Asking to list B10H 565 as co-convening with B10H 465. This will allow students to add an additional graduate component to the current B10H 465 to have the course eligible for grad credit. Please contact the department if you need more information.
NEW GRADUATE COURSE REQUEST

The Department/School of **Cell Biology & Neuroscience** requests permission to offer the following NEW GRADUATE COURSE beginning the **Spring** term, 2014.

<table>
<thead>
<tr>
<th>Rubric</th>
<th>Course #</th>
<th>Section</th>
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<tbody>
<tr>
<td>BION</td>
<td>565</td>
<td>001</td>
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</tbody>
</table>

**Title of Course**: Gene Expression Lab: From Genes to Proteins to Cells

**Instructor**: Marc Mercy

**Instructor's Email Address**: marc.mergy@montana.edu

**SSN**: 944-5328

**Instructor's Phone Number**: 944-5328

**Capacity**

<table>
<thead>
<tr>
<th>Mode</th>
<th>Days</th>
<th>Times</th>
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<td>4:30-7:20 pm</td>
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**Special Notes**
- * If other than regular semester, indicate the dates and total contact hours
- ** Be specific regarding the number of credits. Do not list ranges (i.e. 1-3)

**RECEIVED**

**FEB 06 2014**

**GRAD SCHOOL MSU**

**RECEIVED**

**MARC 26 2014**

**OFFICE OF THE PROVOST**

**RECEIVED**

**FEB 06 2014**

**GRAD SCHOOL MSU**

**RECEIVED**

**MARC 26 2014**

**OFFICE OF THE PROVOST**

**NEW GRADUATE COURSE REQUEST**

**REQUIRED DOCUMENTATION FOR REVIEW OF NEW GRADUATE COURSES**

A. **Course Description:**
   1. What are the special goals or purposes of the course that support a “graduate” level of the course?
   2. Is this course intended to be a required part of a new degree curriculum option, major, or minor?
   3. Provide a course syllabus containing all major topics to be covered.
   4. List required texts or other required references.

B. **Level of Offering:**
   1. Has the course been offered previously as a 580?
      a. If so, when?
      b. What was the enrollment?
      c. What level of students took the course?
      d. What were the evaluations?
   2. Does the course represent an upgraded version of an undergraduate level course?
      a. If so, how has the course been changed to justify offering it at the graduate level? (Be specific)
   3. What are the prerequisites for this graduate course? (List exact MSU courses - e.g. ESCI XXX or equivalent)
   4. What performance requirements are placed on students which make this a graduate course?
      a. Specifically state the written requirements or products of this course.
      b. How will the students learning be assessed and graded?

C. **Relationship to other courses, curricula, and Departments:**
   1. Does this course build on or interrelate with other courses in your curriculum or related curricula?
      a. If so, which one(s)?
   2. Does this course replace one or more courses that will not be offered?
      a. If so, which one(s)?
   3. Do the topics in the proposed course duplicate or reiterate those in other courses in this or any other department?
      a. If so, how do the coverages and education experiences differ, and how are these duplications or reiterations justified?
   4. When the course is to be co-sponsored, taught by faculty from more than one department, or when content overlaps areas of common concern, the concurrence of all department heads and deans involved must be indicated. What liaison has been conducted with other departments? State reactions, both favorable and unfavorable.

D. **Students Served:**
   1. Does the proposed course serve:
      a. Majors only?
      b. Non-majors only? State area(s) or discipline(s) to be served.
      c. Both majors and non-majors? Indicate what specific efforts will be made to make the course materials relevant to all disciplines served. How are faculty and students in the other areas to be served being made aware of this course?

New Course Request.doc (revised 11/03)
NEW GRADUATE COURSE REQUEST

The Department/School of [Cell Biology & Neuroscience] requests permission to offer the following NEW GRADUATE COURSE beginning the [Spring] term, 2014.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title of Course</th>
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<tbody>
<tr>
<td>BIO 565 001</td>
<td>Gene Expression Lab: From Genes to Proteins to Cells</td>
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</tbody>
</table>

**Instructor:** Marc Mercy

**Instructor's email address:** Marc_Mercy@montana.edu

**Instructor's phone number:** 406-5328

**Credits:** 2

**Days/Time:** MW 4:30 - 7:30 pm

**Building:** Leon Johnson

**Room:** 107

**Capacity:** 22

**Beginning Date - End Date:** 1/8/14 - 4/23/14

**Special Notes:**
- *If other than regular semester, indicate the dates and total contact hours
- **Be specific regarding the number of credits. Do not list ranges (i.e. 1-5)

REQUIRED DOCUMENTATION FOR REVIEW OF NEW GRADUATE COURSES

A. Course Description:
1. What are the special goals or purposes of the course that support a "graduate" level of the course?
2. Is this course intended to be a required part of a new degree curriculum option, major, or minor?
3. Provide a course syllabus containing all major topics to be covered.
4. List required texts or other required references.

