

## **Introduction to Biological Engineering**

ABE 2012C

**Class Periods:** MW 10:40-11:30 am (period 4)

**Lab Periods:** M 3:00-3:50 pm OR 4:05-4:55 pm (period 8 OR 9)

**Location:** Frazier-Rogers Hall Room 110

**Academic Term:** Fall 2022

### ***Instructor:***

Dr. Ana Martin-Ryals

admartin@ufl.edu

(352) 294-6708

Office Hours: MW 11:30 am-12:30 pm and by appointment

***Teaching Assistant/Peer Mentor/Supervised Teaching Student:*** none

### ***Course Description***

3 Credits. Introduces the process of design along with approaches to solving engineering problems, manipulations and presentations of engineering data and applied engineering concepts. (WR)

### ***Course Pre-Requisites / Co-Requisites***

Prerequisite: MAC 2311

### ***Course Objectives***

- Students will be able to describe what biological engineering is and the different areas of specialization
- Students will be able to apply basic mathematics, science and engineering principles to solve biological engineering problems
- Students will become familiar with and be able to apply various software, instrumentation, and equipment used in engineering
- Students will develop and apply teamwork and communication skills
- Students will be able to recognize ethical and professional responsibilities in engineering situations
- Students will be able to identify and explain their academic and career goals

### ***Materials and Supply Fees***

None

### ***Required Textbooks and Software***

None

### ***Recommended Materials***

- Cross, Nigel. 1989. Engineering Design Methods. John Wiley & Sons, Chichester. 159 pp. (Sci. Lib. TA174.C76 1989)
- Eide, Arvid R., Roland D. Jenison, Lane H. Mashaw and Larry L. Northup. 1986. Engineering Fundamentals and Problem Solving (2nd Ed.). McGraw-Hill, Inc., New York. 492 pp. (Sci. Lib. TA147.E52 1986)
- Grant, Eugene L., W. Grant Ireson and Richard S. Leavenworth. 1990 Principles of Engineering Economy (8th Ed.). John Wiley and Sons, New York. 624 pp. (Sci. Lib. TA177.4.G7 1990)
- Lindeburg, Michael R. 2000, FE Review Manual. Professional Publications, Inc., Belmont. (Sci. Lib TA159.L5733 2000)

### ***Professional Component (ABET):***

This course contributes 3 credit hours toward meeting the minimum 48 credit hours of Engineering Topics required in the basic-level curriculum for the Bachelor of Science Degree in Biological Engineering.

**Relation to Program Outcomes (ABET):**

This course addresses the following ABET outcomes, and assesses outcomes 4 and 7.

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	Low
3. An ability to communicate effectively with a range of audiences	Medium
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	High
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	High
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

\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

**Evaluation of Grades**

Assignment	Total Points	Percentage of Final Grade
Assignments (10)	350	50%
Exam 1	100	15%
Exam 2	100	15%
Team Project	200	30%
	700	100%

**Grading Policy**

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

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

**Course Schedule**

This is tentative and subject to modification depending on progress of the course and guest speaker schedules.

Week 1:	8/24	Course Overview and Introductions
Week 2:	8/29	Overview of Biological Engineering
		- No lab this week -
	8/31	Engineering Problem Solving: Engineering Design Process
Week 3:	9/5	<b>Labor Day – no class</b>
	9/7	Engineering Problem Solving: Problem Definition and Optimization
Week 4:	9/12	Engineering Problem Solving: Units, Measurement, and Estimation
		<u>Lab 1</u> – Units and Measurement
	9/14	Guest Speaker – Erin Lin, Career Connections Center
Week 5:	9/19	Professional Issues: Engineering Licensure and Academic Planning
		<u>Lab 2</u> – Plant Space Biology
	9/21	Guest Speaker – ABE Graduate Student Panel
Week 6:	9/26	Professional Issues: Engineering Ethics
		<u>Lab 3</u> – Biosensors
	9/28	<b>ABE Career Fair – no class</b>
Week 7:	10/3	Professional Issues: Team Projects
		Review for Exam 1
	10/5	Guest Speaker – Dr. Bruce Welt, Packaging Engineering
Week 8:	10/10	<b>Exam 1</b>
		<u>Lab 4</u> – Remote Sensing and GIS
	10/12	Guest Speaker – Del Bottcher, Soil and Water Engineering Technology
Week 9:	10/17	Statistics: Descriptive Statistics and Linear Regression
		<u>Lab 5</u> – Using Excel
	10/19	Guest Speaker – Erin Webb, Oak Ridge National Laboratory
Week 10:	10/24	Statistics: Probability Functions and Normal Distribution
		<u>Lab 6</u> – Python
	10/26	Guest Speaker – Graduate Student Panel
Week 11:	10/31	Statistics: Confidence Intervals
		<u>Lab 7</u> – Life-cycle Assessment
	11/2	Guest Speaker – Yiannis Ampatzidis
Week 12:	11/7	Statistics: Hypothesis Testing
		<u>Lab 8</u> – Food and Bioprocessing Unit Operations
	11/9	Engineering Economics: Present and Future Worth
Week 13:	11/14	Engineering Economics: Introduction, Simple vs. Compound Interest
		<u>Lab 9</u> – Water Resources
	11/16	Engineering Economics: Decision making
Week 14:	11/21	Engineering Economics: Life-cycle costing
		Review for Exam 2
	11/23	<b>Day before Thanksgiving – no class</b>
Week 15:	11/28	<b>Exam 2</b>
		- No lab this week -
	11/30	Finalize Team Projects and Course Evaluation
Week 16:		Team Project Presentations
Week 17:		Finals week – Team Project Reflection and Essay due this week

### ***Attendance Policy, Class Expectations, and Make-Up Policy***

- Attendance is optional though encouraged. Attendance will be taken for each class and lab. You will achieve up to full credit for your performance with no more than 5 absences. With 6 to 10 absences, you will receive the next lower grade. With 10 to 15 absences, you will receive the second lower grade. 16 or more absences will result in an E grade for the course. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:
- <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>
- If you are unable to attend the lecture portion of the course in-person, you may attend via Zoom with prior permission.
- Assignments are due by 11:59 pm on the day specified for full credit. 10% deduction/day thereafter. Maximum deduction is 50%. For any partial credit, assignments that cover any material on an exam must be turned in at least two days before the exam on which the material is covered.
- No make-up exams will be given except for valid medical reasons or unless prior arrangements have been made.

### ***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 Honor 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. 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:

- Your academic advisor or Undergraduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, [jpennacc@ufl.edu](mailto:jpennacc@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:** <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](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.  
<https://lss.at.ufl.edu/help.shtml>.

**Career Connections 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**: <https://distance.ufl.edu/state-authorization-status/#student-complaint>.