIVIDUAL PROBLEMS
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.

MTA 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.

MOR
Music Education
Department of Music
(406) 994-3562

MUED 515 CONTEMPORARY DIRECTIONS IN MUSIC
Su alternate years, to be offered 2000 2 cr. LEC 2
PREREQUISITE: MUS 311.
In-depth investigation of musical styles prevalent in western music between 1960-present.

MUED 519 WORLD MUSIC
FSu on demand 2 cr. LEC 2
PREREQUISITE: MUS 311.
Approaches to and use of music in world cultures. The influence of world musics on Western music.

MUED 530 FOUNDATIONS OF MUSIC EDUCATION
Su 2000 2 cr. LEC 2
PREREQUISITE: EDEL 410, EDED 410
Philosophical, historical, psychological and social foundations of music education. Music in public education, music curricula, aesthetics, and music learning theory.

MUED 535 TEACHING MUSIC LITERACY
Su 2062 2 cr. LEC 2
PREREQUISITE: EDEL 337.
Analysis of the foundations of music literacy, contemporary trends in music reading and writing instruction and research related to these issues.

MUED 540 ADVANCED CONDUCTING
Su alternate years, to be offered 2001 2 cr. RCT 2
PREREQUISITE: MUS 357 or MUS 558.
Conducting techniques, score study and rehearsal procedures for direction of instrumental and choral groups in the public schools.
MUED 560 APPLIED MUSIC
F,Su 1 cr. STU 1 May be repeated; Maximum 3 cr.
PREREQUISITE: MUS 460 and consent of instructor.
Advanced studies of techniques of performance and interpretation to develop musical ability, expressivity, accuracy and stylistic awareness in student's performance area.

MUED 565 GRADUATE RECITAL
F,Su 1 cr. IND 1
PREREQUISITE: MUED 560.
Formal recital to include works from different eras.

MUED 570 INDIVIDUAL PROBLEMS
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.

MUED 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
F,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.

MUED 576 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.

MUED 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.

MUED 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 inservice educators. A specific focus is given to each course which is appropriately subtitled.

MUS
Music
Department of Music
(406) 994-3562

MUS 101 ESSENTIALS OF MUSIC THEORY
On Demand 2 cr. LEC 1 LAB 1
Introduction to the rudiments of music with emphasis on scales, keys, intervals, and rhythm at the keyboard. For pre-music theory students.

MUS 102F FUNDAMENTALS OF MUSICAL CREATION
F 3 cr. LEC 3
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.

MUS 103 AURAL SKILLS I
F 1 cr. LAB 1
PREREQUISITE: Music reading pre-test.
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. Assumes knowledge of musical notation.

MUS 104 AURAL SKILLS II
S 1 cr. LAB 1
PREREQUISITE: MUS 103.
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.

MUS 105 MUSIC THEORY I
F,S 3 cr. LEC 3
PREREQUISITE: Music reading pre-test.
Continuation of study of materials used in the previous semester: harmony in the common practice period. Successful completion of Music Reading Pre-test (administered during the first class meeting and covering scales, rhythm/meter, clef, and key signatures) required for enrollment in this course.

MUS 106 MUSIC THEORY II
S,Su 3 cr. LEC 3
PREREQUISITE: MUS 105.
Continuation of study of materials used in the previous semester: harmony in the common practice style, musical notation and language, function and interaction of the elements of music.

MUS 120 MARCHING BAND
F 1 cr. LAB 1 May be repeated, Maximum 8 cr.
Non-auditioned ensemble offering experience in marching techniques and outdoor performances.

MUS 126 UNIVERSITY CHORUS
F 1 cr. LAB 1 May be repeated, Maximum 8 cr.
Non-auditioned choir performing a variety of concert music.

MUS 130 TECHNIQUES: FLUTE & CLARINET
F 1 cr. LAB 1
Teaching techniques, basic playing approaches, and maintenance procedures for flute and clarinet. For music education students.

MUS 131 TECHNIQUES: SAX, OBOE & BASSOON
S 1 cr. LAB 1
Teaching techniques, basic playing approaches, and maintenance procedures for saxophone, oboe, and bassoon. For music education students.

MUS 132 TECHNIQUES: TRUMPET & FRENCH HORN
S 1 cr. LAB 1
Teaching techniques and materials for trumpet and French horn. For music education students.

MUS 133 TECHNIQUES: TROMBONE, EUPHONIUM & Tuba
F 1 cr. LAB 1
Teaching techniques and materials for trombone, euphonium, and tuba. For music education students.

MUS 150 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.

MUS 151 KEYBOARD SKILLS II
S 1 cr. LAB 1
PREREQUISITE: MUS 150 or placement audition and music major.
Continued study of keyboard theory and technique, creative activities, sight reading, and piano repertoire. For music majors.

MUS 153 GUITAR IN CLASS I
F 1 cr. LAB 1
PREREQUISITE: Placement audition.
Basic instruction in techniques of chord and classical guitar, music reading, and performance.

MUS 154 GUITAR IN CLASS II
F 1 cr. LAB 1
PREREQUISITE: MUS 153 or placement audition.
Continuation of MUS 153.

MUS 156 VOICE IN CLASS
F 1 cr. LAB 1 May be repeated, Maximum 2 cr.
Basic singing technique: tone production, interpretation, introduction to song literature.

MUS 157 PIANO IN CLASS I
F 1 cr. LAB 1
PREREQUISITE: Permission of instructor
Class instruction in beginning techniques of keyboard performance. For non-music majors with little or no piano experience.

MUS 158 PIANO IN CLASS II
S 1 cr. LAB 1
PREREQUISITE: MUS 157 or permission of instructor
Continuation of class instruction in beginning techniques of keyboard performance. For non-music majors with little or no piano experience.

MUS 160 APPLIED MUSIC I
F,Su 1 cr. STU 1 May be repeated, Maximum 3 cr.
PREREQUISITE: Successful audition.
Techniques of performance and interpretation to develop musical ability, expressivity, accuracy and stylistic awareness in student's performance area.

MUS 201 AURAL SKILLS III
F 1 cr. LAB 1
PREREQUISITE: MUS 104.
Continued development of aural and vocal skills that deal with tonal and temporal relationships.

MUS 202 AURAL SKILLS IV
S 1 cr. LAB 1
PREREQUISITE: MUS 201.
Continued development of aural and vocal skills that deal with tonal and temporal relationships.

MUS 203 TECHNIQUES: PERCUSSION
S 1 cr. LAB 1
Teaching techniques and materials for percussion. For music education students.

MUS 205 TECHNIQUES: STRINGS
F 1 cr. LAB 1
Teaching techniques and materials for strings. For music education students.

MUS 300 MUSIC THEORY III
F 3 cr. LEC 3
PREREQUISITE: MUS 106.
### Course Descriptions

**MUS 206 MUSIC THEORY IV**  
S 3 cr. LEC 3  
PREREQUISITE: MUS 205.  
Continuation of study and use of harmony and counterpoint in the common practice period.

**MUS 210F ENJOYMENT OF MUSIC**  
FS 3 cr. LEC 3  
Presentation of examples of great music literature to develop informed, perceptive listening and musical understanding.

**MUS 212ZG HISTORY OF AMERICAN POPULAR MUSIC**  
FS 3 cr. LEC 3  
American popular music of the twentieth century with emphasis on theories and performance practices as a reflection of the human condition.

**MUS 224 JAZZ ENSEMBLE**  
FS 1 cr. LAB 1  
May be repeated, Maximum 8 cr.  
PREREQUISITE: Successful audition.

**MUS 235 DICTION: ENGLISH-LATIN**  
S 2 cr. LEC 2  
PREREQUISITE: One of the following: MUS 156 or MUS 160 (voice).

**MUS 250 KEYBOARD SKILLS III**  
F 1 cr. LAB 1  
PREREQUISITE: MUS 151 or placement audition and music major.

**MUS 251 KEYBOARD SKILLS IV**  
S 1 cr. LAB 1  
PREREQUISITE: MUS 250 or placement audition and music major.

**MUS 253 GUITAR IN CLASS III**  
F 1 cr. LAB 1  
PREREQUISITE: MUS 154.

**MUS 254 GUITAR IN CLASS IV**  
S 1 cr. LAB 1  
PREREQUISITE: MUS 253.

**MUS 257 PIANO IN CLASS III**  
F 1 cr. LAB 1  
PREREQUISITE: MUS 158 or permission of instructor.

**MUS 258 PIANO IN CLASS IV**  
S 1 cr. LAB 1  
PREREQUISITE: MUS 257 or permission of instructor.

**MUS 260 APPLIED MUSIC II**  
FS,Su 1 cr. STU 1  
May be repeated, maximum 3 cr.  
PREREQUISITE: MUS 160 and successful audition.

**MUS 260 SPECIAL TOPICS**  
On Demand 1 - 4 cr. Maximum 12 cr.  
PREREQUISITE: None required but some may be determined necessary by each offering department.

**MUS 305 INSTRUMENTATION**  
F 2 cr. LEC 1 LAB 1  
PREREQUISITE: MUS 206.

**MUS 310 MUSIC HISTORY: ANTIQUITY THROUGH BAROQUE**  
F 3 cr. LEC 3  
PREREQUISITE: MUS 106.

**MUS 311 MUSIC HISTORY: CLASSICAL THROUGH 20TH CENTURY**  
S 3 cr. LEC 3  
PREREQUISITE: MUS 106.

**MUS 312PG WORLD MUSIC**  
F 3 cr. LEC 3  
PREREQUISITE: Junior standing.

**MUS 320 SYMPHONIC BAND**  
F 1 cr. LAB 1  
May be repeated, maximum 8 cr.  
PREREQUISITE: Successful audition.

**MUS 322F PERCUSSION ENSEMBLE**  
F 1 cr. LAB 1  
May be repeated, maximum 8 cr.  
PREREQUISITE: Successful audition.

**MUS 325 CHAMBER ORCHESTRA**  
F 1 cr. LAB 1  
May be repeated, maximum 8 cr.  
PREREQUISITE: Successful audition.

**MUS 326 CHAMBER MUSIC ENSEMBLE**  
F 3 cr. LEC 3  
S alternate years, to be offered 2002 2 cr. RCT 1  
PREREQUISITE: MUS 235.

**MUS 330 DICTION & REPERTOIRE: FRENCH**  
F alternate years, to be offered 2000 2 cr. LEC 2  
PREREQUISITE: MUS 206.

**MUS 331 DICTION & REPERTOIRE: ITALIAN & GERMAN**  
S alternate years, to be offered 2001 2 cr. LEC 2  
PREREQUISITE: MUS 206.

**MUS 336 DICTION & REPERTOIRE: FRENCH**  
F alternate years, to be offered 2001 2 cr. LEC 2  
PREREQUISITE: MUS 206.

**MUS 337 INSTRUMENTAL CONDUCTING & REHEARSAL TECHNIQUES**  
S 2 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 357.

**MUS 338 CHORAL CONDUCTING & REHEARSAL TECHNIQUES**  
F 2 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 204, MUS 206.

**MUS 340 MARCHING BAND TECHNIQUES**  
S 1 cr. LAB 1  
May be repeated; maximum 8 cr.  
PREREQUISITE: Successful audition.

**MUS 351 ACCOMPANYING**  
F alternate years, to be offered 2000 2 cr. RCT 2  
PREREQUISITE: MUS 260.

**MUS 353 PRODUCTION AND PRESENTATION**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206.

**MUS 354 IMPROVISATION II**  
F 1 cr. LAB 1  
PREREQUISITE: MUS 204, MUS 206.

**MUS 355 IMPROVISATION I**  
F alternate years, to be offered 2001 2 cr. LEC 1  
PREREQUISITE: MUS 206 or successful audition.

**MUS 356 DICTION & REPERTOIRE: ITALIAN & GERMAN**  
F alternate years, to be offered 2001 2 cr. LEC 2  
PREREQUISITE: MUS 255.

**MUS 357 DICTION & REPERTOIRE: FRENCH**  
S alternate years, to be offered 2002 2 cr. LEC 2  
PREREQUISITE: MUS 255.

**MUS 397 ADVANCED STUDY**  
S alternate years, to be offered 2002 2 cr. LEC 2  
PREREQUISITE: MUS 260.

**MUS 398 CHORAL CONDUCTING & REHEARSAL TECHNIQUES**  
F alternate years, to be offered 2000 2 cr. RCT 2  
PREREQUISITE: MUS 260.

**MUS 399 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206.

**MUS 400 MARCHING BAND TECHNIQUES**  
F alternate years, to be offered 2002 2 cr. LEC 2  
PREREQUISITE: MUS 206, MUS 207.

**MUS 410 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206, MUS 207.

**MUS 420 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206, MUS 207.

**MUS 430 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206, MUS 207.

**MUS 440 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206, MUS 207.

**MUS 450 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206, MUS 207.

**MUS 460 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206, MUS 207.

**MUS 470 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206, MUS 207.

**MUS 480 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206, MUS 207.

**MUS 490 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206, MUS 207.

**MUS 500 MARCHING BAND TECHNIQUES**  
F 3 cr. LEC 1 RCT 1  
PREREQUISITE: MUS 206, MUS 207.
Course Descriptions

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and vocal chamber music ensembles. Students will study and perform chamber music repertory composed between 1650 and the present.

MUS 350 PARKENING OBSERVATION
Su 1 cr. IND 1 Maximum 4 cr.
PREREQUISITE: MUS 160.
Guided observation and critique of Parkening Master Class.

MUS 360 APPLIED MUSIC III
F,Su 1 cr. STU 1 May be repeated, Maximum 3 cr.
PREREQUISITE: MUS 260 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.

MUS 400 SEMINAR
FSu 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.

MUS 405C FORM AND ANALYSIS
F 3 cr. LEC 3
PREREQUISITE: MUS 206.

MUS 406 COMPOSITION
F,Su on demand 1 - 3 cr. TUT 1 IND 1-2 May be repeated; maximum 6 cr.
PREREQUISITE: MUS 206.
Individual study of compositional practices in any musical idiom, compositional processes and techniques, and aesthetic concepts applicable to the idiom of writing or creation of music.

