NEW COURSE PROPOSAL SUBMITTED

TRACKING NUMBER: 1083     DATE/TIME: 2012-02-01 11:33:24.0

1. Department and Contact Information

Department          College          Budget Account Number
Mechanical Engineering Engineering  210500

Contact Person      Phone          Email
Delcice Durham      8139745656    drdurham@usf.edu

2. Course Information

Prefix    Number    Full Title
EML      4505      Sustainable Design and Materials

Abbreviated Title (30 characters maximum)
Sustainable Design & Materials

Is the course title variable?   N
Is a permit required for registration?    N
Are the credit hours variable?    N

Credit Hours    Section Type          Grading Option
3                Class Lecture (Primarily) Regular

Prerequisites
EML 4501 Machine Design

Corequisites

Co-Prerequisites

Course Description
This course integrates sustainability into the design of engineered products. Topics include materials selection and functional performance; design for the 4 Rs: end-of-life concerns; and product life cycle assessment (LCA) methods.

3. Justification

A. Indicate how this course will strengthen the Undergraduate Program. Is this course necessary for accreditation or certification?
Quantitatively assessing the sustainability of engineered products and incorporating green engineering design principles into the design of products and processes is in demand in industry and the global marketplace. This course provides a rigorous treatment of the concepts, methods

http://www.ugs.usf.edu/ugc/Proposals/newinsert.cfm
and tools for economics, environmental and societal impacts of design decisions. It is a technical elective at this point in time.

B. What specific area of knowledge is covered by this course which is not covered by courses currently listed?
1. Students will gain an understanding of sustainability and how it applies to green engineering design. 2. Students will learn to evaluate how design decisions and material selection affect environmental impact and costs. 3. Students will learn to apply life cycle assessment and LCA tools to engineering design. 4. Students will learn to apply green engineering design principles and LCA through a design project. 5. Students will learn how the human dimension is integrated into sustainable design and materials.

C. What is the need or demand for this course? (Indicate if this course is part of a required sequence in the major.) What other programs would this course service?
This course includes a collaborative, multi-disciplinary project in conjunction with three other green engineering courses from Chemical and Biomedical Engineering; Civil and Environmental Engineering; and Electrical Engineering. Student interactions across the discipline are designed to prepare them for industry project teams. The course is not part of a required sequence can lead to a certificate in Green Engineering.

D. Has this course been offered as Selected Topics/Experimental Topics course? If yes, what was the enrollment?
Yes. 11 undergraduates.

E. How frequently will the course be offered? What is the anticipated enrollment?
Annually in Spring semester. Anticipated enrollment is 20 students as a technical elective.

F. Do you plan to drop a course if this course is added? If so, what will be the effect on the program and on the students? (Please forward the nonsubstantive course change form regarding the course to be deleted to the Council secretary.)
No.

G. What qualifications for training and/or experience are necessary to teach this course? (List minimum qualifications for the instructor.)
PhD in Mechanical Engineering, research and education in applying green engineering, skill training in life cycle analysis tools.

4. Other Course Information

A. Objectives
1. Students will gain an understanding of sustainability and how it applies to green engineering design. 2. Students will learn to evaluate how design decisions and material selection affect environmental impact and costs. 3. Students will learn to apply life cycle assessment and LCA tools to engineering design. 4. Students will learn to apply green engineering design principles and LCA through a design project. 5. Students will learn how the human dimension is integrated into sustainable design and materials.

B. Learning Outcomes
an ability to apply knowledge of mathematics, science and engineering 2. an ability to identify, analyze, solve engineering problems 3. an ability to apply sustainability principles to engineering
design applications.

C. Major Topics
Topics covered will include materials selection based upon environmental impact and end-of-life considerations as well as functional performance; design for the 4 Rs: reduce, reuse, remanufacture, and recycle, along with end-of-life concerns; and product life cycle assessment (LCA) methods. Student projects will include case studies for green product design and a cross-disciplinary team project to conduct an LCA using state-of-the-art software tools. Sustainability principles will be incorporated into diverse topics organized following the design process (ideation, metrics, evaluation, and implementation). The class will test out different tools such as the carbon footprint, materials flow analysis, and streamlined LCA.