B. Level of Offering:
1. Has the course been offered previously as a 580?
   a. If so, when?
   b. What was the enrollment?
   c. What level of students took the course?
   d. What were the evaluations?
2. Does the course represent an upgraded version of an undergraduate level course?
   a. If so, how has the course been changed to justify offering it at the graduate level? (Be specific)
3. What are the prerequisites for this graduate course? (List exact MSU courses - e.g. ESCI XXX or equivalent)
4. What performance requirements are placed on students which make this a graduate course?
   a. Specifically state the written requirements or products of this course.
   b. How will the student's learning be assessed and graded?

C. Relationship to other courses, curricula, and Departments:
1. Does this course build on or interrelate with other courses in your curriculum or related curricula?
   a. If so, which one(s)?
2. Does this course replace one or more courses that will not be offered?
   a. If so, which one(s)?
3. Do the topics in the proposed course duplicate or reiterate those in other courses in this or any other department?
   a. If so, how do the coverages and education experiences differ, and how are these duplications or reiterations justified?
4. When the course is to be co-sponsored, taught by faculty from more than one department, or when content overlaps areas of common concern, the concurrence of all department heads and deans involved must be indicated. What liaison has been conducted with other departments? State reactions, both favorable and unfavorable.

D. Students Served:
1. Does the proposed course serve:
   a. Majors only?
   b. Non-majors only? State area(s) or discipline(s) to be served.
   c. Both majors and non-majors? Indicate what specific efforts will be made to make the course materials relevant to all disciplines served. How are faculty and students in the other areas to be served being made aware of this course?

New Course Request.doc (revised 11/03)
2. What is the anticipated course enrollment?

E. Resources (including instructor):
   1. Are department financial resources sufficient for offering this course?
   2. Does the instructor have the requisite academic training to offer this course?
      a. Describe these qualifications briefly and include a vita (if the instructor is non-tenured).
   3. Are the library holdings adequate to support this course?

F. Course Evaluation:
   1. How will the students evaluate the course and instructor?
   2. How will the department evaluate the course and instructor?

G. Previous Course Review:
   All courses must have received faculty review and approval by your college curriculum committee and dean before the College of Graduate Studies will consider them.

H. Other Supporting Material:
   Include any additional information you feel is needed to support this request.

I. Include the “Graduate Course Change” form:
   This is the document that provides the information that will be included in MSU’s print and web catalog. Course requests submitted without this form will be returned without being approved.

Chairperson, Departmental Curriculum Committee  Date

Department Head  Date

Academic College Dean  Date

Graduate Dean  Date

Office Use Only

Registrar
College Dean
Department Head
Graduate Dean
Instructor

New Course Request.doc (revised 11/03)
BIOH 565 – Gene Expression Lab: From Genes to Proteins to Cells
Montana State University
Spring Semester 2014

Instructor:
Marc Mergy
506 Leon Johnson Hall
406-994-5328 (office), 615-870-9404 (cell)
marc.mergy@montana.edu

Office Hours:
TBD

Required Texts and Materials:

Textbook: There is no required textbook. Research will draw from the current primary literature and lab protocols will be provided.

Lab notebook: a blank, bound (not spiral) notebook is required for recording all lab activities and results.

Flash drive: a USB flash drive (any size) is required. You will be collecting data on lab computers and will need the data for your lab write-ups.

Prerequisites:

BCH 380 (Biochemistry), BIOB 425 (Advanced Cellular and Molecular Biology)

ADA Compliance:

Reasonable accommodations will be provided for all persons with disabilities to ensure equal participation in the course. If you have a documented disability for which you are or may be requesting accommodation, please contact Marc and the MSU Disabled Student Services (DSS) office as soon as possible.

