CGS Agenda Item: 11-51
Effective: Fall 2012

Eastern Illinois University

NEW COURSE PROPOSAL

(Approved by CAA on 9/29/11 and CGS on 10/18/11, Effective Fall 2011)

This format is to be used for all courses submitted to the Council on Academic Affairs and/or the Council on Graduate Studies.

Please check one: _X_ New course ___ Revised course

PART I: CATALOG DESCRIPTION

1. **Course prefix and number:** BIO 5333
2. **Title:** Bioenergy and Bioresources
3. **Long title:**
4. **Class hours per week, lab hours per week, and credit:** *2-2-3*
5. **Term(s) to be offered:** _X_ Fall ___ Spring ___ Summer ___ On demand
6. **Initial term of offering:** _X_ Fall ___ Spring ___ Summer **Year:** _2012_
7. **Course description:**

This course explores the components and properties of algae and plants that make them useful for bioenergy applications. Sustainable production of crops and species is discussed, along with the environmental impact of their growth, harvest and utilization.

8. **Registration restrictions:**
   a. **Equivalent Courses**
      - **Identify any equivalent courses** (e.g., cross-listed course, non-honors version of an honors course). There are no equivalent courses at this time.
      - Indicate whether coding should be added to Banner to restrict students from registering for the equivalent course(s) of this course. ___ Yes _X_ No

   b. **Prerequisite(s)**
      - **Identify the prerequisite(s),** including required test scores, courses, grades in courses, and technical skills. Indicate whether any prerequisite course(s) MAY be taken concurrently with the proposed/revised course.
        1. admission to an MS in the College of Sciences, or
        2. admission to the MS in Sustainable Energy
      - Indicate whether coding should be added to Banner to prevent students from registering for this course if they haven't successfully completed the prerequisite course(s). ___ Yes _X_ No

   c. **Who can waive the prerequisite(s)?**
      ___ No one _X_ Chair _X_ Instructor ___ Advisor _X_ Other: MS in Sustainable Energy program director(s)

   d. **Co-requisites** (course(s) which MUST be taken concurrently with this one): none

   e. **Repeat status:** _X_ Course may not be repeated.

___ Course may be repeated once with credit.

Please also specify the limit (if any) on hours which may be applied to a major or minor.

f. Degree, college, major(s), level, or class to which registration in the course is restricted, if any:
1. MS programs in the College of Sciences, or
2. MS in Sustainable Energy

g. Degree, college, major(s), level, or class to be excluded from the course, if any: **N/A**

9. Special course attributes [cultural diversity, general education (indicate component), honors, remedial, writing centered or writing intensive] **N/A**

10. Grading methods (check all that apply): _**X**_ Standard letter ___ CR/NC ___ Audit ___ ABC/NC ("Standard letter"—i.e., ABCDF--is assumed to be the default grading method unless the course description indicates otherwise.)

Please check any special grading provision that applies to this course: N/A

___ The grade for this course will not count in a student's grade point average.

___ The credit for this course will not count in hours towards graduation.

If the student already has credit for or is registered in an equivalent or mutually exclusive course, check any that apply: N/A

___ The grade for this course will be removed from the student's grade point average if he/she already has credit for or is registered in _____ (insert course prefix and number).

___ Credit hours for this course will be removed from a student's hours towards graduation if he/she already has credit for or is registered in _____ (insert course prefix and number).

11. Instructional delivery method: (Check all that apply.)

___ lecture ___ lab _**X**_ lecture/lab combined ___ independent study/research
___ internship ___ performance ___ practicum or clinical ___ study abroad
___ Internet ___ hybrid ___ other (Please specify)

PART II: ASSURANCE OF STUDENT LEARNING

1. List the student learning objectives of this course:

a. If this is a general education course, indicate which objectives are designed to help students achieve one or more of the following goals of general education and university-wide assessment:
- **EIU graduates will write and speak effectively. N/A**
- **EIU graduates will think critically. N/A**

- **EIU graduates will function as responsible citizens. N/A**

b. If this is a graduate-level course, indicate which objectives are designed to help students achieve established goals for learning at the graduate level:

Goals:
- **Depth of content knowledge (1)**
- **Effective critical thinking and problem solving (2)**
- **Effective oral and written communication (3)**
- **Advanced scholarship through research or creative activity (4)**

Objectives:
A. Engage in laboratory and class discussions relating to bioenergy and bioresources (1, 2, 3)
B. Understand biomass and algae, and how their traits relate to energy-generating processes (1, 2)
C. Develop an appreciation for the multidisciplinary nature of biomass-to-bioenergy processes (1, 2)
D. Investigate the biochemical, technical, environmental and political aspects of bioenergy (1, 4)
E. Research a bioenergy and bioresource topic and present the information in both written and oral format (1, 2, 3, 4)

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

Objective	Discussion/Lab Participation (10%)	Essays I and II (30%)	Midterm and Final Exams (40%)	Presentation (20%)
A	X			X
B		X	X	X
C	X	X	X	X
D	X	X	X	X
E		X		X

3. Explain how the instructor will determine students' grades for the course:
Discussion/Lab Participation: 10%
Essay I: 10%
Essay II: 20%
Midterm: 20%
Presentation (10-20 min): 20%
Final (non-cumulative): 20%
90-100%=A, 80-89%=B, 70-79%=C, 60-69%=D, <60%=F

4. For technology-delivered and other nontraditional-delivered courses/sections, address the following:
- **a. Describe how the format/technology will be used to support and assess students' achievement of the specified learning objectives: N/A**
- **b. Describe how the integrity of student work will be assured: N/A**
- **c. Describe provisions for and requirements of instructor-student and student-student interaction, including the kinds of technologies that will be used to support the interaction (e.g., e-mail, web-based discussions, computer conferences, etc.): N/A**

5. **For courses numbered 4750-4999, specify additional or more stringent requirements for students enrolling for graduate credit. These include:**
    a. **course objectives; N/A**
    b. **projects that require application and analysis of the course content; and N/A**
    c. **separate methods of evaluation for undergraduate and graduate students. 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. (See Appendix*.) N/A**

PART III: OUTLINE OF THE COURSE

Provide a week-by-week outline of the course's content. Specify units of time (e.g., for a 3-0-3 course, 45 fifty-minute class periods over 15 weeks) for each major topic in the outline. Provide clear and sufficient details about content and procedures so that possible questions of overlap with other courses can be addressed. For technology-delivered or other nontraditional-delivered courses/sections, explain how the course content "units" are sufficiently equivalent to the traditional on-campus semester hour units of time described above.

Bioenergy and Bioresources (BIO 5333)
Credits: 3 (2-2-3)

Lecture Schedule (MW):

1. Energy Crisis/Sustainability
2. Cellulose/Hemicellulose
3. Lignin/Recalcitrance
4. Starch
5. First, Second, Other Generation Fuels
6. What is Biomass?
7. Dedicated Crops
8. Agricultural Waste/Co-Products
9. Harvesting/Transport
10. Gasification and other Bioenergy Technology
11. Algae and Oils
12. Trans-esterification/Biodiesel
13. Economics/Energy-In vs. Energy-Out
14. Environmental Impact
15. Policy and Implementation

Lab Schedule (F):

1. Ethanol from Biomass Pt. I: Acid Hydrolysis
2. Ethanol from Biomass Pt. II: Fractionation
3. Ethanol from Biomass Pt. III: Chemical Analysis
4. Bioreactor Pt. I: Fermentation
5. Bioreactor Pt. II: Chemical Analysis
6. Visit REC and local fields with Biomass Crops
7. Visit REC/Truck Demo
8. Visit Lab-Scale Gasifier

9. Visit Charleston Wastewater Treatment
10. Visit Biodiesel Facility
11. Economics Workshop
12. Guest Presenter or Visit Habitat/Biomass Study Site
13. Guest Presenter or Visit Habitat/Biomass Study Site
14. Policy Review and Discussion
15. Student Presentations

PART IV: PURPOSE AND NEED

1. **Explain the department's rationale for developing and proposing the course.**
   a. **If this is a general education course, you also must indicate the segment of the general education program into which it will be placed, and describe how the course meets the requirements of that segment. N/A**
   b. **If the course or some sections of the course may be technology delivered, explain why. N/A**