MUS 407 COUNTERPOINT
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: MUS 206.
Study and practice of the techniques of writing two- and three-voice counterpoint in the style of J.S. Bach, including polyphony, invertible counterpoint, canon, and simple fugal writing.

MUS 420 WIND ORCHESTRA
FS 1 cr. LAB 1 Maximum 8 cr.
PREREQUISITE: Successful audition.
Study and performance of advanced, traditional, and contemporary wind band repertoire.

MUS 425 ORCHESTRA
FS 1 cr. LAB 1 Maximum 8 cr.
PREREQUISITE: Successful audition.
Advanced orchestral performance in the standard literature.

MUS 426 MONTANANS
FS 1 cr. LAB 1 Maximum 8 cr.
PREREQUISITE: Successful audition.
Advanced performance in small vocal ensemble using stylistic variety in programming.

MUS 430 MUSICAL INSTRUMENT REPAIR
F alternate years, to be offered 2000 1 cr. LAB 1
PREREQUISITE: Junior standing.
Maintenance procedures and minor repairs for band and orchestra instruments.

MUS 459 FIELD EXPERIENCE IN MUSIC
F 1 cr. LAB 1
COREQUISITE: MUS 446, MUS 449
A field experience in secondary (grades 5-12) music situations prior to student teaching.

Observations, interviews, and brief teaching experiences with music ensembles at the secondary level.

MUS 440 INSTRUMENTAL PEDAGOGY & LITERATURE
F and on demand 2 cr. LEC 1 IND 1
PREREQUISITE: Junior standing, MUS 260.
Studio teaching techniques and relevant etudes, solo, and ensemble literature in the student's major applied area. Evaluation of literature and progression of a young player. Required observation of experienced private lesson teachers.

MUS 442 VOCAL PEDAGOGY & LITERATURE
S 2 cr. LEC 2
PREREQUISITE: Junior standing, MUS 251, and one of the following: MUS 156, MUS 250.
Vocal pedagogy, teaching techniques, and literature.

MUS 443 PIANO PEDAGOGY I
F alternate years, to be offered 2001 2 cr. LEC 2
PREREQUISITE: Junior standing and MUS 260.
Piano methods, beginning and intermediate keyboard literature, and supplementary material needed for studio/class piano teacher.

MUS 444 PIANO PEDAGOGY II
S alternate years, to be offered 2002 2 cr. LEC 1
LAB 1
PREREQUISITE: MUS 443.
Study of class piano methods, intermediate and advanced keyboard literature and supplementary material needed for the studio/class piano teacher. Observations and supervised teaching experiences are included.

MUS 445 EXPERIENCE STUDIO TEACHING
F 2 cr. IND 2 May be repeated, Maximum 4 cr.
PREREQUISITE: Senior standing and one of the following: MUS 440, MUS 442, MUS 444.
Supervised teaching in student's performance area. For studio teaching majors.

MUS 446 SECONDARY MUSIC METHODS
F 3 cr. LEC 3
PREREQUISITE: MUS 338, MUS 251.
COREQUISITE: MUS 449, MUS 489.
The historical perspective of public school music education, strategies for teaching music in high school, recruiting, classroom management skills, and administrative responsibilities of the high school choral and instrumental music teacher.

MUS 449 LITERATURE FOR SCHOOL MUSIC ENSEMBLES
F 2 cr. LEC 2
PREREQUISITE: MUS 338, MUS 251.
COREQUISITE: MUS 446, MUS 489.
A study of literature appropriate for performance by middle school and high school band, choir, and orchestral ensembles.

MUS 450 RECITAL
FSu 1 cr. IND 1
PREREQUISITE: MUS 360.
Selection of appropriate program of works suited to student's abilities, preparation for performance.

MUS 458 GUITAR MASTER CLASS
Su and on demand 1 cr. RCT May be repeated. Max 4 cr.
PREREQUISITE: Consent of instructor.
Directed study and research on an individual basis.

MUS 460 APPLIED MUSIC IV
FSu 1 cr. STU 1 May be repeated; maximum 3 cr.
PREREQUISITE: MUS 260 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.

MUS 470 INDIVIDUAL PROBLEMS
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.

MUS 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.

MUS 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FSu 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: MUS 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

MUS 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FSu 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.

N
Nursing
College of Nursing
(406) 994-3783

N 200 SEMINAR
On Demand 1 cr. SEM 1
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.

N 215 NURSING AS A PROFESSION
F 3 cr. LEC 2 RCT 1
PREREQUISITE: Sophomore standing.
Examination of issues relating to nursing as a profession, the multiple roles of nursing in society and health care, and the principle concepts which are generic to nursing: person, health, and environment.

N 222 FUNDAMENTALS OF NURSING
F 3 cr. LEC 2 LAB 1
Application of the principles, concepts, and related skills necessary for care of the individual needing assistance with mobility, hygiene, and comfort. Basic principles of safety, medical asepsis, drug administration, teaching-learning, and vital sign assessment are included.

N 223 NURSING PROCESS
F 3 cr. LEC 2 LAB 1
PREREQUISITE: HDCF 1505 or PSY 252S, N 222
(N 223 may be taken concurrently with permission of instructor and Dean of Nursing).
Introduction to the nursing process with examination of selected nursing diagnoses. Basic communication skills, documentation, principles of teaching-learning, and psychomotor nursing skills are applied in the provision of comfort and safety needs of older adults in the clinical setting.)
organizational concepts for beginning level professional nursing practice.

**N 489 RESEARCH IN NURSING**

ES 3 cr LEC 3

**PREREQUISITE:** N 330, N 541, N 547, N 558 or RN status.

This course introduces students to the nursing research process. Critical questions about nursing practice are formulated and researchable problems are identified. Students are taught to critically examine research studies and to consider the applicability of findings to clinical practice.

**N 498 UNDERGRADUATE RESEARCH/CREATIVITY ACTIVITY INSTRUCTION**

ES,Su 1 - 2 cr RCT May be repeated. Max 4 cr.

**COREQUISITE:** N 490.

Classroom instruction associated with directed undergraduate research/creative activity projects.

**N 499 UNDERGRADUATE RESEARCH/CREATIVITY ACTIVITY**

ES,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.

**N 500 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.

**N 531 RURAL HEALTH: NEEDS AND PERCEPTIONS**

F 3 cr LEC 2 LAB 1

**COREQUISITE:** N 569. Part-time study different, see advisor.

This course focuses on health needs and perceptions of individuals and subgroups in rural areas. Rural environments including communities and individuals will be assessed. Data addressing health concerns from a variety of sources will be examined through systematic approaches.

**N 542 COMMUNICATION IN NURSING LEADERSHIP I**

F 2 cr LEC 1 LAB 1

**COREQUISITE:** N 569. Part-time study different, see advisor.

This course, as one of a series, focuses on skill development in scholarly writing, enhancement of critical thinking as the foundation for effective verbal and written interactions, and the elements of strong collective communication styles for nursing leaders.

**N 544 COMMUNICATION IN NURSING LEADERSHIP II**

S 2 cr LEC 1 LAB 1

**PREREQUISITE:** N 542

**COREQUISITE:** N 579, N 572. Part-time study different, see advisor.

One of a series of courses focusing on verbal, written and computer skills for nursing leaders. The emphasis changes each semester to complement core courses.

**N 546 COMMUNICATION IN NURSING LEADERSHIP III**

F 2 cr LEC 1 LAB 1

**PREREQUISITE:** N 544.

**COREQUISITE:** N 552, N 556. Part-time study different, see advisor.

One of a series of courses focusing on verbal, written and computer skills for nursing leaders. The emphasis changes each semester to complement core courses.

**N 548 COMMUNICATION IN NURSING LEADERSHIP IV**

S 2 cr LEC 1 LAB 1

**PREREQUISITE:** N 546.

**COREQUISITE:** N 553, N 575. Part-time study different, see advisor.

One of a series of courses focusing on verbal, written and computer skills for nursing leaders. The emphasis changes each semester to complement core courses.

**N 550 HEALTH ASSESSMENT**

F 3 cr LEC 1 LAB 2

Students who have not completed a graduate health assessment course will be required to complete this course, consisting 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 FNP faculty.

**N 552 ADMINISTRATION AND ORGANIZATION OF HEALTH CARE SYSTEMS**

F 2 cr LEC 2

**PREREQUISITE:** N 579.

**COREQUISITE:** N 565. Part-time study different, see advisor.

Focuses on nursing leadership in rural community-focused health care systems. Emphasis is on organizational structure, culture, change and behavior. Traditional elements of leadership will be blended with emerging nursing theory to strategically energize current and developing rural health care systems.

**N 553 FINANCING AND BUDGETING OF HEALTH CARE SYSTEMS**

S 2 cr LEC 2

**PREREQUISITE:** N 552.

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.

**N 555 CONCEPTS OF FAMILY CARE**

S 2 cr LEC 2

**PREREQUISITE:** N 551, N 569.

The focus of this course is the analysis and synthesis of family theories from nursing and other disciplines. In addition, related concepts and theories will be analyzed as a basis for understanding the principles of family assessment and family health promotion from a nursing perspective. An emphasis is placed on the rural contextual factors which influence nursing practice within families.

**N 556 PHARMACOTHERAPEUTICS I**

F 3 cr LEC 3

**PREREQUISITE:** Graduate standing.

Provides a basis for understanding the pharmacokinetics and actions of specific groups of drugs commonly used in primary care practice. Discussion will be presented on pharmacological action of drugs, side effects, appropriate dosing, drug interactions and guidelines for use of drugs. Legal and ethical considerations of prescriptive practice will also be addressed.

**N 557 PHARMACOTHERAPEUTICS II**

S 1 cr LEC 1

**PREREQUISITE:** N 556.

**COREQUISITE:** N 553.

One of a series of courses focusing on verbal, written and computer skills for nursing leaders. The emphasis changes each semester to complement core courses.

The focus of the course is application of the students' clinical and didactic pharmacokinetics knowledge. Case study format provides for focusing on medication needs with emphasis on monitoring and adjusting therapeutic dosage, particularly of the aging population. Prescriptive issues for Advanced Practice Registered Nurses (APRNs) will be addressed.

**N 560 ADVANCED PHYSIOLOGICAL/PATHOPHYSIOLOGICAL CONCEPTS IN PRIMARY CARE**

F 4 cr LEC 4

**PREREQUISITE:** Graduate Standing

**COREQUISITE:** N 556. Part-time study different, see advisor.

Comprehensive study of the physiological/pathophysiological functioning of all human body systems. Age-related variations in physiology/pathophysiology are emphasized in this course.

**N 561 PRIMARY CARE I FOR CHILDBEARING AND CHILDRearing FAMILIES**

S 7 cr LEC 3 LAB 4

**PREREQUISITE:** N 569, N 555 and N 581.

Focuses on comprehensive assessment, intervention and preventive care for childbearing and childrearing families in primary health care settings. Advanced nursing practice is based on theoretical perspectives which service as guides to identification and interventions for the common health needs. Recognizing and valuing the holistic nature of individuals within families, this course will include content on physiological, pathophysiological, psychological, sociocultural and spiritual primary health care needs of childbearing and childrearing families.

**N 562 PRIMARY CARE II FOR MIDLIFE FAMILIES**

F 4 cr LEC 3 LAB 4

**PREREQUISITE:** N 561.

Focuses on comprehensive assessment, intervention and preventive care for midlife families in primary health care settings. The use of theoretical perspectives for the advanced practice of nursing is continued. Recognizing and valuing the holistic nature of individuals within families, this course will include content on the physiological, psychological, developmental, sociocultural and spiritual primary health care needs of midlife families.

**N 563 PRIMARY CARE III FOR AGING FAMILIES**

S 7 cr LEC 3 LAB 4

**PREREQUISITE:** N 562.

Assessment, treatment and preventive care for aging families in primary health care settings. Physiological, psychological, sociocultural and spiritual responses to acute and chronic conditions will be explored. Advanced nursing practice is developed through continued utilization of theoretical perspectives which serve as guides to identification and treatment of the common health care needs of the aging family. There is added emphasis on the advocacy role of the nurse practitioner with this population.

**N 565 PRINCIPLES OF POPULATION-BASED HEALTH**

F 3 cr LEC 2 LAB 1

**PREREQUISITE:** N 581, N 479, N 490 and Undergraduate Statistics.

**COREQUISITE:** N 552. Part-time study different, see advisor.

Emphasis is on the 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 will be explored. A strong emphasis on the physical, social, cultural and political environments of rural populations provides a framework for the above concepts.

N 569 THEORETICAL AND CONCEPTUAL FOUNDATIONS OF NURSING
F 3 cr. LEC 3
COREQUISITE: Part-time study different, see advisor.
This course explores ways of knowing in relation to theory and conceptual development. Emphasizes the development, identification, analysis and application of theories and conceptual frameworks for the discipline of nursing.

N 570 INDIVIDUAL PROBLEMS
On Demand 1 - 3 cr. IND Maximum 6 cr.
PREREQUISITE: Graduate standing, consent of instructor, approval of department head and Dean of Graduate Studies.
Direct research and study on an individual basis.

N 571 PRIMARY CARE IV: CLINICAL PRECEPTORSHIP
Su 6 cr. LAB 6
PREREQUISITE: Final semester of course work.
This practicum allows students to further refine family nurse practitioner skills. Students may participate in the selection of a practice setting such as family health, pediatrics, women's health or gerontology or a broad based general practice based on availability. Theoretical perspectives are applied to enhance assessment and treatment skills for the selected area of practice.

N 572 HUMAN RESOURCE MANAGEMENT
S 3 cr. LEC 2 LAB 1
This course examines personnel functions as they apply to health care systems. Emphasis will be done on job design, staffing, equal opportunity employment, training and development, performance appraisal, compensation, and labor-management relations.

N 573 HEALTH POLICY, REGULATION AND ETHICS
S 3 cr. LEC 2 LAB 1
Policy development and implementation, the impact of regulatory and legal issues on organizational systems, and ethical problems in nursing practice is the focus of this course. Legislative processes and political philosophy are discussed in the context of health care ethics and reform.

