Eastern Illinois University
NEW COURSE PROPOSAL

Please check one:  ☒ New course  ☐ Revised course

PART I: CATALOG DESCRIPTION

1. Course prefix and number, such as ART 1000:  BIO 5250
2. Title (may not exceed 30 characters, including spaces):  Biological Microtechnique
3. Long title, if any (may not exceed 100 characters, including spaces):
4. Class hours per week, lab hours per week, and credit [e.g., (3-0-3)]:  3-3-4
5. Term(s) to be offered:  ☐ Fall  ☐ Spring  ☐ Summer  ☒ On demand
6. Initial term of offering:  ☒ Fall  ☐ Spring  ☐ Summer  Year:  2008
7. Course description (not to exceed four lines):  Techniques in preparing biological specimens for sectioning, staining, and visualization with a microscope. Light and scanning electron microscopy will be utilized.
8. Registration restrictions:
   a. Identify any equivalent courses:  N/A
   b. Prerequisite(s):  At least 16 semester hours of biological sciences or permission of the instructor.
   c. Who can waive the prerequisite(s)?
      ☐ No one  ☐ Chair  ☒ Instructor  ☐ Advisor  ☐ Other (Please specify)
   d. Co-requisites:  None
   e. Repeat status:  ☒ Course may not be repeated.
      ☐ Course may be repeated to a maximum of  hours or  times.
   f. Degree, college, major(s), level, or class to which registration in the course is restricted, if any:  Graduate students
   g. Degree, college, major(s), level, or class to be excluded from the course, if any:  None
9. Special course attributes  None
10. Grading methods (check all that apply):  ☒ Standard letter  ☐ C/NC  ☐ Audit  ☐ ABC/NC (“Standard letter”—i.e., ABCDF--is assumed to be the default grading method unless the course description indicates otherwise.)
11. Instructional delivery method:  ☐ lecture  ☐ lab  ☒ lecture/lab combined  ☐ independent study/research
    ☐ internship  ☐ performance  ☐ practicum or clinical  ☐ study abroad  ☐ other
PART II: ASSURANCE OF STUDENT LEARNING

1. List the student learning objectives of this course:

   • Students will learn techniques for light microscopy, which include: 1) general preservation methods for plant and animal specimens; 2) use of both sliding and rotary microtomes; 3) free-hand sectioning methods; 4) methods for visualizing surface structures; 5) paraffin embedding procedures; 6) staining protocols for various tissue types; and 7) maceration methods. (Goal addresses: depth of content knowledge; effective critical thinking and problem solving)
   • Students will learn techniques for scanning electron microscopy, which include: 1) general preservation methods for plant and animal specimens; 2) critical point drying; and 3) sputter coating specimens with an electrically conductive alloy. (Goal addresses: depth of content knowledge; effective critical thinking and problem solving)
   • Students will apply techniques learned during class to design individual research projects. (Goal addresses: depth of content knowledge; effective critical thinking and problem solving; advanced scholarship through research)
   • Students will complete literature searches for individual research projects. (Goal addresses: advanced scholarship through research)
   • Students will prepare written reports of individual research projects in the format of a scientific publication. (Goal addresses: depth of content knowledge; effective critical thinking and problem solving; advanced scholarship through research; effective oral and written communication)
   • Students will give oral presentations of individual research, in the same style as a scientific meeting. (Goal addresses: depth of content knowledge; effective critical thinking and problem solving; advanced scholarship through research; effective oral and written communication)

2. Identify the assignments/activities the instructor will use to determine how well students attained the learning objectives:

<table>
<thead>
<tr>
<th>Assignment/Activity</th>
<th>Midterm</th>
<th>Final Exam</th>
<th>Weekly Assignments</th>
<th>Final Paper</th>
<th>Final Presentation</th>
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</thead>
<tbody>
<tr>
<td>Techniques for light microscopy</td>
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<td>Techniques for scanning electron microscopy</td>
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<td>Research projects</td>
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<td>Literature searches</td>
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<td>Written reports</td>
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<td>Oral presentations</td>
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3. Explain how the instructor will determine students’ grades for the course:

   • 630-700 points = A; 560-629 points = B; 490-559 points = C; 489 or less points = fails course
   • Weekly assignments for each section/technique = 50% of grade
   • Midterm + final exam = 30% of grade
   • Final paper and presentation = 20% of grade
4. For technology-delivered and other nontraditional-delivered courses/sections, address the following:

This course will not be technology-delivered.

