

ABE 4043C

Biological Engineering Design 2

Semester Taught – Spring

Class meets M,W 3:00-3:50 (period 8) in Rog 110

Office hours on Tues from 1:00-3:00 PM in Rog 105 (or email to make an appointment at a different time)

* *Students must email the instructor for arranging meetings outside of office hours*

Catalog Description

Credits: 2

Senior capstone design project

Pre-requisites/Co-requisites

Prerequisite: senior standing (4EG), ABE 4042C, specialization courses

Course Objectives

The goal of the course is to train students to apply the engineering design process by comprehensive hands-on experience. Students who complete the course will demonstrate the ability to:

- Design engineered systems with consideration of public health, safety, and welfare,
- Design engineered systems with consideration of global, cultural, social, environmental, and economic factors
- Communicate effectively with a range of audiences

Contributions of Course to Meeting the Professional Component for ABET

This required course counts for 2 credit hours of "Engineering Design" towards completion of the 55 hour "Professional Requirements" of the undergraduate curricula for all options of the BS.

Relationship of Course to Program Outcomes

The ABE program utilizes 1-7 student outcomes as detailed below. This course assesses student outcomes number 2 and 3, and addresses each outcome at various levels.

ABET Program Outcomes

Outcome	Coverage
1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	High
3. an ability to communicate effectively with a range of audiences	High
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Medium
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	Medium
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Medium
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Medium

Course Schedule

Module	Topic
1	Introduction and Overview
2	Problem Definition: Writing Objective Statements
3	Design Economics: Timeline and Budget
4	Criteria, Benchmarks, and Standards
5	Trade studies: Equivalent systems analysis
6	First Principles Engineering
7	Methodology and Approach
8	Visualization of Design
9	Ethical Design: Results, Failure Analysis and Discussion
10	Executive Summary
11	Conclusions and Significance
12	References and Bibliography

Instructor

Eric S. McLamore

Office: 105 Frazier Rogers Hall

Phone: (352) 294-6703

E-mail: emclamor@ufl.edu

Material/Supply Fees

None

Class Materials Required

No Textbook Required. Copies of all computer files associated with the project should be submitted electronically at the same time as the hard copies of the mid-term and final reports. Each student should have an account on the Agricultural and Biological Engineering Department network to be used in this course for sending and receiving e-mail, for storage of project documents and for accumulation of the student's portfolio. Other accounts are acceptable for e-mail and document storage if they are capable of transmitting all of the required information (e.g., gmail, yahoo mail, etc).

Grading

A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: <http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html>. Credit will not be given for projects performed for other courses. A grade of "I" will not be given for partially completed projects, so students who desire to spread their project over two semesters are advised to register for ABE 4043 during the last semester of their project.

Grading scale
A 91-100 %
B 81-90%
C 71-80%
D 61-70%
E <61%

Grading Method	Percent (%)
Homework	20%
Weekly Reports	10%
Team Evaluations & Attendance	10%
Presentations	20%
Final Report	30%
e-Portfolio	10%

Instructional Procedures

Overall

The focus of the course is a comprehensive student design project to be submitted as an e-portfolio. The course provides the opportunity for students to work with an experienced engineer on a project, and this mentor must be selected prior to initiating a formal design project. The student teams are responsible for transmitting reports to the project advisor and to the course instructor (if not the same). The students will explore solutions, select a candidate solution, execute the design, and, where feasible, build a prototype or model and test it. All results will be compared to established standards and previous designs in published (peer reviewed) literature. Projects will be evaluated based on quality of the design, the steps of the design procedure, and the written and oral presentation of the design concept.

Important Forms

To the extent possible, cross-specialization will be planned, developed and executed for team projects. Students will define a project with the advice of the instructor or another faculty member/advisor in ABE. Teams working with a faculty mentor other than the course instructor must have a signed document (**ABE Form No. ABE4042C-A1**) identifying the faculty mentor. Students who are eligible may obtain credit for Design II by participating in a summer internship (see instructor for permission). To participate in an internship or co-op, students must seek approval from Dr. Martin-Ryals and Dr. McLamore and also fill out the appropriate forms (see **ABE Form No. ABE4042C-A2** for a list of requirements).

Design I-Design II sequence

The Design I and Design II courses are complementary. Thus, it is important that student teams begin to work on design concepts in the Fall semester during enrollment in Design I. A formal written problem statement describing the semester project will be due the first week of class in Design II.