N 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT
FS,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.

N 576 INTERNSHIP
Su 2 - 12 cr. IND Maximum 12 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.

N 579 NURSING RESEARCH
S 4 cr. LEC 3 LAB 1
PREREQUISITE: Undergraduate statistics and research.
This course focuses on the conceptualization of nursing research problems and the techniques of scientific inquiry. Methodologic approaches emphasizing applicability to rural health issues will be included.

N 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.

N 588 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 course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

N 590 MASTER'S THESIS
ES, Su 1 - 10 cr. IND May be repeated.
PREREQUISITE: Master's standing.

NAS
Native American Studies
Center for Native American Studies (406) 994-3881

NAS 001 SELECTED ISSUES IN PERSONAL DEVELOPMENT
F 2 cr. RCT 2
For students making an adjustment to university life. Topics include study skills, goal setting, decision making, time management, and personal issues that face college students.

NAS 100SG INTRODUCTION TO NATIVE AMERICAN STUDIES
ES 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.

NAS 201SG AMERICAN INDIANS IN MONTANA
S 3 cr. LEC 3
Movements of Indians into Montana. Social structures including kinship, political affiliations, military, war, 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.

NAS 210SG AMERICAN INDIANS IN TANZANIA
S 3 cr. LEC 3
The cultural context of Tanzania provides the setting for this study of the potentialities and problems of Native American students. The context is provided by research on the cultural and educational experiences of Native American students in Tanzania. The context is also provided by the historical and cultural context of the United States and the context of the United Nations in which these experiences are occurring.

NAS 220 AMERICAN INDIAN ART
F 3 cr. LEC 3
The aesthetic, cultural, and symbolic meanings of traditional and contemporary American Indian art. Plains, Southwest, Northeast, and Inuit art and artists.

NAS 242SG AMERICAN INDIANS IN CONTEMPORARY SOCIETY
F 3 cr. LEC 3
Selected contemporary economic, social, political, educational, and cultural issues facing American Indian students today, with special emphasis on tribal groups in Montana.

NAS 270 INDIVIDUAL PROBLEMS
On Demand 1 - 3 cr. IND Max 6
PREREQUISITE: Consent of instructor and approval of department head.
Directed research and study on an individual basis.

NAS 280 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.

NAS 289 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
ES, Su 1 - 2 cr. RCT
COREQUISITE: NAS 250.
Classroom instruction associated with directed undergraduate research and creative activity projects.

NAS 290 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
ES, Su 1 - 8 cr. RCT
PREREQUISITE: Consent of department head.
Directed undergraduate research/creative activity.

NAS 305 GENDER ISSUES IN NATIVE AMERICAN STUDIES
F alternate years, to be offered 2001 3 cr. LEC 3
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.

NAS 315 NATIVE AMERICAN INDIANS AND THE CINEMA
F alternate years, to be offered 2001 3 cr. LEC 3
Interpretive analysis of images and representations of American Indians in feature, independent, and tele-films. Study economics and politics of cultural reproduction and the historical and material ideologies at work in the film industries. Dominant society and Indian-created films are examined.

NAS 320HG AMERICAN INDIAN RELIGIONS
F 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.

NAS 352 NATIVE PEOPLES OF THE AMERICAS
S alternate years, to be offered 2001 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.

NAS 350 NATIVE AMERICAN INDIAN POLICY AND LAW
S 3 cr. LEC 3
PREREQUISITE: NAS 100, 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.

NAS 340 HG AMERICAN INDIAN LITERATURE
FS 3 cr. LEC 3
PREREQUISITE: Junior standing and ENGL 121.
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.

NAS 400 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.

NAS 430 AMERICAN INDIAN EDUCATION
S alternate years, will be offered 2002 3 cr. LEC 3
PREREQUISITE: Junior standing, ENGL 121, NAS 201.
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.

NAS 470 INDIVIDUAL PROBLEMS
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.

NAS 476 SEMINAR
On Demand 1 cr. SEM 1 Maximum 4 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 the field.

NAS 489 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.

NAS 490 UNDERGRADUATE RESEARCH/CREATIVITY INSTRUCTION
FS, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: NAS 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

NAS 490 UNDERGRADUATE RESEARCH/CREATIVITY ACTIVITY
FS, 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.

NAS 500 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.

NAS 570 INDIVIDUAL PROBLEMS
On Demand 1 - 5 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.

NAS 575 PROFESSIONAL PAPER
FS, 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.

NAS 576 INTERNSHIP
FS, 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.

NAS 580 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.

NAS 590 MASTER'S THESIS
FS, Su 1-10 cr. May be repeated.
PREREQUISITE: Master's standing.

PHIL
Philosophy
Department of History and Philosophy
(406) 994-4395

PHIL 105 HG PROBLEMS OF GOOD & EVIL
FS 3 cr. LEC 3
An examination of a multi-cultural perspective of traditional conceptions of good and evil and their implications for relativism.

PHIL 120 HG REASON & REALITY
FS 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.

PHIL 220 HG PHILOSOPHIES OF ASIA
S 3 cr. LEC 3
A critical examination of some classical school of Asian philosophy such as Confucianism, Hinduism, or Budhism.

PHIL 231 INTRODUCTION TO LOGIC
On Demand 3 cr. LEC 3
Modern forms of valid inference with applications.

PHIL 280 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.

PHIL 290 SOCIAL & POLITICAL PHILOSOPHY
F 3 cr. LEC 3
Philosophical problems about the nature of the state and society and their relationship to the individual.

PHIL 305 HG 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 originators during ancient and medieval times.

PHIL 306 HG HISTORY OF PHILOSOPHY: MODERN
S 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
Foundations of contemporary thought, Descartes to Kant.

PHIL 511 HG AESTHETICS & THE ARTS
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or permission of instructor.
Philosophical examination of the nature and function of the arts and the aesthetic experience.

PHIL 515 HG PHILOSOPHY OF FILM
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or permission of instructor.
Philosophic study of the moving image. Examines topics such as ontology of the image, theory of cinematic narrative, problem of realism versus illusion in film, its aesthetic, moral, and cultural value, and what constitutes appropriate interpretative activity in judging film.

PHIL 520 PHILOSOPHY OF RELIGION
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
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.

PHIL 525 HG ETHICS
On Demand 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
An examination of general moral theory with applications to moral problems of current interest such as abortion, the legal enforcement of morality, the death penalty, and nuclear war.

PHIL 530 BIO-MEDICAL ETHICS
F alternate years, to be offered 2001 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.

PHIL 540 ENVIRONMENTAL ETHICS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
This course reviews the major readings, both classical and contemporary, on environmental ethics, and isolates the major issues. It provides the appropriate theoretical background. It applies these readings and this background to the investigation and resolution of several environmental policy questions.
PHIL 342 APPROACHES TO EPistemology
S alternate years, to be offered 2001 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. It offers three approaches: traditional, naturalized, and Bayesian approaches to some of the problems mentioned above.

PHIL 352 METAPHYSICS
S alternate years, to be offered 2002 5 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
The most basic questions human beings raise in reflecting on their world, themselves, and their place in the world. Sample questions concern the possibility of freedom, the relation of mind and brain, and the nature of being.

PHIL 360H EXISTENTIALISM & AFTER
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Previous course in Philosophy or consent of instructor.
Existentialism and related developments including phenomenology and postmodernism.

PHIL 382 PHILOsOPHY OF RACE
F 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".

PHIL 386 CONTEMPORARY PHILOSOPHY
F alternate years, to be offered 2000 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.

PHIL 388 LANGUAGE & THE WORLD
F alternate years, to be offered 2001 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.

PHIL 378 PHILOSOPHY OF SCIENCE
F alternate years, to be offered 2000 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.

PHIL 388 PHILOSOPHY OF TECHNOLOGY
F alternate years, to be offered 2001 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.

PHYS 101N MYSTERIES OF THE SKY
FS 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, motions of the night sky, the solar system, stellar evolution, galaxies, and cosmology.

PHYS 105N OUR PHYSICAL WORLD
FS 4 cr. LEC 3 LAB 1
PREREQUISITE: High School Algebra.
A conceptual survey of topics in physics for non-science majors. Topics include motion, force, momentum, energy, waves, and sound, and may include heat, the structure of matter, relativity, optics, electricity and magnetism, or modern physics. Students will not receive credit if they have passed PHYS 205, PHYS 211, or PHYS 221.

PHYS 201N PHYSICS BY INQUIRY
FS 3 cr. LAB 3
An indepth 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.

PHYS 205N COLLEGE PHYSICS I
FS Su 4 cr. LEC 3 LAB 1
PREREQUISITE: One of the following: high school trigonometry or MATH 160.
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 PHYS 211 or PHYS 221.

PHYS 206N COLLEGE PHYSICS II
FS Su 4 cr. LEC 3 LAB 1
PREREQUISITE: PHYS 205 or PHYS 211.
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 PHYS 212 or PHYS 222.

PHYS 211N GENERAL AND MODERN PHYSICS I
FS Su 4 cr. LEC 3 LAB 1
PREREQUISITE: MATH 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).

PHYS 212N GENERAL AND MODERN PHYSICS II
FS Su 3 cr. LEC 3
PREREQUISITE: PHYS 211 or PHYS 221;
MATH 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).

PHYS 215N GENERAL AND MODERN PHYSICS III
FS 4 cr. LEC 3 LAB 1
PREREQUISITE: PHYS 212 or PHYS 222.
Covers topics in thermodynamics (such as temperature, heat, laws of thermodynamics, and the kinetic energy of particles) and modern physics (such as quantum mechanics, atomic physics, and nuclear physics).
theory of gases) and modern physics (such as relativity; models of the atom; quantum mechanics; and atomic, molecular, solid state, nuclear, and particle physics).  

**PHYS 221N HONORS GENERAL AND MODERN PHYSICS I**  
F 4 cr. LEC 3 LAB 1  
COREQUISITE: MATH 181  
The honors section of PHYS 211N. The concepts are discussed in more depth and the range of applications is greater.  

**PHYS 222N HONORS GENERAL AND MODERN PHYSICS II**  
S 4 cr. LEC 3 LAB 1  
COREQUISITE: PHYS 211 or PHYS 221.  
The honors section of PHYS 212N. The concepts are discussed in more depth and the range of applications is greater.  

**PHYS 231 INTRODUCTION TO THEORETICAL PHYSICS**  
S 3 cr. LEC 3  
COREQUISITE: PHYS 213, MATH 225.  
Mathematical methods essential to the practice of theoretical physics, such as matrices, vector calculus, differential equations, and Fourier series, with applications to examples from mechanics and electromagnetism.  

**PHYS 253N PHYSICS OF PHOTOGRAPHY**  
F 2 cr. LEC 2  
COREQUISITE: 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.  

**PHYS 261 PHYSICAL MEASUREMENTS I**  
F 2 cr. LEC 1 LAB 1  
COREQUISITE: PHYS 212 or PHYS 222.  
Basic measurements, AC circuits, transistor amplifiers.  

**PHYS 270 INDIVIDUAL PROBLEMS**  
On Demand 1-8 cr. IND Maximum 6 cr.  
PREREQUISITE: Consent of instructor and approval of department head.  
Directed study on an individual basis.  

**PHYS 280 SPECIAL TOPICS**  
On Demand 1 - 4 cr. Minimum 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.  

**PHYS 289 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**  
F,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.  
COREQUISITE: PHYS 290.  
Classroom instruction associated with directed undergraduate research/creative activity projects.  

**PHYS 290 UNDERGRADUATE RESEARCH**  
F,Su 1 - 8 cr. RCT  
PREREQUISITE: Consent of instructor and approval of department head.  
Directed undergraduate research.  

**PHYS 301 CLASSICAL MECHANICS**  
S 4 cr. LEC 4  
COREQUISITE: PHYS 231.  
Principles of Newtonian, Lagrangian, and Hamiltonian mechanics including single particle motion, systems of particles, rigid body motion, moving coordinate systems, and small oscillations.  

**PHYS 411 INTRODUCTORY QUANTUM MECHANICS I**  
S 4 cr. LEC 4  
PREREQUISITE: PHYS 301.  
Historical review, operators, eigenvalue problem, Schrodinger equation, one-dimensional problems, bound and unbound states, harmonic oscillator, and angular momentum.  

**PHYS 425 THERMODYNAMICS AND STATISTICAL PHYSICS**  
S alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: PHYS 211 or PHYS 221.  
Emphasis was placed on common methods of calculating problems into forms amenable to numerical solution and for displaying numerical results.  

**PHYS 441 SOLID STATE PHYSICS**  
S alternate years, to be offered 2001 3 cr. RCT 3  
PREREQUISITE: PHYS 212, MATH 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 visual software.  

**PHYS 460C CAPSTONE PRESENTATIONS**  
S 1 cr SEM 1  
PREREQUISITE: Senior standing and completion of a senior project.  
Senior capstone course. Participation in this course requires the completion of a senior capstone project that integrates the student's knowledge and skills acquired during the undergraduate curriculum. Results of the senior project will be presented orally and in writing.  

**PHYS 511 INTRODUCTION TO ASTRONOMY**  
F,S on demand 4 cr. LEC 3 LAB 1  
PREREQUISITE: PHYS 205, PHYS 211, or PHYS 221.  
Includes exciting discoveries about the solar system, stars, stellar systems, cosmology, and new and strange astrophysical objects. Laboratory operates in a "project mode" and includes experiments with models that can be done indoors as well as with the use of telescopes.  

**PHYS 571 ELECTRICITY AND MAGNETISM I**  
F 3 cr. LEC 3  
PREREQUISITE: PHYS 231 or MATH 348.  
Electrostatic fields, dielectric materials, magnetic fields, magnetic materials, and Maxwell's equations.  

**PHYS 604 SPECIAL RELATIVITY**  
S alternate years, to be offered 2001 1 cr. LEC 1  
PREREQUISITE: PHYS 212, MATH 182.  
Einstein's theory of special relativity is presented from the modern viewpoint, with emphasis on the geometry of spacetime.  