D. Textbooks

5. Syllabus (Anatomy of a Syllabus)

Upon receipt of college approval, please forward an electronic copy of your syllabus to Undergraduate Studies.
Course Description
This course will provide a foundation for green engineering design. Concerns regarding population growth, global warming, resource scarcity, globalization, and environmental degradation have led to an increasing awareness that current engineering design and policy strategies can be engaged more effectively to advance the goal of sustainability. Approaching sustainability from a design perspective requires the need for a fundamental conceptual shift from the current paradigms of product toward a more sustainable system based on efficient and effective use of benign materials and energy.

The objective of this course is to integrate the attributes of sustainability into the design of engineered products. Topics covered will include materials selection based upon environmental impact and end-of-life considerations as well as functional performance; design for the 4 Rs: reduce, reuse, remanufacture, and recycle, along with end-of-life concerns; and product life cycle assessment (LCA) methods. Student projects will include case studies for green product design and a cross-disciplinary team project to conduct an LCA using state-of-the-art software tools. Sustainability principles will be incorporated into diverse topics organized following the design process (ideation, metrics, evaluation, and implementation). The class will test out different tools such as the carbon footprint, materials flow analysis, and streamlined LCA.

Required Course Material

Class Time and Location
Tuesday & Thursday, 12:30 – 1:45 p.m. ENG 3
Syllabus, homework assignments and other class information will be available on Blackboard at http://my.usf.edu

Instructor
Dr. Delcie R. Durham, PE, FSME
ENC 2209, 813-974-5656, drdurham@usf.edu
Office hours: Weds 3:00 – 4:30 pm

Course Objectives
1. Students will gain an understanding of sustainability and how it applies to green engineering design.
2. Students will learn to evaluate how design decisions and material selection affect environmental impact and costs.
3. Students will learn to apply life cycle assessment and LCA tools to engineering design.
4. Students will learn to apply green engineering design principles and LCA through a design project.
5. Students will learn how the human dimension is integrated into sustainable design and materials.

Course Relationship to USF Mechanical Engineering
1. an ability to apply knowledge of mathematics, science and engineering
2. an ability to identify, analyze, solve engineering problems
3. an ability to apply sustainability principles to engineering design applications.

Reference Books


Class Preparation
Attendance at all class lectures is essential for learning the course material. It is expected that the assigned reading materials will be read prior to class on the topic. You can visit the instructor during office hours when necessary. It is also recommended that detailed notes be taken or recorded for your personal later use, but the sale of these notes and/or recordings is not permitted. Active use of the website is highly encouraged.

Students are expected to adhere to basic standards of politeness and considerate behavior when interaction with the instructors, teaching assistants and peers. The use of cell phones and pagers can be disruptive during class, and these must be silenced or off during class. Although attending class is not required, it is expected that when attending class, you remain for the entire period. If you must leave early, please inform the instructor prior to the beginning of the class. Arriving on time for class guarantees that you don’t miss a quiz or assignment discussion.

Religious Holidays
Students who anticipate the necessity of being absent from class, due to the observation of a major religious observance, must provide notice of the date(s) to the instructor. The notice must be provided, in writing, by the third class meeting (January 17, 2012).
Grading

Class participation/Quizzes/
  In-class exercises: 10%
Homework sets: 15%
Midterm exam: 20%
Design case studies: 15%
Group project (oral
  presentation and
  written report): 20%
Final Exam 20%
Total 100%

Undergraduate grading:

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<th>Grade</th>
<th>Range</th>
<th>Description</th>
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Graduate grading:

Same as A through C for
undergraduates. Below C will be an F.

Location: During the semester there will be several classes held jointly with other engineering disciplines in CHE 103. These will be clearly identified on the class schedule, and will include Guest lectures, group project presentations.