Meeting and Attendance

Student teams will meet with the instructor each week for in-person lecture and also to discuss progress, problems, and expectations related to the design projects. During each week, students will be given ample time (in class and out of class) to work as a team, ask questions of the instructor, and/or seek advice from project mentor(s). Attendance to all scheduled class times is mandatory. Excused absences are consistent with university policies in the undergraduate catalog.

Failure in regular attendance may result in deductions to Peer Evaluation & Participation portion of grade. Contact your instructor if you have an excused absence to work out a plan to make up the work. Excused absences must be consistent with university policies in the undergraduate catalog and require appropriate documentation.

Use of cell phones or musical devices is not allowed during class or lab.

Design projects

The design project will be the design of a physical device or system. Computer-aided design is encouraged, but use of the computer and development of software are considered methodology rather than a true design. All designs must be developed and presented in a form such that a contractor could build it without additional input from the designer. There must be some evidence that the design will work as planned and, where feasible, prototypes are encouraged. A major consideration in any design is the cost of owning and operating the system or device and the benefits to be derived from it. Although the benefit may be conjectural, the designer must be able to project at least the cost of construction. The final report should address environmental impact, use of standards, safety, legal requirements (including permitting), and social and economic impacts as well as the expected technical considerations.

Written report:

A written design report (word-processed, hard and electronic copies) is required as part of the final e-portfolio. The formal proposal will include quantitative design criteria and a proposed project schedule, as well as other topics identified by the instructor during the first week of class (see Design Report Guideline). A series of homeworks will introduce students to key concepts for successfully completing the Design challenge. Students should use feedback from these homeworks to modify and improve the sections of the report document. One-paragraph to one-page progress reports will be submitted to both the instructor (and project advisor if applicable) weekly via e-mail.

Oral presentations:

There will be two oral presentations by teams (attendance by all members is mandatory). *Presentation #1*) Project proposals will be formally presented in the form of a poster presentation as part of the Department student poster competition. The audience is ABE faculty and students. These semi-formal presentations will be business casual. *Presentation #2*) A formal presentation of the final design and conclusions will be given to an external advisory board. The advisory board consists of Deans from other Universities, CEOs and lead engineers in companies, and entrepreneurs related to Agricultural & Biological Engineering. Teams will provide a draft copy of the written final report during this presentation for the Board to review.

e-Portfolio:

An electronic portfolio (e-portfolio) is required to receive a final grade in the course. The portfolio must contain:

1. all graded homework assignments (including signed reviews),
2. all graded weekly reports (including signed reviews),
3. an electronic copy of the final popular press article (i.e., headline),
4. an electronic copy of the final poster presentation,
5. an electronic copy of the final written report,

Assignment submissions: All assignments are due by 5 pm on the day specified for full credit (20% deduction per day thereafter). Assignment makeups will follow University Policy described in the undergraduate catalog.

For credit, all files must be combined into a single PDF document and named using the convention below prior to loading in the canvas course page. **Failure to submit an e-portfolio will result in a grade of "E" for the course.**

TEAM NAME_(YEAR) SENIOR DESIGN PORTFOLIO

Academic Honesty

All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>.

Accommodation for Students with Disabilities

Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

Use of Library, Personal References, PC Programs and Electronic Databases

These items are university property and should be utilized with other users in mind. Never remove, mark, modify nor deface resources that do not belong to you. If you're in the habit of underlining text, do it only on your personal copy. It is inconsiderate, costly to others, and dishonest to use common references otherwise.

Software Use

All faculty, staff and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.

UF Counseling Services

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. If you feel like your performance in class is being impacted by discrimination or harassment of any kind please contact your instructor or any of the following:

Your academic advisor or Graduate Program Coordinator

- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@ufl.edu

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the Office of Title IX Compliance, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Resources are available on-campus for students having personal problems or lacking clear career and academic goals which interfere with their academic performance. These resources include:

1. [University Counseling Center](#), 301 Peabody Hall, 392-1575, personal and career counseling;
2. [Student Mental Health](#), Student Health Care Center, 392-1161, personal counseling;
3. [Sexual Assault Counseling \(STRIVE\)](#), UF Counseling and Wellness Center, 392-1575
4. [Career Resource Center](#), Reitz Union, 392-1601, career development assistance and counseling.