**PHYS 630 COMPUTATIONAL PHYSICS**  
F 1 cr. LEC 1  
PREREQUISITE: PHYS 283.  
Introduction to the use of computational methods in physics. Emphasis will be placed on common methods of calculating problems into forms amenable to numerical solution and for displaying numerical results.  

**PHYS 631 HOLOGRAPHY/LASER PHOTOGRAPHY**  
F,S; Su on demand 2 cr. LEC 2  
PREREQUISITE: Junior standing and one core science course.  
Pictorial and geometric interpretations of interference, coherence, and holography. A descriptive explanation of the helium-neon laser. Students make their own holograms. Lectures are given early in the semester so that the theory is explained before independent work begins.  

**PHYS 670 PHYSICAL MEASUREMENTS II**  
F 2 cr. LEC 1 LAB 1  
PREREQUISITE: PHYS 261.  
Operational amplifiers, filters, and digital circuits.  

**PHYS 671 LASER APPLICATIONS**  
S alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: PHYS 283.  
A survey of laser types and properties and applications for scientists and engineers who wish to use lasers in research or technology. Many demonstrations will be used to illustrate the principles.  

**PHYS 680 MODERN OPTICS**  
S alternate years, to be offered 2002 3 cr. LEC 3  
PREREQUISITE: PHYS 213 and MATH 225.  
Emphasis is on new developments in optics triggered by the laser. Provides a good foundation in wave optics, nonlinear optics, integrated optics, and spectroscopy.  

**PHYS 690 LASER APPLICATIONS**  
S alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: PHYS 213.  
A survey of laser types and properties and applications for scientists and engineers who wish to use lasers in research or technology. Many demonstrations will be used to illustrate the principles.  

**PHYS 730 STATISTICAL MEASUREMENTS AND PROBABILITY**  
S alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: PHYS 261.  
A treatment of the classification and electronic
structure of solids. Properties of conductors, superconductors, insulators, and semiconductors will be discussed.

**PHYS 451 ELEMENTARY PARTICLE PHYSICS**
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: PHYS 251.
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.

**PHYS 461 SENIOR LAB**
ES 4 cr. LAB 4 Maximum 8 cr
PREREQUISITE: PHYS 561.
COREQUISITE: PHYS 411.
Introduction to methods, instrumentation, and data acquisition techniques used in modern physics research. Experiments chosen from laser optics, atomic physics, solid-state physics, superconductivity, and nuclear physics.

**PHYS 470 INDIVIDUAL PROBLEMS**
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.

**PHYS 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.

**PHYS 489 UNDERGRADUATE RESEARCH/Creative Activity Instruction**
ES, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: PHYS 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

**PHYS 490 UNDERGRADUATE RESEARCH/Creative Activity**
ES, 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.

**PHYS 500 SEMINAR**
On Demand 1 cr. SEM Maximum 8 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.

**PHYS 501 ADVANCED CLASSICAL MECHANICS**
F 3 cr. LEC 3
PREREQUISITE: PHYS 301.

**PHYS 502 QUANTUM MECHANICS II**
F 3 cr. LEC 3
PREREQUISITE: PHYS 506.

**PHYS 511 ASTRONOMY FOR TEACHERS**
ES 3 cr. RCT 3
PREREQUISITE: PHYS 206 or PHYS 212, and secondary certification in teaching and two years of teaching experience.
This is an online, distance education course primarily intended for science educators. Topics include: the laws of gravity and orbital dynamics, a survey of the solar system, stars and stellar evolution, galaxies, and Big Bang cosmology.

**PHYS 512 GENERAL RELATIVITY ONLINE**
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: PHYS 212, MATH 192, PHYS 403 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.

**PHYS 513 QUANTUM MECHANICS ONLINE**
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: PHYS 212, MATH 182, PHYS 403 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.

**PHYS 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.

**PHYS 516 EXPERIMENTAL PHYSICS**
ES 3 cr. LAB 3 Maximum 6 cr.
PREREQUISITE: PHYS 261, PHYS 517, and PHYS 411.
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.

**PHYS 519 ELECTROMAGNETIC THEORY I**
S 3 cr. LEC 3
PREREQUISITE: PHYS 518.
Electro- and magnetostatics, conservation laws and covariance of Maxwell's equations, and dynamics of relativistic particles and fields.

**PHYS 520 ELECTROMAGNETIC THEORY II**
F 3 cr. LEC 3
PREREQUISITE: PHYS 519.
Radiation by moving charges. Electromagnetic waves in condensed matter and plasma.

**PHYS 523 GENERAL RELATIVITY I**
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: PHYS 529.
Advanced topics in gravitation theory such as singularities, cosmological models, and gravitational waves.

**PHYS 531 NONLINEAR OPTICS & LASER SPECTROSCOPY**
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: PHYS 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.

**PHYS 535 STATISTICAL MECHANICS**
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: PHYS 425.
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.

**PHYS 544 CONDENSED MATTER PHYSICS I**
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: PHYS 425, PHYS 507.
Crystal structure and the reciprocal lattice. Quantum theory of electrons and phonons.

**PHYS 545 CONDENSED MATTER PHYSICS II**
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: PHYS 544.
Applications to the transport, optical, dielectric, and magnetic properties of metals, semiconductors, and insulators.

**PHYS 555 QUANTUM FIELD THEORY**
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: PHYS 507.
Techniques of canonical and path integral quantization of fields; renormalization theory. Quantum electrodynamics; gauge theories of the fundamental interactions.

**PHYS 560 ASTROPHYSICS**
F alternate years, to be offered 2000 5 cr. LEC 3
PREREQUISITE: PHYS 318, PHYS 412, PHYS 425, and PHYS 435.
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.

**PHYS 561 MODERN PHYSICS FOR TEACHERS: PARTICLES AND WAVES**
Su 3 cr. LAB 3
PREREQUISITE: Secondary teaching certificate; 2 years teaching experience. PHYS 213, PHYS 401, and PHYS 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.

**PHYS 566 MATHEMATICAL PHYSICS I**
F 3 cr. LEC 3
PREREQUISITE: MATH 549, MATH 449, PHYS 501.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLP 518</td>
<td>PLANT VIRUS DISEASES</td>
<td>3</td>
<td>LEC</td>
<td>An in-depth study of viruses with an emphasis on plant viruses.</td>
</tr>
<tr>
<td>PLP 519</td>
<td>PLANT VIRUS DISEASES LAB</td>
<td>1</td>
<td>LAB</td>
<td>Laboratory exercises related to plant virology.</td>
</tr>
<tr>
<td>PLP 520</td>
<td>PLANT BACTERIAL DISEASES</td>
<td>3</td>
<td>LEC</td>
<td>An in-depth study of bacteria and their etiology in causing plant disease.</td>
</tr>
<tr>
<td>PLP 527</td>
<td>PLANT BACTERIAL DISEASES LAB</td>
<td>1</td>
<td>LAB</td>
<td>Laboratory exercises related to the study of plant bacterial diseases.</td>
</tr>
<tr>
<td>PLP 541</td>
<td>PHYSIOLOGY OF HOST-PARASITE INTERACTIONS</td>
<td>3</td>
<td>LEC</td>
<td>Advanced study of the physiological and biochemical aspects of host-parasite interactions.</td>
</tr>
<tr>
<td>PLP 542</td>
<td>GENETICS OF PLANT-FUNGAL INTERACTIONS</td>
<td>3</td>
<td>LEC</td>
<td>Laboratory exercises related to the study of the genetics of plant-fungal interactions.</td>
</tr>
<tr>
<td>PLP 551</td>
<td>PLANT FUNGAL DISEASES</td>
<td>3</td>
<td>LEC</td>
<td>An in-depth study of fungi and their etiology in causing plant diseases.</td>
</tr>
<tr>
<td>PLP 552</td>
<td>PLANT FUNGAL DISEASES LAB</td>
<td>1</td>
<td>LAB</td>
<td>Laboratory exercises related to the study of plant fungal diseases.</td>
</tr>
<tr>
<td>PLP 553</td>
<td>PLANT DISEASE DIAGNOSIS</td>
<td>3</td>
<td>LEC</td>
<td>Recognition and diagnosis of plant diseases as they occur naturally in the field.</td>
</tr>
<tr>
<td>PLP 570</td>
<td>INDIVIDUAL PROBLEMS</td>
<td>3</td>
<td>LEC</td>
<td>Directed research and study on an individual basis.</td>
</tr>
<tr>
<td>PLP 580</td>
<td>SPECIAL TOPICS</td>
<td>3</td>
<td>LEC</td>
<td>Upper division courses and others as determined for each offering.</td>
</tr>
</tbody>
</table>

**PLP 589 GRADUATE CONSULTATION**

- **Credits:** 3
- **Type:** LEC
- **Description:** Master's standing and approval of the Dean of Graduate Studies. Directed research and study on an individual basis.

**PLP 590 MASTER'S THESIS**

- **Credits:** 5-10
- **Type:** IND
- **Description:** Master's standing.

**PLP 690 DOCTORAL THESIS**

- **Credits:** 1-10
- **Type:** IND
- **Description:** Doctoral standing.

**POLS 206S THE GOVERNMENT OF THE UNITED STATES**

- **Credits:** S 3
- **Type:** LEC
- **Description:** Special emphasis on the constitution and other political rules of the game as shapers of public consciousness and government policy.

**POLS 208 STATE AND LOCAL GOVERNMENT AND POLITICS**

- **Credits:** S 3
- **Type:** LEC
- **Description:** The changing role of state and local government in the American federal system. Emphasis on the constitutional basis of the distribution of governing powers and upon the problems confronting state and local government in Montana.

**POLS 214S INTRODUCTION TO INTERNATIONAL RELATIONS**

- **Credits:** 3
- **Type:** LEC
- **Description:** A survey of the major global issues and the means nations-states use to resolve them. The students will explore the concepts of sovereignty, the elements of power, and the global trends of regionalism and internationalism.

**POLS 251 CONDUCTING POLITICAL INQUIRY**

- **Credits:** S 3
- **Type:** LEC
- **Description:** The major concepts and values of democracy in the United States including the founding, power, behavioral concepts, and sense of community.

**POLS 280 SPECIAL TOPICS**

- **Credits:** On Demand 1-10
- **Type:** IND
- **Description:** Use of nonparametric statistics. 

**POLS 290 PARTIES AND ELECTIONS**

- **Credits:** F alternate years 3 cr. LEC 3
- **Type:** LEC
- **Description:** The structure and function of political parties, interest groups, and the mass media in the electoral process. Special emphasis on electoral rules and citizen participation from a comparative democratic perspective.
POLS 302 MEDIA & POLITICS
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: POLS 206.
Explores the role of the media in the political process with special emphasis on various print media, television, film, and cyberspace.

POLS 304 THE U.S. PRESIDENCY
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: POLS 206.
The American presidency as a government institution. Examination of the legal, political, administrative, and policy making roles of the president. Emphasis on recent issues of responsiveness to national needs and public accountability.

POLS 306 THE LEGISLATIVE PROCESS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: POLS 206 and POLS 208.
Examines legislative decision-making in a constitutional, political, and comparative context. Special emphasis on how institutional rules and relationships shape the making of public policy at both the Congressional and state legislative level.

POLS 321 CLASSICAL POLITICAL THOUGHT
F 3 cr. LEC 3
PREREQUISITE: POLS 206.
The nature and origin of modern public international relations, PREREQUISITE: POLS 206.
Themes and issues in political discourse from Plato through Rousseau with emphasis on contemporary relevance.

POLS 322 MODERN POLITICAL THOUGHT
S 3 cr. LEC 3
PREREQUISITE: POLS 206.
Significant modern and post-modern thinkers, ideologies, utopias, movements, and discourses. May include variants of liberalism, Marxism, anarchism, feminism, political ecology, Freud, and political dimensions of popular culture and cultural theory.

POLS 325 AMERICAN POLITICAL THOUGHT AND POPULAR CULTURE
F,S 3 cr. LEC 3
PREREQUISITE: POLS 206.
Political issues in American life revealed in ideas of major thinkers and mass popular culture including film, television, and popular music. Review of social science approaches to analysis of mass culture.

POLS 331 COMPARATIVE DEMOCRACY
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: POLS 206.
Conceptual and theoretical approaches to democracy as system and process in selected contexts.

POLS 334 POLITICAL MOVEMENTS AND CHANGE
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: POLS 241.
Theoretical and empirical social science approaches to political movements, resistance cultures, and protest and change in selected contexts, both historical and contemporary. Behavior of individuals in mass and revolutionary movements, in cults, and through acts of terrorism is examined.

POLS 340 INTERNATIONAL RELATIONS THEORY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: POLS 241.
Overview of the idealism versus realism debate during the first half of the twentieth century. Followed by theories formulated in the postwar period to study causes of war/conflict, problems of interdependence, and recent developments such as the end of the Cold War, global democratization,
growing ethnic conflict, and a more active United Nations.

POLS 350 NATURAL RESOURCE POLICY
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: POLS 206.
Public lands policy and the economic and political issues that emerge. Special emphasis is placed on the National Parks and Federal public lands of the Greater Yellowstone Ecosystem.

POLS 351 PUBLIC POLICY ANALYSIS
F alternate years, to be offered 2000 3 cr. LEC 3
Analysis of impact of public decisions with emphasis placed on secondary data sources and interpretation.

POLS 352 COMPARATIVE PUBLIC POLICY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: POLS 214.
Cross-national application of public policy analysis to questions of how, why, and to what effect public policies toward certain common issues are developed in differing national contexts. Topics may include energy, environment, land use, social security, income maintenance, health care, transportation, and others.

POLS 353 WOMEN AND POLITICS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing, POLS 206.
Women's political involvement in the U.S., the nature and history of women's social movements, women as political actors in electoral politics, the effects of "second wave" feminism on public policy, and the exclusion of women from politics.

POLS 354 ENVIRONMENTAL POLITICS
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: Junior standing, POLS 206.
The evolution of the environmental movement and the various types of environmental approaches will be examined. Special emphasis on the role of electoral and non-electoral politics, strategy, and tactics will be assessed.

