Proposal Form For Addition And Revision Of Courses

1. Proposing College / School: Agriculture, Engineering
   Department: Biosystems Engineering

2. Course Prefix and Number: BSEN 5260
   3. Effective Term: Fall 2012

4. Course Title: Renewable Energy in Biosystems Process Operations
   Abbreviated Title (30 characters or less): Renewable Energy in Biosys

5. Requested Action:
   - Renumber a Course
     Current Course Number: BSEN 4260
     Proposed Course Number: BSEN 5260
   - Add a Course
   - Revise a Course
     Type of Revision:

6. Course Credit:
<table>
<thead>
<tr>
<th>Contact/Group Hours</th>
<th>Scheduled Type</th>
<th>Weekly or Per Term?</th>
<th>Credit Hours</th>
<th>Anticipated Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(Repeatability):</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>Lecture</td>
<td>Weekly</td>
<td>2</td>
<td>40</td>
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<tr>
<td>3</td>
<td>Lab</td>
<td>Weekly</td>
<td>1</td>
<td>40</td>
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</tbody>
</table>
   Total Credit Hours: 3

7. Grading Type:
   - Regular (ABCDF)
   - Satisfactory/Unsatisfactory (S/U)
   - Audit

8. Prerequisites/Corequisites:
   Use “P:” to indicate a prerequisite, “C:” to indicate a corequisite, and “P/C:” to indicate a prerequisite with concurrency.
   P: BSEN 3310 or departmental approval

9. Restrictions:
   List specific restriction in space above.
   - College
   - Major
   - Standing
   - Degree

10. Course Description:
    (20 Words or Less; exactly as it should appear in the Bulletin)
    Application and use of renewable energy in biological, food, forest and agricultural systems including biomass and bioenergy, solar energy, wind power and geothermal.

11. May Count Either: [ ] or [ ]
    (Indicate if this particular course cannot be counted for credit in addition to another)
    Program Type
    Program Title
    Requirement or Elective?
    (e.g.: minor, major, etc.)
    (e.g.: MS in Chemistry, Performance Option, Minor in Art)
    (required or optional?)
    Major
    BS Biosystems Engineering
    Elective

12. Affected Program(s):
    (Respond “N/A” if not included in any program; attach memorandum if more space is required)
    [ ] Major
    [ ] BS Biosystems Engineering

13. Overlapping or Duplication of Other Units' Offerings:
    (If course is included in any other degree program, is used as an elective frequently by other unit(s), or is in an area similar to that covered by another college/school, attach correspondence with relevant unit)
    - Applicable
    - Not Applicable
14. Justification:
Course is already being taught, Change is for Accelerated Masters Program

(Include a concise, yet adequate rationale for the addition/revision of the course, citing accreditation, assessments (faculty, graduate, and/or external) where applicable)

15. Resources:
No additional resources are required.

(Indicate whether existing resources such as library materials, classroom/laboratory space, and faculty appointments are adequate to support the proposed addition/revision; if additional resources are required, indicate how such needs will be met, referencing the appropriate level of authorization -- i.e.: Dean -- where necessary; if no additional resources or shifting of resources will be necessary, respond "Not Applicable")

16. Student Learning Outcomes:
To understand energy use, needs, resources and availability in the United States
To apply principles of mathematics and basic science; and to acquire the techniques, skills and engineering tools needed to design and analyze renewable energy systems.
To identify, formulate and solve problems related to the handling and storage of biological materials.

(State in measurable terms (reflective of course level) what students should be able to do when they have completed this course)

17. Course Content Outline:

BSEN 4260 - Renewable Energy in Biosystems Process Operations
Credit Hours: 2 Lecture hours per week; 3 Lab hours/week
Prerequisites: BSEN 3310.

Textbook: Hodge, B.K. Alternative Energy Systems and Applications. 2010, John Wiley and Sons; Instructor’s Class Notes
Other References:

Course Description:
Application and use of renewable energy in biological, food, forest and agricultural systems. Hydroelectricity, wind power systems, conversion of biomass to bioenergy, biofuels and biopower, solar energy, geothermal energy, electrical energy generation

Course Objectives:
(a) To understand energy use, needs, resources and availability in the United States
(b) To apply principles of mathematics and basic science; and to acquire the techniques, skills and engineering tools needed to design and analyze renewable energy systems.
(c) To identify, formulate and solve problems related to the handling and storage of biological materials.