Student Conduct Policy:
This course adheres to the MSU Student Conduct Code and Instructor Responsibilities, available at http://www2.montana.edu/policy/student_conduct/.
Overall Themes and Goals:

This course is intended to provide students with the opportunity to develop a specific research question and to learn the appropriate techniques necessary to address the chosen research question. The primary focus will be experience with a wide breadth of laboratory techniques including tissue culture, heterologous expression, microscopy, RNA extraction, RT-PCR, gene expression analysis, protein extraction, protein expression analysis, and data quantification.

Content:

The first phase of the course will be an extension of the fall semester Gene Construction Lab; students will have the opportunity to express the plasmid constructs that they designed and synthesized in the fall semester in cultured cells. Students that were not in Gene Construction Lab will be provided with DNA constructs encoding fluorescent proteins. Students will learn fluorescence microscopy, time-lapse microscopic imaging, and image analysis.

The second phase of the lab will utilize Dr. Frances Lefcort’s IKAP mutant mice (central and peripheral nervous system-specific inactivation of the IKAP gene and protein), a model for familial dysautonomia. Dr. Lefcort’s lab has already generated data that identified several genes that are dysregulated in this model system. Students will have the opportunity to perform confirmatory experiments to validate the existing data. The students will also be challenged to identify candidate genes that may contribute to other phenotypes present in the IKAP mutant mice. Students will then perform experiments on brain tissue isolated from IKAP mutant mice and wild-type control mice to assay changes in gene and/or protein expression for the targets that they have identified.

Grades and Assignments:

Lab Participation and Lab Notebook (50% of final grade)
- This course requires your presence in the lab for all meetings.
- The focus will be on research techniques and how to apply them to a novel research question. You will be performing real experiments (we don’t know the answers!) and will be evaluated on your ability to properly design and perform experiments.
- You are required to keep meticulous notes of your activities in the lab in your notebook. Lab notebooks should be arranged in a logical fashion (i.e. by date and experiment) and present methods/protocols, deviations from protocol, results, and interpretation of data. Lab notes must be presented legibly and clearly so that another research could replicate your experiments.
- Lab notebooks will be evaluated every 1-2 weeks.

Lab Reports (3, each worth 10% of final grade)
- Present your experiment in the written form in the manner of a published scientific article.
- Lab reports will explain the rationale for an experiment, methods used, findings, and interpretation of data.

*Final Lab Report* (worth 20% of final grade)
- Present a series of related experiments as a scientific article.
- The final lab report will compile the data from all of the lab reports into a single coherent presentation of the overall research question, techniques used, results, discussion of results, and discussion of future experimental aims.
- The final lab report will take the form of a manuscript one would submit for publication, including figures, data tables, etc.
**Schedule:**

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*RT-PCR, DNA Gel Electrophoresis, and Gene Expression Analysis (2/19-3/5) is allotted substantial time to allow for experimental troubleshooting as well as multiple attempts to identify genes with altered expression.

*Protein Gel Electrophoresis, Western Blotting, and Protein Expression Analysis (4/7-4/23) is allotted substantial time to allow for experimental troubleshooting.*
Marc A. Merger
Vanderbilt University School of Medicine
7150 Medical Research Building III
746 21st Avenue South
Nashville, TN 37232
marc.mergy@vanderbilt.edu

Education:

St. Xavier High School, Cincinnati, Ohio 1998-2002
Baccalaureate, summa cum laude, Kenyon College, Gambier, Ohio 2002-2006
Majors: Biochemistry, Neuroscience, Advisor: Dr. John Lutton
Independent Research: Dr. Kathryn L. Edwards,
Biology Dept., Kenyon College
Project: Non-Muscle Myosin II Regulatory Mechanisms in the
slime mold Dictyostelium discoideum

Kenyon College Summer Science Scholars Program, Gambier Ohio Summer 2004
Advisor: Dr. Kathryn L. Edwards, Biology Dept., Kenyon College
Project: Generation and Characterization of Random Gene
Knockout Mutants in the slime mold Dictyostelium
Discoideum

Vanderbilt University Summer Science Academy Summer 2005
Advisor: Dr. Louise Rollins-Smith, Dept. of Microbiology and
Immunology Vanderbilt University
Project: Effects of the Pesticide Carbaryl on the Innate Immune
Defenses of the Northern Leopard Frog, Rana pipiens

Neuroscience Graduate Program, Vanderbilt Univ. School of Medicine 2006-present
Doctor of Philosophy, Neuroscience, expected spring of 2013
Ph.D. Thesis Advisor: Dr. Randy D. Blakely
Thesis: Creation and Analysis of a Novel Mouse Model of ADHD

