

ABE 4043C
Biological Engineering Design 2 (Capstone Design)

Class Periods: MWF Period 8, 3:00 – 3:50 PM

Location: Frazier Rogers Hall Rm. 110

Academic Term: Spring 2022

Instructors:

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| Dr. Ziyne Boz ziynetboz@ufl.edu (352) 294-7690 | Dr. Ana Martin-Ryals admartin@ufl.edu (352) 294-6708 |
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Office Hours: MW 4:00-5:00 PM via Zoom or by appointment. Office hours will be held online via Zoom*.

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

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

None

Course Description

Senior capstone design project (2 credits.)

Course 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

Materials and Supply Fees

N/A

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.

Relation to Program Outcomes (ABET):

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.

| 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 |

Required Textbooks and Software

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 can transmit all the required information (e.g., Gmail, yahoo mail, etc.).

Course Schedule*

| Week | Lecture Topic | Deliverable |
|---|---|--|
| 1 | Class Overview and Expectations | Report Update (Updated Team Contract) |
| 2 | Review of Design Process | |
| 3 | Review of Design Standards | Prototype Design and Testing Methodology |
| 4 | Story Telling, Value-Proposition | |
| 5 | Engineering Economics | Report Update |
| 6 | Economic, Social, Environmental Impacts | |
| 7 | | Report Update |
| 8 | Statistics | |
| 9 | | Mid-term Report Update, Prototype Demo |
| 10 | SPRING BREAK | |
| 11 | Failure Analysis | Report Update |
| 12 | Guest Speaker | |
| 13 | Guest Speaker | Poster and Testing Results, Failure Analysis, and Alternatives |
| 14 | Guest Speaker | |
| 15 | Guest Speaker | Report Update |
| 16 | | Final Presentation |
| 17 | | Final Report and Peer Evaluations |
| *The course schedule is subject to change | | |

Evaluation of Grades

A "C-" will not be a qualifying grade for critical tracking courses. 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: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>. 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 Method | Percentage of Final Grade |
|--|---------------------------|
| Report Updates | 5% |
| Project Milestones | |
| • Prototype Design/Testing Methodology | 5% |
| • Mid-Term Report Update | 5% |
| • Prototype Demo | 25% |
| • Testing Results and Failure Analysis | 20% |
| Poster | 10% |
| Final Presentation | 10% |
| Final Report | 15% |
| Peer Evaluations | 5% |
| TOTAL | 100% |

Grading Policy

| Percent | Grade |
|---------|-------|
| 91-100% | A |
| 81-90 % | B |
| 71-80% | C |
| 61-70% | D |
| <61% | E |

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

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.

Meeting and Attendance

Student teams will meet with the instructors each week for in-person lecture and also to discuss progress, problems, and expectations related to the design projects. 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 schedule 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. 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. The final report will include quantitative design criteria, as well as other topics identified by the instructor during the first week of class (see Design Report Guideline). Each team will be required to submit bi-weekly report updates and meet various project milestones as outline in the class schedule. Students should use feedback from the report updates and project milestone deliverables to modify and improve the sections of the final report document.

Oral presentations:

There will be two oral presentations by teams (attendance by all members is mandatory). Presentation #1) Poster presentation to ABE faculty, students, and/or advisory board members. Presentation #2) A formal presentation of the final design and conclusions will be given in class during the last week of classes. Both presentations will be business casual.

Assignment submissions: All assignments are due by 11:59 pm on the day specified for full credit (20% deduction per day thereafter. Assignment makeups will follow University Policy described in the undergraduate catalog.

Students Requiring Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

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/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil

proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session. Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Conduct Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@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@eng.ufl.edu

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 uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

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

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

COVID-19

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>;<https://care.dso.ufl.edu>.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.