POLS 355 PRINCIPLES OF PUBLIC ADMINISTRATION
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing, POLS 206.
Implementation of public policy in American government. Topics include but are not limited to: bureaucratic politics, decision making, budgeting, personnel management, ethics, organization theory, and organization behavior.

POLS 400 SEMINAR: JUNIOR-SENIOR
F,S 5 cr. SEM 3
PREREQUISITE: Junior standing.
Topics offered at the upper division level which are not covered by catalogued courses. Students are expected to do individual research projects leading to an oral and written report of each student's findings.

POLS 402G INTERNATIONAL LAW
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: POLS 241.
The nature and origin of modern public international law and its role in contemporary world politics. Topics include the rights and duties of states, human rights, law pertaining to armed conflict, aggression and international crimes, and the role of international law in conflict management.

POLS 403 INTERNATIONAL ORGANIZATION
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: POLS 241.
The evolution of contemporary international organizations and their impact on world politics. Primary focus is on the United Nations but historical as well as regional perspectives are included.

POLS 405 POLITICAL PSYCHOLOGY
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: Junior standing and POLS 214 or POLS 241.
The impact of personal and collective psychological factors upon political phenomena. Particular emphasis given to the influence of the unconscious upon political relationships between peoples and nations. World War II and the Holocaust as well as more recent world conflicts are examined.

POLS 409 CONSTITUTIONAL LAW AND PUBLIC POLICY
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing and POLS 206.
Explores the relationship between law, individual rights, and public policy. Legal research and case law approach are stressed. Topics will include, but are not limited to the aspects of the Bill of Rights and the 14th and 15th Amendments.

POLS 415 MONTANA LOCAL POLITICS & POLICY
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing, POLS 208.
Montana politics with stress on the process, the interaction of political decision makers, and the policies currently addressing state and local problems. Examination of Montana's place in the American federalism and its part in the western states region.

POLS 420 NATIVE AMERICAN GOVERNMENT AND POLITICS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing, POLS 206.
The national and international settings in which American Indian politics takes place. Survey of American Indian governments, how they function, and the Federal policies affecting them. Contemporary political issues confronting American Indian people are also examined.

POLS 441SG INTERNATIONAL HUMAN RIGHTS
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: POLS 241.
The development of human rights in legal and political context of the post World War II period. Civil and political rights of due process; political participation and fundamental democratic freedoms; as well as social, cultural, and economic rights including basic human needs, self-determination, gender equality, and cultural integrity. National and International implementation is also considered.

POLS 456 ADMINISTRATIVE LAW & REGULATION
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing, POLS 555.
Explores the evolution of the administrative state and regulatory policy. Emphasis on the constitutional and statutory basis for administrative law and the public policy effects which flow from administrative rulemaking.

POLS 457 URBAN POLITICS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: POLS 206, Junior standing.
Examines urban politics with reference to critical theoretical and historical concerns such as economic development, ethnic conflict, and political organization.

POL 460C SENIOR CAPSTONE SEMINAR
F,S 3 cr. LEC 1 RCT 2
PREREQUISITE: Senior standing, POLS major.
Senior capstone course. Required course for graduation. Students examine the major concerns and issues in the discipline of political science in a mentored research project.

POL 470 INDIVIDUAL PROBLEMS
On Demand 1 - 5 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, cumulative g.p.a. of 2.5 or better, consent of the instructor, and approval of the department head.
Directed research and study on an individual basis.

POL 476 INTERNSHIP
F,S,Su 6 - 12 cr. IND 5-11 RCT 1-2
PREREQUISITE: Junior standing, cumulative g.p.a. of 2.5 or better, 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.

POL 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.

POL 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
F,S,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: POLS 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

POL 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
F,S,Su 1 - 6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Junior standing, cumulative g.p.a. of 2.5 or better, consent of the instructor and approval of the department head.
Students propose, develop, and complete an individual research project under the direction of a faculty mentor. Written and oral presentation of the results are expected.

POL 551 RESEARCH METHODS
S 3 cr. LEC 3
PREREQUISITE: Graduate standing.
The research process as a means of acquiring knowledge that is reliable and relevant to the making of public management decisions. Students will prepare and submit a research design that meets social scientific standards.

POL 554 INTRODUCTION TO ADVANCED PUBLIC ADMINISTRATION
F 3 cr. LEC 3
PREREQUISITE: Graduate standing.
Theoretical, historical, intellectual foundations of public administration. Examines the relationship between public administration theory and practice, the political context and the intellectual heritage of the field. Examines basic functions and processes of public administration. Examines the relationship between public administration and contemporary issues of governance facing the public sector.

POL 555 PUBLIC PERSONNEL ADMINISTRATION
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: POLS 554, graduate standing.
The development of the concept of "public service" in the United States. Topics include historical development of public personnel, position classification, recruitment, selection, equal opportunity, affirmative action, collective bargaining.

POL 557 PUBLIC BUDGETING & FINANCE
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: POLS 554, graduate standing.
Public sector budgeting as a tool for financial management and the implementation of fiscal and programmatic policy. Emphasis on the political context.

POL 558 PUBLIC ORGANIZATION THEORY
S alternate years, to be offered 2003 3 cr. LEC 3
PREREQUISITE: POLS 554, graduate standing.
The context of public organization: political, structural, cultural, and environmental. Examination of alternative theories of organization; organizational structure, management/leadership styles, decision making, and change. Managerial leadership capacity and individual differences are examined as well as issues relating to individual development and organizational mission.

POL 559 PROGRAM EVALUATION AND POLICY ANALYSIS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: POLS 554, graduate standing.
Methods of evaluation and analysis for public programs. Utilization, implementation, and political context of the evaluation process are examined. Alternative methodologies for the conduct examined with particular emphasis upon qualitative methods.

POL 560 ETHICS AND PUBLIC SERVICE
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: POLS 554.
Explores ethics and selected issues in public service and policy making through theoretical and case study approaches. Emphasis on the relation of continuing issues and problem areas to individual careers in policy making and administrative decision making.

POL 562 LOCAL GOVERNMENT ADMINISTRATION
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: POLS 554, graduate standing.
Training in the administration of municipal and county governments for graduate students who intend a career in agencies of these governments, or in state and federal agencies whose programs focus on local governments.

POL 570 INDIVIDUAL PROBLEMS
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.

POL 573 DIRECTED PROFESSIONAL RESEARCH PROJECT 1
F,S,Su 3 cr. IND 2 RCT 1
PREREQUISITE: POLS 555, graduate standing.
Preparation of a prospectus under the supervision of a faculty mentor that includes the selection of a research topic, project design, and bibliography.

POL 574 DIRECTED PROFESSIONAL RESEARCH PROJECT II
F,S,Su 3 cr. IND 2 RCT 1
PREREQUISITE: POLS 573, graduate standing.
Write, complete and present a graduate professional paper under the supervision of a faculty mentor.

POL 576 INTERNSHIP
F,S,Su 3-12 cr. IND 10-11 RCT 1-2 Maximum 12 cr.
An individualized preprofessional assignment arranged with an agency, business, or other organization.

POL 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.

POL 588 PROFESSIONAL DEVELOPMENT
On Demand 1 - 3 cr. May be repeated; maximum 8 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.

POL 589 GRADUATE CONSULTATION
F,S,S,Su 3 cr. TUT
PREREQUISITE: Master's standing and approval of the 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.

PS
Plant Sciences
Department of Plant Sciences and Plant Pathology
(406) 994-4832

PS 101 INTRODUCTION TO BIOTECHNOLOGY
F 2 cr. LEC 2
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. Cross-listed with VTMB 101 and MB 110.

PS 182N PLANT SCIENCE, RESOURCES AND THE ENVIRONMENT
S 3 cr. LEC 3
Provide an understanding of basic plant science principles and environmental components that impact humankind and develop solutions to problems. Real-life case histories will be emphasized with a career goal emphasis on science, resources, the environment, and the transfer of technologies.
Course Descriptions

PS 289 UNDERGRADUATE RESEARCH/WORKSHOP WITH BIOL 251.
Identification and characteristics, adaptations and uses of coniferous trees, deciduous trees, coniferous shrubs, deciduous shrubs, and woody vines commonly used as ornamentals in Montana.

PS 292 HORTICULTURE SCIENCE AND TECHNOLOGY F 3 cr. LEC 1 STU 2
PREREQUISITE: BIOL 101.
Identification and characteristics of ornamentals, trees, and shrubs used in the landscape.

PS 250 IDENTIFICATION OF SEED PLANTS S 4 cr. LEC 2 LAB 2
PREREQUISITE: BIOL 101.
Identification and characteristics of seed plants, including herbs, grasses, and legumes.

PS 251 BOTANY: AN INTRODUCTION TO PLANT BIOLOGY F 4 cr. LEC 3 LAB 1
PREREQUISITE: BIOL 101.
Introduction to the study of plant form, function, and classification.

PS 286 SPECIAL TOPICS On demand 1 - 4 cr. Maximum 12 cr.
PREREQUISITE: None required, but some may be necessary by each offering department.

PS 299 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION F/S/SU 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: PS 290.
Classroom instruction associated with directed undergraduate research/creative activity projects.

PS 299 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY PS 1 - 4 cr. RCT May be repeated.
COURSEWORK requires formal standing and approval of instructor.

PS 518 BIOMETRY F 5 cr. LEC 3
PREREQUISITE: CS 150.
Analysis and interpretation of biological data. Topics include: analysis of frequency data, probability distributions, hypothesis testing, one-way analysis of variance, linear regression, and correlation. Use of computer software in solving problems.

PS 351 PLANTING DESIGN F 3 cr. LEC 1 STU 2
PREREQUISITE: PS 251 (may be taken as a corequisite).
Graphic communication including drafting and presentation drawing with computer applications of site analysis, site planning, landscape design, planting design, and irrigation design using LandCADD software.

PS 335 SITE DEVELOPMENT S 2 cr. LEC 2
PREREQUISITE: MATH 150, PS 331.
Site analysis, site survey, structure siting, roadway and parking lot planning, grading and earthwork modifications, site drainage, pedestrian circulation design, and functional uses of plant materials.

PS 356 LANDSCAPE CONSTRUCTION S 5 cr. LEC 1 LAB 2
PREREQUISITE: PS 355 (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 and other landscape features. Production of landscape construction portfolio which details a complete site development project including cost estimating and bidding for construction.

PS 359 HORTICULTURE IRRIGATION SYSTEMS AND DESIGN F 3 cr. LEC 2 LAB 1
PREREQUISITE: PS 102.
Planning and design of irrigation systems for landscape, golf course, nursery, and greenhouse use. Emphasis on pumping stations and irrigation application utilizing sprinkler, drip, and trickle systems.

PS 341 FIELD CROP PRODUCTION S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: PS 109.
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.

PS 425 MYCOLOGY F alternate years, to be offered 2002 3 cr. LEC 2 LAB 1
PREREQUISITE: BIOL 101.
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.

PS 426 PLANT BIOTECHNOLOGY S 3 cr. LEC 2 LAB 1
PREREQUISITE: BCHM 540 or BIOL 501.
Humans have historically altered plants to meet food and fiber needs. Our ability to transfer genes from organisms to organisms is accelerating this process. The principles of plant genetic engineering will be discussed along with hands-on laboratory.

PS 429C BIOTECHNOLOGY CAPSTONE SEMINAR F/S 2 cr. SEM 2
PREREQUISITE: Junior or Senior standing.
Senior capstone course. Participants in this seminar section will bring closure to the student's required internship. Students will have the opportunity to refine their public speaking and writing skills through synthesis of the goals, progress, and outcome of their industrial or research laboratory experience. Exposure to many different types of internship outcomes will broaden the student's perception of the disciplines which contribute to the field of Biotechnology.

PS 431 LANDSCAPE MANAGEMENT F 3 cr. LEC 3
PREREQUISITE: BIOL 101.
Maintenance of landscape plants on public grounds, athletic fields, golf courses, and commercial and residential properties. Includes planting, transplanting, pruning, and fertilization techniques for woody plants.

PS 429C LANDSCAPE ARCHITECTURE F 4 cr. LEC 1 STU 3
PREREQUISITE: PS 351, PS 355, PS 356.
Senior capstone course. Advanced graphic communication skills, environmental land use planning, master plan design, site specific design, and construction detailing. Individual and group problem-solving skills are stressed through graphic, verbal, and written landscape design solutions. Capstone course for Bachelor of Science in Horticulture - Landscape Design Option.
Course Descriptions

PS 433 PLANT PROPAGATION  
S 3 cr. LEC 2 LAB 1  
PREREQUISITE: CHEM 121 or 131, PS 332.  
Sexual and asexual reproduction of plants including seed germination, micropropagation, stem and leaf cuttings, grafting, and layering. Includes discussion of propagation structures and growing media.

PS 434 GREENHOUSE MANAGEMENT  
S 3 cr. LEC 2 LAB 1  
PREREQUISITE: CHEM 121 or 131, PS 332.  
Greenhouse design and operation. Growing media selection, irrigation, and fertilization systems. Crop selection and programming. Retail and wholesale management strategies. Alternative cropping systems. Insects and disease-integrated pest management techniques. Lab will investigate herbaceous ornamentals and vegetable production techniques.

PS 435C NURSERY MANAGEMENT  
F 3 cr. LEC  
PREREQUISITE: Junior standing and CHEM 121 or 131, PS 332.  
Senior capstone course. Management of retail and wholesale nurseries. Emphasis on woody ornamentals including production and handling of nursery stock and hard goods, industry standards, issues, and business strategies specific to the nursery industry. Capstone course for Bachelor of Science in Horticulture - Horticulture Option.

PS 436 ADVANCED TURFGRASS MANAGEMENT  
S alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: PS 394.  
COREQUISITE: PS 450.  
Advanced studies in turfgrass science including the impact of light, temperature, water, soil mixes, and fertilization on turfgrass development. Turfgrass production and management of sod farms, sports fields, and golf courses will be addressed.