5. For courses numbered 4750-4999, specify additional or more stringent requirements for students enrolling for graduate credit.

N/A

6. If applicable, indicate whether this course is writing-active, writing-intensive, or writing-centered, and describe how the course satisfies the criteria for the type of writing course identified.

N/A

PART III: OUTLINE OF THE COURSE

- units of time: one three-hour lecture and one three-hour laboratory for 15 weeks

Week 1
- overview
- basic safety and working in the microtechnique laboratory
- chemical fixation methods

Week 2
- use of the light microscope
- use of the scanning electron microscope

Week 3
- making surface preparations for light microscopy
- staining with safranin
- tissue dehydration
- mounting and making permanent slides for use with a light microscope

Week 4
- freehand sectioning
- staining with toluidine blue
- mounting and making semi-permanent slides using glycerol
- staining with phloroglucinol

Week 5
- midterm exam – review and exam
- making chromosome preparations

Week 6
- paraffin embedding
- staining with safranin and hematoxylin
- staining with safranin and fast green

Week 7
- sectioning with the sliding microtome
- tissue dehydration
- mounting and making permanent slides for use with a light microscope

Week 8
- sectioning with the sliding microtome
Week 9
• using the scanning electron microscope
• making surface preparations for scanning electron microscopy

Week 10
• sectioning with the rotary microtome

Week 11
• sectioning with the rotary microtome
• serial sectioning

Week 12
• photomicrography

Week 13
• macerations

Week 14
• final project presentations

Week 15
• final project presentations

Week 16
• final exam – comprehensive review and exam

PART IV: PURPOSE AND NEED

1. Explain the department’s rationale for developing and proposing the course.

Understanding basic microtechnique is important in many different aspects of biology. When asking questions about organismal development, comparative growth strategies in different habitats, or phylogenetic character delimitation, it is important to know how to visualize the internal make-up of a plant or animal. This course will provide students with a wide variety of techniques they can apply to their own research as well as the critical thinking skills to handle new projects that may require them to develop new techniques.

2. Justify the level of the course and any course prerequisites, co-requisites, or registration restrictions.

This course is intended for graduate students. At least 16 semester hours of biological sciences courses are required to ensure students have a working knowledge of basic organismal structure. This course will be labor intensive and requires experienced and motivated students. Additionally, students will be required to develop independent research projects, which will give them invaluable practical experience with techniques used in preparing biological specimens that can be used throughout their academic career.

3. If the course is similar to an existing course or courses, justify its development and offering.

This course does not significantly overlap with any existing course within Biological Sciences or any other department. Currently, Biological Sciences has courses teaching basic plant and animal anatomy, but does not have any courses in how to prepare specimens for observing plant or animal anatomy. This course would fill that curricular gap.

4. Impact on Program(s):

This course will be an approved elective for graduate students in the M.S. Biological Sciences program.
PART V: IMPLEMENTATION

1. Faculty member(s) to whom the course may be assigned:

This course will be taught by Dr. Barbara Carlsward or any qualified Biological Sciences faculty member.

2. Additional costs to students:

$30 laboratory fee pending approval by the President’s Council for consumable supplies such as microscope slides, coverslips, stains, and reagents. The fee will also be used to pay for time on the electron microscope.

3. Text and supplementary materials to be used (Include publication dates):

Primary Course Text:

Reserve Course Texts:

PART VI: COMMUNITY COLLEGE TRANSFER

N/A

PART VII: APPROVALS

Date approved by the Department of Biological Sciences: November 14, 2007

Date approved by the College of Sciences Curriculum Committee: November 30, 2007

Date approved by the Council on Graduate Studies: February 5, 2008