

INTRODUCTION TO BIOLOGICAL ENGINEERING

ABE 2012C

Class Periods: MW 10:40-11:30 am (period 4), M 3:00-3:50 pm OR 4:05-4:55 pm (period 8 OR 9)

Location: 110 Frazier Rogers Hall

Academic Term: Fall 2019

Instructor:

Dr. Ana Martin-Ryals

admartin@ufl.edu

(352) 294-6708

Office Hours: MW 9:30-10:30 am & 2:00-3:00 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

- To assist student understanding of the areas of curriculum specialization and career opportunities available through Biological Engineering.
- To develop student understanding of basic engineering concepts including the design process and solving engineering problems.
- To introduce students to various computer software, instrumentation and equipment used in engineering.
- To develop teamwork skills.
- To develop academic and career planning skills.
- To learn the process to acquire professional licensure.
- To have an awareness of the global and international impact of engineering decisions, as well as a sense of professional, ethical and societal responsibility.

Materials and Supply Fees

None

Required Textbooks and Software

No textbook; materials will be provided.

Recommended Reading 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

| Outcome | Coverage* |
|--|-----------|
| 1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics. | High |
| 2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs. | Low |
| 3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. | Medium |
| 4. An ability to communicate effectively with a range of audiences | Medium |
| 5. 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 |
| 6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately. | High |
| 7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty | Medium |

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

Course Schedule

This is a tentative schedule and is subject to modification depending on the progress of the course

| | | |
|---------|------|--|
| Week 1: | 8/21 | Course Introduction and Orientation Overview of Biological Engineering Concentrations |
| Week 2: | 8/26 | Engineering Design and Problem Solving <u>Lab #1</u> - Measurement |
| | 8/28 | Dimensions, Units, and Conversions Engineering Estimations and Approximations |
| Week 3: | 9/2 | Labor Day - no class |
| | 9/4 | Engineering Solutions: Standards of Problem Presentation General Graphing Procedures |
| Week 4: | 9/9 | Empirical Functions and Curve Fitting <u>Lab #2</u> - Software Tools for Engineering – Excel, part 1 |
| | 9/11 | Guest Speaker – Erin Lin, Career Connections Center |
| Week 5: | 9/16 | Software Tools for Engineering – Excel, part 2 <u>Lab #3</u> – Wind Tunnel |
| | 9/18 | Software Tools for Engineering – Python, part 1 |
| Week 6: | 9/23 | Software Tools for Engineering – Python, part 2 <u>Lab #4</u> - Remote Sensing |
| | 9/25 | Academic Planning & Review for Exam 1 |
| Week 7: | 9/30 | Exam 1 <u>Lab #5</u> - Biosensors (<i>tentative</i>) |
| | 10/2 | Guest Speaker – Erik Sander, Engineering Innovation Institute |
| Week 8: | 10/7 | Guest Speaker – Shawn Webber, Sustainable Design <u>Lab #6</u> – Water Resources (<i>tentative</i>) |
| | 10/9 | Guest Speaker – Dr. Del Bottcher, Soil and Water Engineering Inc. |

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| Week 9: | 10/14 | Guest Speaker – Ping Neo, Engineering Study Abroad Opportunities <u>Lab #7</u> - Packaging Engineering (<i>tentative</i>) |
| | 10/16 | Guest Speaker – Dr. Bruce Welt, Careers in Packaging |
| Week 10: | 10/21 | Statistics: Frequency Distribution, Measures of Central Tendency, Measures of Variation <u>Lab #8</u> - Big Data Analysis |
| | 10/23 | Graduate School Considerations |
| Week 11: | 10/28 | Statistics: Continuous Distribution and Normal Distribution <u>Lab #9</u> - Precision Agriculture |
| | 10/30 | Guest Speaker –Dr. Barry Jacobson, Solar Impact |
| Week 12: | 11/4 | Statistics: Linear Regression, Coefficient of Correlation, t-Test <u>Lab #10</u> - Bioengineering (<i>tentative</i>) |
| | 11/6 | Engineering Economics: Introduction, Simple vs. Compound Interest |
| Week 13: | 11/11 | Veteran’s Day – no class |
| | 11/13 | Engineering Economics: Cash Flow Diagrams, Present and Future Worth, Annuities |
| Week 14: | 11/18 | Engineering Economics: Economic Decision Making <u>Lab # 11</u> - Bioenergy (<i>tentative</i>) |
| | 11/20 | Professional Issues: Ethics and Responsibilities |
| Week 15: | 11/25 | Professional Issues: FE Exam, Professional Registration, Technical/Professional Societies <u>Lab # 12</u> – Fluids (<i>tentative</i>) |
| | 11/27 | Day before Thanksgiving – no class |
| Week 16: | 12/2 | Final Assignment Presentations Lab Session: Review for Exam 2 |
| | 12/4 | Exam 2 |

Attendance Policy, Class Expectations, and Make-Up Policy

- Attendance is optional though encouraged. There will be a sign-in sheet available for each class or 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. Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.
- Assignments are due in my office by 5 pm on the day specified for full credit [midnight if electronic submission requested] (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.
- Credit will only be given for laboratories attended. There will be a sign-in sheet. You are responsible for signing the sheet.
- No make-up exams will be given except for valid medical reasons or unless prior arrangements have been made.
- Cell phone and musical device use is not allowed during class or lab.

Evaluation of Grades

| Assignment | Total Points | Percentage of Final Grade |
|----------------------|---------------------|----------------------------------|
| Assignments (15-16) | 350 | 35% |
| Laboratories (10-12) | 300 | 30% |
| Midterm Exam | 100 | 10% |
| Final Exam | 100 | 10% |
| Final Project | 150 | 15% |
| | | 100% |

Grading Policy

| Percent | Grade | Grade Points |
|----------------|--------------|---------------------|
| 93 - 100 | A | 4.00 |
| 90 - 92 | A- | 3.67 |
| 87 - 89 | B+ | 3.33 |
| 83 - 86 | B | 3.00 |
| 80 - 82 | B- | 2.67 |
| 77 - 79 | C+ | 2.33 |
| 73 - 76 | C | 2.00 |
| 70 - 72 | C- | 1.67 |
| 67 - 69 | D+ | 1.33 |
| 63 - 66 | D | 1.00 |
| 60 - 62 | D- | 0.67 |
| 0 - 59 | E | 0.00 |

More information on UF grading policy may be found at:
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/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:

- 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@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: <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

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 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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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