PS 437 TURFGRASS PEST MANAGEMENT  
S alternate years, to be offered 2002 3 cr. LEC 3  
PREREQUISITE: PS 394.  
COREQUISITE: ENTO 204, PS 421.  
Advanced studies in the identification of major turfgrass pests (disease, weeds, insects), management strategies for control of each pest, integrated pest management principles, and recognition of federal/state organizations and regulations pertaining to pesticide applications and safety.

PS 438 MARKET GARDENING  
Su, 5 cr. LEC 1 LAB 2  
PREREQUISITE: PS 102, LRES 201, 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 given to present and analyze sustainable food crop production systems.

PS 441 CROP BREEDING  
S 3 cr. LEC 3  
PREREQUISITE: BIOL 301.  
Application of genetic principles in improving important agronomic and horticultural plant species. Traditional methods of hybridization as well as methods of non-sexual gene transfer are included.

PS 450 PLANT PHYSIOLOGY  
S 3 cr. LEC 3  
PREREQUISITE: Junior standing, BIOL 101, and one of the following: CHEM 215, CHEM 311, or BCHM 122.  
Physiological process of higher plants, including photosynthesis, water relations, mineral nutrition, development, stress physiology, and biotechnology. Cross-listed with BIOL 430.

PS 452 PLANT ANATOMY  
F alternate years, to be offered 2001 3 cr. LEC 1 LAB 3  
PREREQUISITE: Junior standing, BIOL 101.  
Advanced plant biology examining structure and functions of plant cells and tissues. Includes experience with plant growth in greenhouse, light microscopy, and an individual project with slide preparation. Cross-listed with BIOL 452.

PS 453 PHYCOLOGY  
S alternate years, to be offered 2001 3 cr. LEC 3  
PREREQUISITE: BIOL 102, BIOL 303.  
Identification, physiology, ecology, and evolution of marine and freshwater algae. Cross-listed with BIOL 453.

PS 454 AGROSTOLOGY  
F alternate years, to be offered 2001 3 cr. LEC 1 LAB 2  
PREREQUISITE: BIOL 230.  
Introduction to methods of analyzing evolutionary relationships of land plants, classification, and species concepts. Lab concentrates on plant identification emphasizing angiosperm plant families of Montana; preparation of reference specimens. Cross-listed with BIOL 454.

PS 456 PLANT SYSTEMATICS  
F alternate years, to be offered 2000 3 cr. LEC 3  
PREREQUISITE: BIOL 101, BIOL 230.  
Identification, classification, evolution, and nomenclature of grasses and grass-like plants; morphological and ecological features; preparation of reference specimens. Cross-listed with BIOL 456.

PS 457 PLANT DEVELOPMENT  
F alternate years, to be offered 2000 3 cr. LEC 3  
PREREQUISITE: BIOL 301.  
Cellular and molecular mechanisms of the development of plants. Topics include developmental differences between plants and animals, regulation of gene expression, environmental effects on plant development, and computer modeling of development. Cross-listed with BIOL 457.

PS 470 INDIVIDUAL PROBLEMS  
On Demand 1 - 4 cr. IND  
major professor, consent of instructor and approval of department head.  
Directed research and study on an individual basis.

PS 476 INTERNSHIP  
On Demand 2 - 4 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.

PS 480 SPECIAL TOPICS  
On Demand 1 - 4 cr. IND  
PREREQUISITE: Course prerequistes 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.

PS 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION  
S 1 - 2 cr. RCT May be repeated. Maximum 4 cr.  
COREQUISITE: PS 490.  
Classroom instruction associated with directed undergraduate research/creative activity projects.

PS 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY  
F 1 - 4 cr. IND  
PREREQUISITE: Junior or Senior standing and approval of instructor.  
Undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis.

PS 500 SEMINAR  
F 1 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.

PS 516 AGRICULTURAL 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, randomized block and Latin square designs, comparisons among means, factorial experiments with restricted randomization and analysis of covariance.

PS 517 ETHICAL & ENVIRONMENTAL ISSUES IN AGRICULTURE  
S alternate years, to be offered 2002 1 cr. LEC 1  
PREREQUISITE: Graduate standing.  
Interactive class dealing with the social impacts of the adoption of new technologies. Issues pertinent to Montana, national and international agriculture are researched and discussed in relation to regulatory and/or policy decisions.

PS 541 ADVANCED PLANT GENETICS  
F alternate years, to be offered 2001 4 cr. LEC 3  
PREREQUISITE: PS 441.  
Theory and practice of genetic analysis and genome modification in higher plants. Development of familiarity with current and classical literature is stressed as is sound hypothesis formulation and research project planning.

PS 542 GENETIC PLANT IMPROVEMENT  
S alternate years, to be offered 2002 3 cr. LEC 3  
PREREQUISITE: PS 441, STAT 401.  
The past, present and future of plant improvement. Emphasis on genetical principles underlying classical plant breeding, and on molecular biological principles underlying plant genetic engineering.

PS 545 AGRICULTURAL AND MEDICAL BIOTECHNOLOGY  
S 3 cr. LEC 3  
PREREQUISITE: BIOL 450 and instructor's permission.  
A distance delivery course encompassing the theory, principles, and techniques of molecular biology and its applications in modern medicine, agriculture and animal production. Participants will develop an understanding and appreciation of the societal and legal ramifications of biotechnology, including the ethical and environmental concerns associated with its implementation.

PS 570 INDIVIDUAL PROBLEMS  
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.
PSY 231 RESEARCH DESIGN AND ANALYSIS II

On Demand 1 - 4 cr. IND

PREREQUISITE: Upper division courses and others as 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.

Breadth of topics and methods 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.

PSY 252 DEVELOPMENTAL PSYCHOLOGY

On Demand 1 cr. IND

PREREQUISITE: Consent of instructor and approval of Department Head.

Directed research and study on an individual basis.

PSY 280 SPECIAL TOPICS

On Demand 1 cr. IND

PREREQUISITE: Doctoral standing.

Laboratory to accompany PSY 311, exploring issues and techniques in sensation and perception.

PSY 311 PSYCHOLOGICAL MEASUREMENT LAB

On Demand 3 cr. LEC

Laboratory to accompany PSY 311, exploring issues and techniques in sensation and perception.

PSY 320 PSYCHOLOGICAL MEASUREMENT

On Demand 3 cr. IND

PREREQUISITE: PSY 221.

Laboratory to accompany PSY 311, exploring issues and techniques in sensation and perception.

PSY 341 HISTORY & SYSTEMS OF PSYCHOLOGY

On Demand 3 cr. LEC

Laboratory to accompany PSY 311, exploring issues and techniques in sensation and perception.

PSY 355 BEHAVIOR MODIFICATION

S 3 cr. LEC

PREREQUISITE: PSY 280 or PSY 341.

Human behavior change with emphasis on practical techniques for changing individual and group behavior in real-life situations.

PSY 361 MEMORY AND COGNITION LAB

F 1 cr. LAB

PREREQUISITE: PSY 221.

Laboratory to accompany PSY 361, exploring issues and techniques in cognition and learning.
broad current interest such as behavioral science, cognitive science, and neuroscience.

**PSY 415 PSYCH OF PREJUDICE**
On Demand 3 cr. LEC 3
**PREREQUISITE:** PSY 100
Review 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.

**PSY 422 CONSCIOUSNESS**
S 3 cr. LEC 3
**PREREQUISITE:** PSY 221 and PSY 301
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.

**PSY 452 SOCIAL PSYCHOLOGY**
S 3 cr. LEC 3
**PREREQUISITE:** PSY 100S
Experimental research and theoretical viewpoints in social psychology, including interpersonal attraction, perception, aggression, attitudes and attitude change, altruism, group behavior, and social influence.

**PSY 453 INDUSTRIAL & ORGANIZATIONAL PSYCHOLOGY**
F 3 cr. LEC 3
**PREREQUISITE:** PSY 221 and junior standing
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.

**PSY 462 PSYCHOLINGUISTICS**
On Demand 3 cr. LEC 3
**PREREQUISITE:** PSY 100 or PSY 361 and 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.

**PSY 470 INDIVIDUAL PROBLEMS**
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.

**PSY 479 ADVANCED RESEARCH DESIGN AND ANALYSIS**
F 3 cr. LEC 1 LAB 2
**PREREQUISITE:** PSY 231 or Graduate standing or consent of instructor.
Advanced topics in the design and analysis of psychological research.

**PSY 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.

**PSY 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION**
FS, Su 1 - 2 cr. RCT
**COREQUISITE:** PSY 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

**PSY 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY**
FS, 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.

**PSY 491 FIELD PRACTICUM IN APPLIED PSYCHOLOGY**
FS, Su 3 - 12 cr. IND May be repeated. Max 12 cr.
**PREREQUISITE:** Junior or senior standing, PSY 221, PSY 382 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).

**PSY 493C SENIOR THESIS CAPSTONE**
F 2 cr. SEM
**PREREQUISITE:** PSY 489 and 490 (minimum 3 cr.) or PSY 491.
**COREQUISITE:** PSY 494C
Senior capstone course. Written and oral presentation of senior thesis work.

**PSY 494C SENIOR THESIS CONSULTATION**
FS 1 cr. RCT 1
**COREQUISITE:** PSY 495C.
Consultation with faculty on senior thesis project.

**PSY 500 SEMINAR**
On Demand 2 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.

**PSY 539 PHYSIOLOGICAL PROCESSES**
S 3 cr. RCT 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.

**PSY 540 SENSORY-PERCEPTUAL PROCESSES**
S 3 cr. RCT 3
**PREREQUISITE:** Graduate standing or consent of instructor.
Overview of theories and methods of psychophysics and selected content areas within perception. Application of research design skills to specific problem areas in perception.

**PSY 541 COGNITIVE PROCESSES**
S 3 cr. RCT 3
**PREREQUISITE:** Graduate standing or consent of instructor.
Theories, methods, findings, and applications concerning memory and cognitive processes.

**PSY 542 LEARNING**
F 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.

**PSY 544 SOCIAL PSYCHOLOGY**
F 3 cr. LEC 3
**PREREQUISITE:** Graduate standing and consent of instructor.
Advanced experimental and applied research and theoretical viewpoints in social psychology. Topics include social cognition, interpersonal attraction, attitudes and attitude change, group dynamics, and social influence.

**PSY 545 ORGANIZATIONAL PSYCHOLOGY**
F 3 cr. LEC 3
**PREREQUISITE:** Graduate standing and 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.

**PSY 546 SOCIAL COGNITION**
On demand 3 cr. LEC 3
**PREREQUISITE:** Graduate standing or PSY 361 and PSY 492.
This course examines organizational behavior from a social-cognitive perspective. Topics include theory development, leadership, group behavior, performance appraisal, mood and affect, decision-making, and discrimination. The primary goal is to understand theory and research in social cognition and how it relates to organizational behavior.

**PSY 570 INDIVIDUAL PROBLEMS**
On Demand 1 - 3 cr. IND Maximum 6 cr.
**PREREQUISITE:** Graduate standing, consent of instructor.
Directed research and study on an individual basis.

**PSY 575 RESEARCH OR PROFESSIONAL PAPER/PROJECT**
FS 1-6 crs. 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.

**PSY 576 INTERNSHIP IN APPLIED PSYCHOLOGY**
FS 2 - 12 cr. IND. Maximum 12 cr.
**PREREQUISITE:** Graduate standing.
An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field.

**PSY 580 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 requesting a regular course number.

**PSY 589 GRADUATE CONSULTATION**
FS 3 cr. TUT.
**PREREQUISITE:** Graduate standing and approval.
of 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 option) for a master's degree but who need additional faculty help or time.

PSY 590 MASTER'S THESIS
FS 1-10 crs. IND. Maximum 15 cr.
PREREQUISITE: Graduate standing.

RELS
Religious Studies
Department of History and Philosophy
(406) 994-4395

RELS 105H INTRODUCTION TO THE STUDY OF RELIGION
S 3 cr. LEC 2 RCT 1
The great themes of the world's religions and the methodological approaches to the academic study of religion and culture.

RELS 202H ASIAN RELIGIONS
F 3 cr. LEC 3
The sacred texts and the historical forms of religious thought and practice in the traditions of India, China, and Japan.

RELS 206H ORIGINS OF GOD
Offered subject to faculty availability. 3 cr. LEC 3
The roots and varieties of concepts of the divine in Judaism, Christianity, and Islam.

RELS 207H IMAGES OF JESUS
Offered subject to faculty availability 5 cr. LEC 3
Images of Jesus in the Bible, Apocryphal and Gnostic literature and contemporary novels, plays, films, and visual arts, as well as contemporary biblical scholarship.

RELS 216H CHRISTIAN THOUGHT
Offered subject to faculty availability. 3 cr. LEC 3
Major figures and themes of the Christian tradition from the end of the biblical period through the 19th century.

RELS 217 RELIGION AND SCIENCE
Offered subject to faculty availability. 3 cr. LEC 3
The histories of religious world-views and their responses to scientific thought, particularly in the 19th and 20th centuries.

RELS 250H 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.

RELS 280H NEW TESTAMENT
Offered subject to faculty availability. 3 cr. LEC 3
PREREQUISITE: One of the following: RELS 202, RELS 206, RELS 207, RELS 304 or consent of instructor.

The New Testament and its interpreters will be studied from literary, historical, archaeological, anthropological, and cultural perspectives.

RELS 317HG BUDDHISM & CHRISTIANITY
Offered subject to faculty availability. 3 cr. LEC 3
PREREQUISITE: RELS 202 or RELS 216.
The cultural encounters of the two major religions of salvation.

RELS 350 PHILOSOPHY OF RELIGION
Offered subject to faculty availability. 3 cr. LEC 3
PREREQUISITE: One of the following: PHIL 105, PHIL 120, PHIL 220, PHIL 251, or PHIL 250.
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.

RELS 351 GENDER AND RELIGION
Offered subject to faculty availability. 3 cr. LEC 2 RCT 1
PREREQUISITE: One of the following: HUM 204, HUM 205, RELS 105, RELS 202, RELS 206, or RELS 207.
Investigation of metaphors and myths of gender and world cultures.