Course Contents:
Introduction to Renewable Energy (1 week): Energy Consumption (U.S. and World), Biomass, Geothermal, Solar, Hydro, Wind
Hydropower (1.5 weeks): Production and attributes, hydropower hydraulic analysis and sizing, specific speed
Biomass Processing (1.5 weeks): Particle Size Analysis, Size Reduction, Sorting and Separation, Agglomeration and Particle Bonding
Biomass Conversion (2 weeks): US Biomass resource, Biomass properties, Thermochemical and Biochemical Production of Biofuels, Biopower and Bioproducts from Biomass, Material balance in conversion in power plant
Solar Energy Fundamentals (2 weeks): Radiation Heat transfer, Sun Path
calculation, Solar Energy Database
Active Solar Passive Solar Energy (2 weeks): Flat plate collectors, solar collector and weather data, f-chart, daylighting
PV systems (1.5 weeks): PV Cells, PV components, PV Systems
Geothermal Energy (1 week): Geothermal Resources, types and energy systems, Ground Source Heat Pumps
Electrical Energy Generation for Biosystems (1 week): National Electric Code, fuses, circuit breakers, GFCI, overcurrent protection devices, conduit wire types, electric motors, switches and sensing elements

Lab Sessions
Week 1: Navigating and collecting information from energy related websites (e.g. eia.gov, nrel.gov, doe.gov etc.)
Weeks 2 & 3: Hydropower problem solving
Weeks 4 & 5: Wind energy systems design and problem solving
Week 6: Particle size analysis
Week 7: Physical properties of biomass
Week 8: Mid-term examination
Week 9: Chemical characterization of biomass
Week 10: Visit to gasification and fractionation pilot scale facilities at the Center for Bioenergy and Bioproducts
Week 11: Sun path calculation using Excel
Week 12: Active and Passive Solar Energy design
Week 13: Visit to Lee County Justice Center and to sites on campus with Photovoltaics installation
Weeks 14-15: Simple wiring and electrical connection

Course Requirements/Evaluation: Grades will be based on homework assignments, laboratory report, mid-term examination and final examination. The relative weight of each item and grade distribution will be as follows:
- Mid term examination 30%
- Final examination 30%
- Homework 20%
- Lab Report 20%
- Total of 100%

Grade Assignment
A = 90 - 100%
B = 80 - 89%
C = 70 - 79%
D = 60 - 69%
F = below 60%

Class Policy Statements:
(a) Class Attendance: It is critical that you attend class regularly to be successful in the course. Class attendance and participation will be taken into consideration in case of a borderline final grade. If you miss a class, it is the student's responsibility to become informed of any material presented or assignments announced during an absence.
(b) Electronic devices: Only calculators approved by the National Council of Examiners for Engineering and Surveying (NCEES) are permitted for use on exams, quizzes, etc. The following are currently the only calculators permitted: (1) Hewlett Packard – HP 33S, (2) Casio – FX 115MS or FX 115MSPlus (may have SR designation), (3) Texas Instruments – TI 30X, TI 30X IIIS, and (4) Texas Instruments – TI 36X SOLAR. Students may check with the instructor to see if any other calculator may be permitted. Use of other electronic devices with communication capabilities are also prohibited during exam or quiz periods (e.g. computers, cell phones, cameras, PDAs, beepers, pagers, iPods, Zunes, cameras, etc.) If these types of electronic devices are seen in use during the quiz or exam, they may be confiscated and the student may face disciplinary action through the academic honesty policy.
(c) Cell phones. To provide the optimal learning environment for all students, all cellular phones must be turned OFF or otherwise inactivated during class, lab, quiz, and exam periods. Text messaging or emailing during class is prohibited.

(d) Disputes over grades: All grade objections are to be submitted to the instructor in writing no later than one week after an assignment is returned to the class. Otherwise, grade objections will not be entertained. Grade objections should be very specific; i.e., objections that simply ask that a problem be re-graded without providing detailed explanation will not be considered. The original exam or assignment that corresponds with the objection must be submitted along with the written objection. All reviewed objections are final, and multiple objections for the same assignment by the same student are prohibited.

Auburn University Diversity Statement
Diversity at Auburn University encompasses the whole of human experience and includes such human qualities as race, gender, ethnicity, physical ability, nationality, age, religion, sexual orientation, economic status, and veteran status. These and other socially and historically important attributes reflect the complexity of our increasingly diverse student body, local community, and national population. Diversity is a core value at Auburn University. The Office for Diversity and Multicultural Affairs strives to offer a comprehensive range of exemplary educational programs that foster and sustain an environment that promotes academic excellence, respects differences, and accepts inclusiveness. Auburn University recognizes and values the considerable educational benefits emanating from diversity as we prepare our students for life and leadership in a multicultural world. Students who interact with and learn about people from a variety of backgrounds are more apt to understand, appreciate, and excel in the community they inhabit. In this context, diversity is aligned with Auburn University’s land grant mission of providing its students with a superior education in service to the needs of Alabama, the nation, and the world. More information can be found at -www.auburn.edu/diversity/