Teaching and Mentoring Experience:

Undergraduate mentorship in the laboratory of Dr. Kathryn Edwards 2004-2006
Coordinated and directed several simultaneous projects
performed by other Kenyon students

Students: Chris Heffelfinger, class of 2005
Louisa Harding and Hayes Wong, class of 2006
Melissa Martin, class of 2007
Emmett Brady and Christina Kucher, class of 2009

Individual tutor for Shawn Gulati, Kenyon class of 2008, 2004-2005
Introductory Chemistry
Tutor, Kenyon College Math and Science Skills Center 2004-2006

Peer tutoring for introductory and second-year courses in biology, chemistry, economics, mathematics, physics, and psychology

Mentor for Vanderbilt Summer Science Academy research students:

Raymond Rivera, University of Puerto Rico  
Project: Investigation of the Role of the ADHD-Associated Dopamine Transporter Variant Val24Met (V24M)  
Summer 2010

B.J. Waters, Lipscomb University College of Pharmacy  
Project: Anomalous Amphetamine Response in a Novel Mouse Model of Attention-Deficit/Hyperactivity Disorder (ADHD)  
Summer 2011

Mentor for Vanderbilt undergraduate research students:

Chesney Oravec, class of 2012  
Fall 2009- Spring 2011
Austin Wheeler, class of 2014  
Fall 2011- present
Francisco Ochoa-Vargas, class of 2015  
Spring 2012

Mentor for first-year graduate student lab rotations:

Michael Nedelcovych  
February-May 2011
Joined Carrie Jones’ lab, Pharmacology

Gwynne Davis  
February-May 2012
Joined Randy Blakely’s lab, Neuroscience

Distinctions and Awards:

Michelson-Morley Science Award  
2001
(awarded by the Case Western Reserve University Cincinnati Alumni Association to the high school junior that has achieved in and shows promise for a career in science)

National Merit Scholar  
2002-2006

Kenyon Science Scholarship  
2002-2006

Kenyon College Biology Department Independent Study Prize  
2005

University Graduate Fellowship  
2006-2011

Ruth R. Kirschstein Predoctoral Fellowship, NIMH  
2010-present

Irv Kopin Travel Award, Tenth International Catecholamine Symposium (XICS)

Professional Societies/Affiliations:

Society for Neuroscience
America Chemical Society, Biological Chemistry Division
Sigma Xi, The Scientific Research Society
Publications:


Abstracts:


BIOH 465: Gene Expression Lab

Documentation for a new graduate-level course

A) Course Description:

1) What are the special goals or purposes of the course that support a "graduate" level of the course?

This lab course will address the demand for research experience in the Master's in Health Sciences program. It is also offered aimed at undergraduate cell biology and neuroscience majors. The course will give students experience with a broad array of laboratory techniques, including tissue culture, heterologous gene expression, microscopy, RNA extraction, RT-PCR, gene expression analysis, protein extraction, protein expression analysis, and data quantification, all in the context of a novel research product guided by the students in the course. The course will utilize Dr. Frances Lefcort's IKAP mutant mice (central and peripheral nervous system-specific inactivation of the IKAP gene and protein), a model for familial dysautonomia. Dr. Lefcort's lab has already generated data that identified several genes that are dysregulated in this model system. Students will have the opportunity to perform confirmatory experiments to validate the existing data. Students will also be challenged to identify candidate genes that may contribute to other phenotypes present in the IKAP mutant mice. For example, the IKAP mutant mice display a growth retardation phenotype, a characteristic that could arise from dysfunction in the hypothalamic signaling pathways. Students will be required to read the primary literature to identify the genes that may underlie the observed growth retardation, then perform experiments on brain tissue isolated from IKAP mutant mice and wild-type control mice to assay changes in gene and/or protein expression for the targets that they have identified.

2) Is this course intended to be a required part of a new degree curriculum option, major, or minor?

No.

3) Provide a course syllabus containing all major topics to be covered.

Please see attached syllabus.

4) List required texts or other required references.
All text resources will be drawn from the body of primary literature related to the experiments to be conducted in the lab. All required resources will be provided.

B) Level of offering:
1) Has the course been offered previously as a 580?
   No.
2) Does the course represent an upgraded version of an undergraduate level course?
   Yes, this course is an upgraded version of BIOB 465.
   a) If so, how has the course been changed to justify offering it at the graduate level?