RELS 352 LITERATURE AND RELIGION
Offered subject to faculty availability. 3 cr. LEC 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.
Exploration of the relationship between the sacred and the aesthetic in a variety of ancient, modern, and postmodern texts.

REIS 325 LITERATURE AND RELIGION
Offered subject to faculty availability. 3 cr. LEC 3
PREREQUISITE: One of the following: RELS 105, RELS 202, RELS 206, RELS 207, or permission of the instructor.
The sacred and the aesthetic in a variety of ancient, modern, and postmodern texts.

REIS 326 MYSTICS, FOUNDERS, REFORMERS
Offered subject to faculty availability. 3 cr. LEC 3
PREREQUISITE: One of the following: RELS 105, RELS 202, RELS 206, RELS 207, or permission of the instructor.
The varieties of religious experience and the varieties of theories describing and analyzing those texts considered mystical. Questions of foundation and reform period considered in light of mystical experience.

REIS 370 THE NATURAL, THE UNNATURAL, AND THE SUPERNATURAL
Offered subject to faculty availability. 4 cr. SEM 4
PREREQUISITE: One of the following: HUM 205, RELS 202, RELS 206, RELS 207, or permission of the instructor.
Investigating biblical, medieval, American, Taoist, and Buddhist views of nature, ways of categorizing nature and the sacred, and implications of traditional images for contemporary thought.

REIS 405 TEXT AND IMAGE
Offered subject to faculty availability. 4 cr. LEC 3 RCT 1
PREREQUISITE: One of the following: RELS 105, RELS 206, HUM 201, HUM 205.
If western religions are grounded in an iconoclastic imagination, what are the theories of reading and of seeing? This course examines the histories of literacy and of visual representation as keys to the foundations of western culture and religion.

REIS 410 PSYCHE AND THE SACRED
Offered subject to faculty availability. 3 cr. LEC 3
PREREQUISITE: One of the following: RELS 105, RELS 202, HUM 201, or permission of the instructor.
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 trans-temporal.

REIS 470 INDIVIDUAL PROBLEMS
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.

REIS 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.

REIS 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
FS,Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
COREQUISITE: RELS 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

REIS 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS,Su 1 - 6 cr. IND May be repeated. Max 12 cr.
PREREQUISITE: Junior standing and consent of department head.
Directed undergraduate research.

SOC
Sociology
Department of Sociology and Anthropology
(406) 994-4201

SOC 101 INTRODUCTION TO SOCIOLOGY
FS,SSu 3 cr. LEC 3
The principles of human behavior, social organizations, and institutions expressed through the language and methods of sociology as a social science.

SOC 202 INTRODUCTION TO THEORY AND ANALYSIS
S 3 cr. LEC 3
PREREQUISITE: SOC 101.
How sociologists look at social phenomena from different theoretical and methodological perspectives. Selected social issues relevant to contemporary society are analyzed.

SOC 212 SOCIAL PROBLEMS
Fall alternate years, to be offered 2000 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.

SOC 225 SOCIETY THROUGH FILM
Fall alternate years, to be offered 2001 3 cr. LEC 3
Examination of social structure, interaction, and organization using classic and contemporary American films. Topics include class, power, and status; social construction of reality; social control; socialization; social institutions.
Course Descriptions

SOC 290 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.

SOC 301 INTRODUCTION TO SOCIAL THEORY
F 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101.
Introduction to major theories in sociology, both historical and contemporary. Problems of theory development and conflicting explanatory frameworks are discussed.

SOC 302 MICROCOMPUTER APPLICATIONS IN JUSTICE STUDIES
F 4 cr. LEC 3 LAB 1
PREREQUISITE: CS 150, SOC 101.
Application of Windows Microcomputer-based software systems. Specific topics include primary emphasis on data base management. Other topics include word processing, statistical analysis, graphics, spreadsheet analysis, and microcommunication.

SOC 304 SOCIAL STRATIFICATION
S 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.
Social differentiation and stratification, class, and caste systems; class and power; class and status; and a review of research in American class structure.

SOC 308S POPULATION PROBLEMS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.
Population 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.

SOC 309 SOCIOLOGY OF DEVIANCE
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.
Varieties of social deviance including legal, mental, sexual, and religious. Theories of general deviance, the social setting in which types of deviance take place, and the relationship between forms of deviance and social organization.

SOC 314 FAMILY AND SOCIETY
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.
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.

SOC 318 RESEARCH METHODS
FS 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, STAT 216.
Introduction to research methods in sociology with emphasis given to defining variables, hypothesis formation, and development of strategies used to test hypotheses.

SOC 335 SOCIOLOGY OF RACE AND GENDER
S 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.
Historical, comparative, and social psychological study of race and ethnic relations in the U.S. and elsewhere. Power, prejudice, and discrimination relating to minority status are emphasized.

SOC 336 ENVIRONMENTAL SOCIOLOGY
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.

SOC 330 SOCIOLOGY OF EDUCATION
F alternate years, to be offered 2000 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.

SOC 340 SOCIAL MOVEMENTS
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.
Of all the means of achieving social change, movements are among the most controversial. This course looks at movements through the theories used to interpret their activities in order to improve our understanding of their dynamics.

SOC 345 COMPLEX ORGANIZATIONS
F 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.
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.

SOC 351 SCIENCE, TECHNOLOGY, AND SOCIETY
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.
It has been said that the "fresh power" in society comes from science. This course explores that statement as well as the social forces that shape science and technology and the roles of technologies in our daily lives.

SOC 359 SOCIOLOGY OF WORK AND OCCUPATIONS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.
Social, cultural, organizational, and occupational contexts of work. Work and identity, social status and community, bureaucracy and informal structure in organizations, the effects of organizations on society, and professionalization.

SOC 363 POLITICAL SOCIOLOGY
F 3 cr. LEC 3
PREREQUISITE: SOC 101, Math core.
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 everyday lives. Political economy will also be examined.

SOC 300 SEMINAR
On Demand 1-3 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.

SOC 401 SOCIAL PSYCHOLOGY
S 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.
Social behavior of the individual in the group, linguistic behavior, social perception, motivation and learning, and self-focus on symbolic interaction approach.

SOC 407 MODERN SOCIOLOGICAL THOUGHT
On Demand 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 301.
Modern social theories will be explored, possibly including feminism, neo-Marxism, sociobiology, the "micro-macro divide", and anarchist thought. Theory construction and related topics may also be covered.

SOC 414 FAMILY VIOLENCE
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: Junior standing, SOC 101, Math core.

SOC 427 SOCIOLOGICAL ANALYSIS
S 4 cr. LEC 3 LAB 1
PREREQUISITE: Junior standing, SOC 318. Application of analytical tools to the analysis of sociological data.

SOC 446 RESEARCH PRACTICUM
FS,SS 1-12 cr. IND
PREREQUISITE: SOC 318 and approval of department head.
The practical application of research skills through the development of an original project, work on a project already underway, or work on an appropriate project with an outside agency. Students are supervised by a faculty member and are expected to demonstrate competency in the application of research skills.

SOC 445 SOCIOLOGY OF RELIGION
S alternate years, to be offered 2002 3 cr. LEC 2 RCT 1
PREREQUISITE: Junior standing, SOC 101, ANTH 101, Math core.

SOC 451C SENIOR CAPSTONE SEMINAR
S 3 cr. SEM 3
PREREQUISITE: Senior standing, SOC 101, SOC 301, and SOC 318.
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.

SOC 470 INDIVIDUAL PROBLEMS
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.
STAT 217 INTERMEDIATE STATISTICAL CONCEPTS
FS,Su 3 cr. LEC 3
PREREQUISITE: STAT 216.
One- and two-sample tests and associated confidence intervals for means and proportions; one-way analysis of variance; F-tests, correlation, regression, contingency tables. Statistical analysis using the computer.

STAT 290 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.

STAT 332 STATISTICS
FS,Su 1 - 6 cr. IND May be repeated. Max 12 cr.
Directed undergraduate research/creative activity projects.

STAT 410 APPLIED MULTIPLE REGRESSION
FS,Su 3 cr. LEC 3
PREREQUISITE: STAT 217 or STAT 332.
Multiple linear regression using matrix notation, diagnostics, transformations and dummy variables, variable selection.

STAT 412 ANALYSIS OF VARIANCE & DESIGN OF EXPERIMENTS
S, Su alternate years to be offered 2001 3 cr. LEC 3.
PREREQUISITE: One of the following: STAT 217, STAT 392, or STAT 401.
One way, two-way and higher-way layouts ANOVA; interaction, fixed, random and mixed effects; completely randomized design, randomized complete block design, Latin square design and nested designs.

STAT 420 PROBABILITY
F 3 cr. LEC 3
PREREQUISITE: Math 224.
Fundamentals of probability; discrete and continuous random variables; expected value; variance; joint, marginal, and conditional distributions; conditional expectations; applications; simulation; central limit theorem.

STAT 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
FS,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.

STAT 501 INTERMEDIATE PROBABILITY & STATISTICS
F alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: STAT 424.
Families of distributions, distributions of functions of random variables, limiting distributions, order statistics.

STAT 505 LINEAR MODELS I
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: STAT 535 or STAT 441, STAT 424 and either STAT 410 or STAT 412.
Special matrix theory for statistics, multivariate normal distribution, quadratic forms, estimation and hypothesis testing for the general linear model, one-way model, multiple comparison techniques.
Applications of linear models using statistical packages S and SAS; detecting and dealing with violations of assumptions including nonconstant variance, nonnormality, and collinearity; influence in the general linear model.

STAT 510 STATISTICAL CONSULTING SEMINAR
F 1 cr. SEM 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 520 TOPICS IN APPLIED STATISTICS
F alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: STAT 424 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 522 STOCHASTIC PROCESSES
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: STAT 424.
Conditional probability theory, discrete and continuous time markov chains including birth and death processes and long run behavior; Poisson processes; queuing systems; system reliability.

STAT 524 BIOSTATISTICS
F alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: STAT 410 or STAT 420.
Statistical methodology applicable to vital statistics, life tables and survival curves, clinical trials, epidemiologic investigations, and cause-effect studies.

STAT 526 EXPERIMENTAL DESIGN
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: STAT 410 or STAT 412.
Randomization, multiple comparisons and contrasts, balanced and complete and incomplete blocking designs, Latin square designs, factorial designs, nested designs, split-plot designs, random and fixed effects.

STAT 530 NONPARAMETRICS
F alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: STAT 401.
One-sample tests for location and scale; location and scale tests for two independent samples, tests for three or more independent samples, tests for three or more dependent samples, tests for goodness of fit including chi-square and Kolmogorov-Smirnov tests; non-parametric measures of association; bootstrapping and jackknife techniques.

STAT 534 SPATIAL DATA ANALYSIS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: STAT 410 or STAT 420, or equivalent, or consent of the instructor.
Statistical methods of spatial data analysis, stationary and nonstationary random fields, covariance structures, geostatistical models and analysis, spatial point process models and analysis, spatial lattice models and analysis.

STAT 537 MULTIVARIATE ANALYSIS I
S alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: STAT 505.
Wahsart distribution, Hotelling's T-squared, multivariate regression, factor analysis, principle components, canonical correlation, multivariate graphical displays, robust estimation.

STAT 538 MULTIVARIATE ANALYSIS II
F alternate years, to be offered 2002 3 cr. LEC 3
PREREQUISITE: STAT 506, STAT 587.
Multivariate linear models, mixed and random effects models, analysis of covariance structures, analysis of repeated measures.

STAT 550 GENERALIZED LINEAR MODELS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: STAT 501 or STAT 506.
Analysis of categorical data including logistic regression, log-linear models, analysis of deviance, extrabinomial variation, quasi-likelihood.

STAT 554 SPATIAL DATA ANALYSIS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: STAT 500 or STAT 507.
Multivariate linear models, mixed and random effects models, analysis of covariance structures, analysis of repeated measures.

STAT 559 GENERALIZED LINEAR MODELS
S alternate years, to be offered 2001 3 cr. LEC 3
PREREQUISITE: STAT 501 or STAT 506.
Analysis of categorical data including logistic regression, log-linear models, analysis of deviance, extrabinomial variation, quasi-likelihood.

STAT 590 MASTER'S THESIS
F,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's standing.

STAT 649 DOCTORAL READING & RESEARCH
On Demand 5 - 9 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 669 DOCTORAL THESIS
F,Su 1-10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.

TE Technology Education
Department of Education
(406) 594-3120

TE 101 INTRODUCTION TO TECHNOLOGY EDUCATION
F 1 cr. LEC 1
Introduction to the rationale, principles, concepts, and philosophy of technology education. Guidance in curriculum offerings and the development of personal and professional goals will also be developed.

TE 115 BASIC ELECTRONICS/COMPUTER NETWORKS
S 2 cr. LAB 2
Provides basic understanding of electricity/electronics as it can be used to control devices.

TE 200 SEMINAR
On Demand 1 cr. SEM Maximum 4 cr.
Topics offered at the lower division level which are not covered in regular courses. Students participate in preparing and presenting discussion material.

TE 207 MATERIALS AND PROCESSES
F 4 cr. LEC 2 LAB 2
Development of technical competencies using tools and equipment common to wood, metal, composite material processing, and the application of simple electrical and electronic circuits.

TE 215 TEACHING TECHNOLOGY EDUCATION
S 2 cr. LEC 1 LAB 1
PREREQUISITE: TE 101, TE 207
The provision of classroom experience-based pre-student teaching activities and experiences for technology education teaching majors.

TE 220 COMPUTER GRAPHICS DESIGN
F 2 cr. LEC 1 LAB 1
This course is user-oriented and provides experience in the operation and application of computer graphics hardware and software. Hardware devices include a variety of input and output devices. Software addresses applications which include charts/graphs, technical drawings/illustrations, and free form graphics.