Academic Honesty Statement:
Academic Honesty Policy: The Auburn University student academic honesty code can be found at https://sites.auburn.edu/admin/universitypolicies/Policies/AcademicHonestyCode.pdf. All academic honesty violations or alleged violations of code will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Students with Disabilities Statement:
Disability Accommodations: Students who need special accommodations in class, as provided for by the American Disabilities Act, should arrange a confidential meeting with the instructor during office hours the first week of classes - or as soon as possible if accommodations are needed immediately. You must bring a copy of your Accommodation Memo and an Instructor Verification Form to the meeting. If you do not have these forms but need accommodations, make an appointment with The Program for Students with Disabilities, 1244 Halley Center, 844.2096 or follow the steps on the website for the office to request for accommodation (https://fp.auburn.edu/disability/students/requestaccommodations.asp)

(Provide a comprehensive, week-by-week breakdown of course content, including assignment due dates)

18. Assignments / Projects:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Mid term examination</td>
<td>30%</td>
</tr>
<tr>
<td>Final examination</td>
<td>30%</td>
</tr>
<tr>
<td>Homework</td>
<td>20%</td>
</tr>
<tr>
<td>Lab Report</td>
<td>20%</td>
</tr>
<tr>
<td>TOTAL (T)</td>
<td>100%</td>
</tr>
</tbody>
</table>

(List all quizzes, projects, reports, activities and other components of the course grade -- including a brief description of each assignment that clarifies its contribution to the course’s learning objectives)
19. Rubric and Grading Scale:

Grades will be assigned as follows (T=% of total points):
- T ≥ 90% A
- 89% ≥ T ≥ 80% B
- 79% ≥ T ≥ 70% C
- 69% ≥ T ≥ 60% D
- T ≤ 59% F

(List all components of the course grade -- including attendance and/or participation if relevant -- with point totals for each; indicate point totals and ranges or percentages for grading scale; for S/U grading, detail performance expectations for a passing grade)

20. Justification for Graduate Credit: N/A

(Include a brief statement explaining how the course meets graduate educational standards (i.e.: rigorous standards for evaluation, development of critical thinking and analytical skills, etc.))

(Include below are standard statements regarding course policies. If necessary, a statement may be altered to reflect the academic policies of individual faculty members and/or the academic unit or department, provided that there is no conflict with the Tiger Cub, Faculty Handbook, or any existing university policy.)

POLICY STATEMENTS

Attendance: Although attendance is not required, students are expected to attend all classes, and will be held responsible for any content covered in the event of an absence.

Excused Absences: Students are granted excused absences from class for the following reasons: illness of the student or serious illness of a member of the student's immediate family, the death of a member of the student's immediate family, trips for student organizations sponsored by an academic unit, trips for university classes, trips for participation in intercollegiate athletic events, subpoena for a court appearance, and religious holidays. Students who wish to have an excused absence from class for any other reason must contact the instructor in advance of the absence to request permission. The instructor will weigh the merits of the request, and render a decision. When feasible, the student must notify the instructor prior to the occurrence of any excused absences, but in no case shall such notification occur more than one week after the absence. Appropriate documentation for all excused absences is required. Please see the Tiger Cub for more information on excused absences.

Make-Up Policy: Arrangement to make up a missed major examination (e.g., hour exams, mid-term exams) due to properly authorized excused absences must be initiated by the student within one week of the end of the period of the excused absence(s). Except in unusual circumstances, such as the continued absence of the student or the advent of university holidays, a make-up exam will take place within two weeks of the date that the student initiates arrangements for it. Except in extraordinary circumstances, no make-up exams will be arranged during the last three days before the final exam period begins.

Academic Honesty Policy: All portions of the Auburn University student academic honesty code (Title XII) found in the Tiger Cub will apply to university courses. All academic honesty violations or alleged violations of the SGA Code of Laws will be reported to the Office of the Provost, which will then refer the case to the Academic Honesty Committee.

Disability Accommodations: Students who need special accommodations in class, as provided for by the Americans With Disabilities Act, should arrange for a confidential meeting with the instructor during office hours in the first week of classes (or as soon as possible if accommodations are needed immediately). The student must bring a copy of their Accommodation Letter and an Instructor Verification Form to the meeting. If the student does not have these forms, they should make an appointment with the Program for Students with Disabilities, 1288 Haley Center, 844-2066 (VTT).