   This course has multiple roles in the Department of Biological Sciences and Eastern Illinois University:
   1. Functions as a cellular/molecular biology-based graduate course, which are currently limited in Biological Sciences
   2. Integrates two key EIU themes, environmental sustainability and renewable energy, into the departmental graduate curriculum
   3. Serves as a required core graduate course for the new interdisciplinary MS in Sustainable Energy

2. **Justify the level of the course and any course prerequisites, co-requisites, or registration restrictions.**
   This course requires independent thought, creativity and an understanding of scientific systems, cultural diversity and global policy – in short, a well-balanced perspective common to students with an undergraduate degree. The discussions and essays will focus on preparing students for advanced careers in research and industry where emphasis will be placed on publication and presentation of data.

3. **If the course is similar to an existing course or courses, justify its development and offering.**
   This course does not duplicate an existing course offered at EIU.
   a. **If the contents substantially duplicate those of an existing course, the new proposal should be discussed with the appropriate chairpersons, deans, or curriculum committees and their responses noted in the proposal. N/A**
   b. **Cite course(s) to be deleted if the new course is approved. If no deletions are planned, note the exceptional need to be met or the curricular gap to be filled. N/A**

4. **Impact on Program(s):**

   a. **For undergraduate programs, specify whether this course will be required for a major or minor or used as an approved elective. N/A**
   b. **For graduate programs, specify whether this course will be a core requirement for all candidates in a degree or certificate program or an approved elective.**
      This course will serve as an elective in the Biological Sciences graduate program, but will serve as a required core course in the MS in Sustainable Energy program.

   If the proposed course changes a major, minor, or certificate program in or outside of the department, you must submit a separate proposal requesting that change along with the course

proposal. Provide a copy of the existing program in the current catalog with the requested changes noted. N/A

PART V: IMPLEMENTATION

1. **Faculty member(s) to whom the course may be assigned:**
   Dr. Thomas Canam or any other qualified faculty member from Biological Sciences.
   If this is a graduate course and the department does not currently offer a graduate program, it must document that it employs faculty qualified to teach graduate courses. N/A
2. **Additional costs to students:**
   Include those for supplemental packets, hardware/software, or any other additional instructional, technical, or technological requirements. (Course fees must be approved by the President's Council.)
   $35 per student to offset the cost of travel and laboratory supplies and reagents (pending approval by the President's Council).

3. **Text and supplementary materials to be used (Include publication dates):**
   Course material will consist of scientific journal articles and handouts containing information gathered from multiple sources. This material will be available to students electronically through course management software.

PART VI: COMMUNITY COLLEGE TRANSFER

If the proposed course is a 1000- or 2000-level course, state either, "A community college course may be judged equivalent to this course" OR "A community college course will not be judged equivalent to this course." A community college course will not be judged equivalent to a 3000- or 4000-level course but may be accepted as a substitute; however, upper-division credit will not be awarded. N/A

PART VII: APPROVALS

Date approved by the department or school: November 28, 2011

Date approved by the college curriculum committee: December 9, 2011

Date approved by CGS:

*In **writing-active courses**, frequent, brief writing activities and assignments are required. Such activities -- some of which are to be graded – might include five-minute in-class writing assignments, journal keeping, lab reports, essay examinations, short papers, longer papers, or a variety of other writing-to-learn activities of the instructor's invention. Writing assignments and activities in writing-active courses are designed primarily to assist students in mastering course content, secondarily to strengthen students' writing skills. In **writing-intensive courses**, several writing assignments and writing activities are required. These assignments and activities, which are to be spread over the course of the semester, serve the dual purpose of strengthening writing skills and deepening understanding of course content. At least one writing assignment is to be revised by the student after it has been read and commented on by the instructor. In writing-intensive courses, students' writing should constitute no less than 35% of the final course grade. In **writing-centered courses** (English 1001G, English 1002G, and their honors equivalents), students learn the principles and the process of writing in all of its stages, from inception to completion. The quality of students' writing is the principal determinant of the course grade. The minimum writing requirement is 20 pages (5,000 words).