Homework: There will be 5 homework assignments through the semester. Homework problems will be assigned through Blackboard. Doing problems is an integral part of learning and students are expected to complete homework assignments and submit them for grading. All assignments must be emailed in before or handed in at the beginning of class when they are due. **Penalties for late homework submission:** < 48 hours late – possible grade 50% of assignment grade; 48 - < 96 hours late – possible grade 25% of assignment grade; 96 or more hours late – will not be graded. You are allowed (and encouraged) to work together with other students on homework, as long as you write up and submit your own individual solutions. You are also allowed (and encouraged) to ask the instructor questions, but only after having read the textbook and the web support materials relevant to the assignment.

Graduate students will be asked to complete additional and more difficult questions on homework assignments, the midterm exam, projects.

Class Participation/Quizzes/In-class Exercises: Attendance in lectures and discussion sections is required. If you cannot come to a lecture due to legitimate reasons, contact me prior to class by email.

Exams: One midterm exam and a final exam will be given in class. Accommodations for missing an exam will be made only for reasons approved by the instructor prior to the examination. To request that an accommodation be made, the instructor must receive written notification by email at least one week prior to the exam date. Make-up exams are
given at the discretion of the instructor in the event of a documented, legitimate reason for the absence.

**Design Case Studies:** Two case studies will be performed by each student. Students will prepare a brief presentation for class and a written report. More details will be provided on Blackboard.

**Group project:** Multi-disciplinary teams of graduate students or undergraduate students will be tasked to innovatively design a solution to a real world and timely sustainability challenge. The various projects will be introduced on February as well as the guidelines for the project.

**Extra Credit**
No extra credit assignments.

**Grade Dispute**
If you wish to dispute the grade earned on an exam, homework or case study, it must be done in writing within 48 hours after the graded work has been returned. A specific rationale for why the grade should be adjusted must be included. “I think I deserve a higher grade” is not an acceptable rationale. Grade disputes will not be considered if submitted more than 48 hours after the graded work has been returned.

**Academic Integrity**
Academic integrity is essential to a positive teaching and learning environment. All university students are expected to complete coursework responsibilities with fairness and honesty. The USF Academic Integrity Policy applies and can be found at http://www.ugs.usf.edu/pdf/cat1011/20102011.pdf. The policy covers plagiarism, cheating, fabrication, forgery, obstruction, multiple submissions, assisting another person in acts of academic dishonesty and computer misuse. Punishments for academic dishonesty will depend on the seriousness of the offense and may include assignment of an “F” or a numerical value of zero on the exam, and “F” or an “FF” grade (the latter indicating academic dishonesty) in the course, suspension, or expulsion from the University. The penalties for cheating on an exam will be in accordance with the current USF policies.

**Plagiarism**
The University of South Florida has an account with an automated plagiarism detection service which allows instructors and students to submit student assignments to be checked for plagiarism. I reserve the right to 1) request that assignments be submitted as electronic files and 2) electronically submit assignments to SafeAssignment, or 3) ask students to submit their assignments to SafeAssignment through Blackboard. Assignments are compared automatically with a database of journal articles, web articles, and previously submitted papers. The instructor receives a report showing exactly how a student’s paper was plagiarized. For more information about SafeAssignment and plagiarism, go to http://www.c21te.usf.edu. Click on Plagiarism Resources. For information about plagiarism in USF’s catalogs, go to
http://www.ugs.usf.edu/catalogs/0304/adadap.htm#plagiarism or the equivalent graduate catalog source.

Accommodations for students with disabilities: USF is committed to providing reasonable support for students with disabilities. Students in need of academic accommodations for a disability may consult with the office of Students with Disabilities Services to arrange appropriate accommodations. Students are required to give reasonable notice prior to requesting an accommodation.

Academic Continuity in the Event of a Campus Closure: In the event of an emergency, it may be necessary for USF to suspend normal operations. During this time, USF may opt to continue delivery of instruction through methods that include but are not limited to: Blackboard, Elluminate, Skype, and email messaging and/or an alternate schedule. It's the responsibility of the student to monitor Blackboard site for each class for course specific communication, and the main USF, College, and department websites, emails, and MoBull messages for important general information.