

## ABE 4043C

### Biological Engineering Design 2

---

Semester Taught – Spring 2021

Class meets M,F 1:55-2:45 (period 7) in Rog 110, or  
M,W 3:00-3:50 (period 8) in Rog 110

Office hours on Wednesday from 1:55-2:45 PM via Zoom (or email to make an appointment at a different time)

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

#### Instructors

---

**Dr. Richard Scholtz**  
(352) 294-6704  
[rscholtz@ufl.edu](mailto:rscholtz@ufl.edu)

**Dr. Ana Martin-Ryals**  
(352) 294-6708  
[admartin@ufl.edu](mailto:admartin@ufl.edu)

**Dr. Ziyet Boz**  
(352) 294-7690  
[ziynetboz@ufl.edu](mailto:ziynetboz@ufl.edu)

#### 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

#### 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).

#### 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
<b>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</b>	<b>High</b>
<b>3. an ability to communicate effectively with a range of audiences</b>	<b>High</b>
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

## 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: <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 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 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

## **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.

## F2F-Course Policy in Response to COVID-19

---

We will have face-to-face instructional sessions to accomplish the student learning objectives of this course. In response to COVID-19, the following policies and requirements are in place to maintain your learning environment and to enhance the safety of our in-classroom interactions.

You are required to wear approved face coverings at all times during class and within buildings. Following and enforcing these policies and requirements are all of our responsibility. Failure to do so will lead to a report to the Office of Student Conduct and Conflict Resolution.

This course has been assigned a physical classroom with enough capacity to maintain physical distancing (6 feet between individuals) requirements. Please utilize designated seats and maintain appropriate spacing between students. Please do not move desks or stations.

Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.

Follow your instructor's guidance on how to enter and exit the classroom. Practice physical distancing to the extent possible when entering and exiting the classroom.

If you are experiencing COVID-19 symptoms ([Click here for guidance from the CDC on symptoms of coronavirus](#)), please use the UF Health screening system and follow the instructions on whether you are able to attend class. [Click here for UF Health guidance on what to do if you have been exposed to or are experiencing Covid-19 symptoms](#).

Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work. [Find more information in the university attendance policies](#).

## Course Evaluations

---

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.a.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.a.ufl.edu/public-results/>.

## 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 Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. 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:

- Robin Snyder, Academic Advisor ABE, 352-294-6709, [rsnyder@ufl.edu](mailto:rsnyder@ufl.edu)
- Robin Bielling, Director of Human Resources, 352-392-0903, [rbielling@eng.ufl.edu](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto: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](mailto: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:** <http://www.counseling.ufl.edu/cwc>, 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](mailto: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/>.

### Academic Resources

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

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.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://care.dso.ufl.edu>.

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