The course is designed to contribute to an ongoing research project using Dr. Frances Lefcort's I KAP knockout mice. Undergraduates in the course will focus on molecular assays to study this animal model. **Graduate-level students will be required to participate in animal behavior experiments that parallel the “wet lab” portion of this course (i.e. undergraduates may be studying a particular neurotransmitter receptor related to anxiety; graduate students will be required to test anxiety behaviors in these animals).**

3) What are the pre-requisites for this graduate course?

   BCH 380 (Biochemistry), BIOB 425 (Advanced Cellular and Molecular Biology)

4) What performance requirements are place on students which make this a graduate course?
   a) Specifically state the written requirements or products of this course.

   Students in this course will generate several types of experimental data. They will keep lab notebooks recording their activities in the lab and will also produce lab reports that present their findings in a professional, publication-style format.

   b) How will the student’s learning be assessed and graded?

   Learning outcomes will be evaluated based on the quality of the students’ lab notebooks and lab reports, as well as their abilities in the
laboratory. The department head or other senior faculty will be invited to sit in on the course to help evaluate its success, too.

C) Relationship to other courses, curricula, and Departments:
   1) Does this course build on or interrelate with other courses in your curriculum or related curricula?
      Not directly. This course is similar to the Gene Construction Lab, in that it aims to teach laboratory skills necessary for a career in biomedical research or the biotech industry. This course will also apply some of the content learned in the prerequisite courses. However, this class does not draw directly from those courses.

   2) Does this course replace one or more courses that will not be offered?
      No.

   3) Do the topics in the proposed course duplicate or reiterate those in other courses in this or any other department?
      To my knowledge, the topics in this course do not duplicate any other course.

   4) When the course is to be co-sponsored, taught by faculty from more than one department, or when content overlaps areas of common concern, the concurrence of all department heads and deans involved must be indicated. What liaison has been conducted with other departments? State reactions, both favorable and unfavorable.

D) Students served:
   1) Does the proposed course serve:
      a) Majors only?
         This course will primarily serve Cell Biology and Neuroscience majors.

      b) Non-majors only? State area(s) or discipline(s) to be served.
         This course will be open to other qualifies pre-med, life sciences, engineering, and psychology majors.

      c) Both majors and non-majors? Indicate what specific efforts will be made to make the course materials relevant to all disciplines served. How are the faculty and students in the other areas to be served being made aware of this course?
This course will serve primarily Cell Biology and Neuroscience majors, but is open to other qualified majors. The course material will be relevant to all disciplines, as long as the students are seeking a course designed to demonstrate a real research project.

2) What is the anticipated course enrollment? 22 students, total.

E) Resources (including instructor):
  1) Are departmental resources sufficient for offering this course?

Yes, this course will have a lab fee to help defray the costs of reagents needed to perform experiments. In addition, several Cell Biology and Neuroscience department faculty will provide specialized equipment necessary for this course.

2) Does the instructor have the requisite academic training to offer this course?

Yes.

  a) Describe these qualifications briefly and include a vita (if the instructor is non-tenured).

I am not a member of the regular faculty. I feel that I am qualified for this course, as I recently completed my Ph.D. in Neuroscience from Vanderbilt University in the fall of 2013 and during the course of my thesis research, I have gained experience in all of the techniques that will be used in the course. In addition, I had several experiences mentoring undergraduate students in a lab setting while in graduate school. I am very comfortable teaching students in the lab.

3) Are the library holdings adequate to support the course?

Yes.

F) Course Evaluation:
  1) How will the students evaluate the course and instructor?

Students will complete the University-sanctioned evaluation forms near the end of the semester. Since this is a small lab course and the students have a significant role in designing the experiments that we perform, feedback will be solicited as the semester progresses, as well.

2) How will the department evaluate the course and instructor?
Several faculty members in the department will be involved in arranging materials for this course. They will be invited to visit the class to share their expertise and can evaluate class performance, as well.

G) Previous Course Review:
All courses must have received faculty review and approval by your college curriculum committee and dean before the College of Graduate Studies will consider them.

H) Other Supporting Material:
Include any additional information you feel is needed to support this request.

I) Include the “Graduate Course Change” form:
This is the document that provides the information that will be included in MSU’s print and web catalog. Course requests submitted without this form will be returned without being approved.