TE 230 2D COMPUTER AIDED DRAFTING
F,Su 3 cr. LEC 1 LAB 2
PREREQUISITE: CS 150
Provides the learner with an understanding of two-dimensional computer-aided drafting. Study includes instruction to the use of a complete computer aided drafting system. Course content is structured in a manner which does not require prior knowledge of computer systems.
Course Descriptions

TE 280 SPECIAL TOPICS
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 330 TRANSPORTATION TECHNOLOGY
F, alternate years, to be offered 2002 3 cr. Lec 2 Lab 1
Prerequisite: TE 101 and TE 207
Study of transportation systems of land, sea, and air, and the dependence on energy forms to operate transportation systems. Development of technological literacy pertinent to transportation and energy planning.

TE 331 ELECTRONIC AND VIDEO COMMUNICATION TECHNOLOGY
5 cr. Lec 2 Lab 2
Electronic communication systems which have been developed to encode, transmit, receive, decode, store, and retrieve information. Telecommunication systems which include voice, data, and video. Students explore the technical and technological concepts of these systems and sub-systems.

TE 352 MANUFACTURING TECHNOLOGY
5 cr. Lec 3 Lab 2
Prerequisite: TE 101 and TE 207
The basic processes involved with the manufacture of products. Emphasis is placed on the analysis of the various components of any manufacturing enterprise including the design of the products, material selection, and fabrication.

TE 353 TEACHING PRACTICES
F cr. Lab 1 Corequisite: EDS 392
Provides additional experience in planning, teaching, and evaluating lessons in technology education.

TE 360 TECHNOLOGY PRACTICUM
ES 5 cr. Lab 5
Prerequisite: TE 101, TE 207, and one of the following: TE 330, TE 331, or TE 352.
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 400 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.

TE 406 CURRICULUM AND FACILITIES PLANNING
FS cr. Lec 3
Prerequisite: Acceptance in Teacher Education program; junior standing.
Corequisite: EDS 392

DETERMINING APPROPRIATE TECHNOLOGY EDUCATION BASED ON AN ANALYSIS OF STUDENT AND COMMUNITY NEEDS. ORGANIZING SUBJECT MATTER MATERIALS AND LABORATORY RESOURCES TO PROMOTE EFFECTIVE TEACHING AND LEARNING. THE ORGANIZATION AND ADMINISTRATION OF SCHOOL LABORATORIES IS ALSO INCLUDED.

TE 407 MAINTENANCE AND ASSESSMENT OF FACILITIES
Students, to be offered 2001 2 cr. Lab 2
Prerequisite: TE 207, junior standing.
Selection, maintenance, and repair of machines and tools used in materials processing. Assessment and evaluation of facilities and equipment for technology laboratories.

TE 410 COMPUTER-AIDED MACHINING AND MANUFACTURING
S 3 cr. Lec 1 Lab 2
Prerequisite: TE 230
Provides the learner with an 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.

TE 417C MASS PRODUCTION
F alternate years, to be offered 2003 3 cr. Lec 1 Lab 2
Prerequisite: TE 332 and TE 207
Senior capstone course. Mass production and assembly line concepts common to industry, including the stages of initial planning, prototype construction, market research, and analysis. Presentation of group design efforts and written research reports that are common to research and development in industrial applications. Synthesis of all planning and marketing concepts are integrated into the class.

TE 470 INDIVIDUAL PROBLEMS
On Demand 1 - 4 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 476 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 a technology field.

TE 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.

TE 489 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY INSTRUCTION
ES, Su 1 - 2 cr. RCT May be repeated. Max 4 cr.
Corequisite: TE 490.
Classroom instruction associated with directed undergraduate research/creative activity projects.

TE 490 UNDERGRADUATE RESEARCH/CREATIVE ACTIVITY
ES, 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.

TE 500 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.

TE 501 HISTORY & PHILOSOPHY OF TECHNOLOGY EDUCATION
F, Su alternate years, will be offered 2001 3 cr. Lec 3
Prerequisite: EDS 302.
A study of educational trends related to industry. Also, national trends and issues in technology education and their implications for program development at the local and state level.

UH University Honors
University Honors Program
(406) 994-4110

UH 201V TEXTS AND CRITICS: KNOWLEDGE
F 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 tutorials.

UH 202H TEXTS AND CRITICS: IMAGINATION
S 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 tutorials.

UH 204 GREAT EXPEDITIONS
On Demand 2 cr. SEM 2 Maximum credit 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 CHILDREN
ES 2 cr. SEM 2
Prerequisite: Admission to the University Honors Program.
University Honors Program students mentor gifted children from the Bozeman Public Schools. Students meet together in seminar discussion, plan and implement projects, and evaluate their projects.

UH 270 INDIVIDUAL PROBLEMS
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.
Advanced Honors seminars are interdisciplinary courses which emphasize class discussion, development of analytic thinking and writing skills, and encourage independent creativity/research.

UH 450 ADVANCED HONORS TUTORIAL
F,S,4-6 cr. RCT 4 TUT 2 May be repeated; maximum 12 cr.
PREREQUISITE: UH 201 and UH 202.
Weekly seminar and tutorial supervision with extensive interdisciplinary reading, analytic writing, and oral argument, leading to comprehensive examinations. Student meets four hours/week with instructor in seminar mode, and two hours/week with instructor in tutorial.

UH 451 ADVANCED HONORS TUTORIAL
F,S 4-6 cr. RCT 4 TUT 2 May be repeated; maximum 12 cr.
PREREQUISITE: UH 450, admission to the University Honors Program, and approval of Director.
Weekly seminar and tutorial supervision with extensive interdisciplinary reading, analytic writing, and oral argument, leading to comprehensive examinations. Student meets four hours/week with instructor in seminar mode, and two hours/week with instructor in tutorial.

UH 470 INDIVIDUAL PROBLEMS
On Demand 1-35 cr. IND Maximum 6 cr.
PREREQUISITE: Junior standing, consent of instructor and approval of Director.
Directed research and study on an individual basis.

UH 480 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.

UH 481F HONORS SEMINAR IN THE FINE 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 encourage independent creativity/research.

UH 482H HONORS 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 encourage independent creativity/research.

UH 483M HONORS SEMINAR IN MATH
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.

UH 484N HONORS SEMINAR IN THE NATURAL SCIENCES
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.

UH 485S HONORS SEMINAR IN THE SOCIAL SCIENCES
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.

UH 487V HONORS SEMINAR IN COMMUNICATION
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.

UH 488W SPECIAL TOPICS IN WRITING
On Demand 2-4 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 490 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.
### Course Descriptions

**VTMB Veterinary Molecular Biology**

**Department of Veterinary Molecular Biology**

(406) 994-4705

**VTMB 101 Introduction to Biotechnology**

F S 2 cr. LEC 2

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 events. Cross-listed with PS 101 and MB 110.

**VTMB 270 Individual Problems**

On Demand 1-5 cr. IND Maximum 6 cr.

PREREQUISITE: Consent of instructor and approval of department head.

Directed research and/or study on an individual basis.

**VTMB 271 Functional Anatomy of Domestic Animals**

F 4 cr. LEC 3 LAB 1

PREREQUISITE: BIOL 102, Sophomore standing.

Location, structure and function of various tissues, organs, and systems of domestic animals. Lab utilizes ruminants and monogastric species.

**VTMB 280 Special Topics**

On Demand 1-5 cr. Maximum 12 cr.

PREREQUISITE: Course prerequisites as 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.

**VTMB 289 Undergraduate Research/Creative Activity Instruction**

F S, Su 1-2 cr. RCT May be repeated. Max 4 cr.

PREREQUISITE: VTMB 250.

Classroom instruction associated with directed undergraduate research projects.

**VTMB 290 Undergraduate Research/Creative Activity**

On Demand 1-4 cr. IND

PREREQUISITE: Sophomore standing.

Directed undergraduate research.

**VTMB 406 Animal Diseases**

S 4 cr. LEC 2 RCT/DIS 1 LAB 1

PREREQUISITE: MB 301 or consent of instructor. Selected infectious diseases of domestic animals will be covered emphasizing disease processes and immune responses.

**VTMB 411 Hybridomas**

F 2 cr. LEC 1 LAB 1

PREREQUISITE: MB 301 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.

**VTMB 412 Advanced Immunology**

F 1 cr. LAB 1

PREREQUISITE: MB 301, BIOL 301, or consent of instructor.

This course provides hands-on experience on assays commonly used in immunology for the detection of an immune response.

**VTMB 413 Flow Cytometry**

F 1 cr. LAB 1

PREREQUISITE: MB 301, BIOL 301, or consent of instructor.

Theory and practice of flow cytometry with an emphasis on the analysis of mammalian cells.

**VTMB 414 Advanced Microscopy**

F 1 cr. LAB 1

PREREQUISITE: MB 301, BIOL 301, 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.

**VTMB 421 Genomic Science**

S 5 cr., LEC 1 LAB 2

PREREQUISITE: BCHM 340 or consent of instructor.

Course will train students in modern practice of genomics and functional gene expression using DNA cloning, automated DNA sequencing, and comprehensive sequence analysis.

**VTMB 422 Functional Gene Expression**

S 2 cr. LEC 1 LAB 1

PREREQUISITE: BCHM 340 or consent of instructor.


**VTMB 424 Ethical Practice of Science**

S 3 cr. SEM 3

PREREQUISITE: PHIL 332, PHIL 338, 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.

**VTMB 425 Modern Microscopy**

S 3 cr. LEC 1 LAB 2

PREREQUISITE: Junior standing in biological or microbiological field and consent of instructor.

Introduction to instrument design, operation, and application, and to techniques used in modern light and electron microscopy.

**VTMB 451 Virology**

On Demand 1 cr.

PREREQUISITE: VTMB 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.

**VTMB 452 Protein Biochemistry**

On Demand 1 cr.

PREREQUISITE: VTMB 410 series or consent of instructor.

Principles and techniques involved in biochemical analysis of proteins.

**VTMB 470 Individual Problems**

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.

**VTMB 476 Internship**

On Demand 2-12 cr. IND

PREREQUISITE: VTMB 476.

Senior capstone course. Participants in this seminar section will bring closure to the student's required internship. Students will have the opportunity to refine their public speaking and writing skills through synthesis of the goals, progress, and outcomes of their internship or research laboratory experience. Exposure to many different types of internship outcomes will broaden the student's perception of the disciplines which contribute to the field of biotechnology.

**VTMB 480 Special Topics**

On Demand 1-4 cr. Maximum 12 cr.

PREREQUISITE: Course prerequisites as 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.

**VTMB 489 Undergraduate Research/Creative Activity Instruction**

F S, Su 1-2 cr. RCT May be repeated. Max 4 cr.

PREREQUISITE: VTMB 490.

Classroom instruction associated with directed undergraduate research/creative activity.

**VTMB 490 Undergraduate Research/Creative Activity**

F S, Su 1-6 cr. IND

PREREQUISITE: VTMB 490.

Directed undergraduate research/creative activity which may culminate in a research paper, journal article, or undergraduate thesis.

**VTMB 500 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.

**VTMB 501 Experimental Immunology/Pathology**

S alternate years, to be offered 2002 3 cr. LEC 3

PREREQUISITE: MB 401.

Recent advances in and history of immunochromy, immunogenetics, immunopathology, molecular and cellular immunology.

**VTMB 505 Eukaryotic Gene Regulation**

S 2 cr. LEC 2

PREREQUISITE: BCHM 444, Graduate standing.

The regulation of gene expression in eukaryotic
cells emphasizing the role of messenger RNA. Methods for measuring gene transcription will be covered.

VTMB 512 ULTRASTRUCTURAL CYTOLOGY
S 4 cr. LEC 4
PREREQUISITE: BIOL 312, MEDS 510 or consent of instructor.
The ultrastructure and function of mammalian cells as organized in tissues and organs. Presents detailed ultrastructural organization of organ systems as a foundation for research in cell biology, emphasizing the unique ultrastructural features of the cells and tissues that comprise each system including, but not limited to, the eye, inner ear, spleen, liver, kidney, lung, heart, adrenals, lymph nodes, intestine, stomach, skin, pancreas, brain, spinal cord, reproductive organs, pituitary, thyroid and parathyroid.

VTMB 570 INDIVIDUAL PROBLEMS
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.

VTMB 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.

VTMB 589 GRADUATE CONSULTATION
F,S,Su 3 cr. TUT 3 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 coursework (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

VTMB 590 MASTER'S THESIS
F,S,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Master's standing.

VTMB 610 COMPLEX BIOLOGICAL SYSTEMS I
F 3 cr. LEC 3
PREREQUISITE: College calculus and analytic geometry comparable to MSU's MATH 181/182 and two out of three of the following types of courses: 1. general chemistry comparable to MSU's CHEM 131/132; 2. college physics comparable to MSU's PHYS 205/206 or general and modern physics comparable to MSU's PHYS 211/212; 3. general biochemistry comparable to MSU's BCHM 340 or molecular and cellular biology comparable to MSU's BIOL 102/402 or biophysics (not currently offered by MSU).
The core goal is to integrate understanding of the components of biological systems into quantitative models of the integrated, intact systems. This course will cover signal transduction, cellular organization, molecular motors, and the neural basis of learning and memory.

VTMB 611 STRUCTURE AND MECHANISMS OF COMPLEX BIOLOGICAL SYSTEMS
S 3 cr. LEC 3
PREREQUISITE: Consent of instructor or IGERT program trainee status and the following course prerequisites: college calculus and analytic geometry comparable to MSU's MATH 181/182 and two out of three of the following types of courses: 1. general chemistry comparable to MSU's CHEM 131/132; 2. college physics comparable to MSU's PHYS 205/206 or general and modern physics comparable to MSU's PHYS 211/212; 3. general biochemistry comparable to MSU's BCHM 340 or molecular and cellular biology comparable to MSU's BIOL 102/402 or biophysics (not currently offered by MSU).
The core goal is to integrate understanding of the components of biological systems into quantitative models of the integrated, intact systems. This course will cover signal transduction, cellular organization, molecular motors, and the neural basis of learning and memory.

VTMB 690 DOCTORAL THESIS
F,S,Su 1 - 10 cr. IND Maximum credits unlimited.
PREREQUISITE: Doctoral standing.