

BME 4882 Senior Design, Professionalism and Ethics II
Class Periods: T (3:00 – 4:55 pm), Periods 8-9; R (4:05 – 4:55 pm), Period 9
Location: COM C1-115; **Academic Term:** Spring 2020

Instructors: Eric Fuller efuller@bme.ufl.edu 352 273-9338 J293 BMS	W. Lee Murfee wmurfee@bme.ufl.edu 352-294-8813 J284 BMS	Ismael "Tito" Arroyo iarroyo@ufl.edu 352-273-4988 410 NSC
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Office Hours: To be determined.

Course Description

3 credit hours - Design of custom strategies to address real-life issues in the development of biocompatible and biomimetic devices for biotechnology or biomedical applications. Teams work with a client in the development of projects that incorporate various aspects of biomedical engineering including instrumentation, biomechanics, bio-transport, tissue engineering and others. Emphasizes formal engineering design principles; overview of intellectual properties, engineering ethics, risk analysis, safety in design and FDA regulations are reviewed. Designs and prototypes are developed in BME 4882. BME 4883 focuses on implementation, testing, and iteration.

Course Pre-Requisites / Co-Requisites

BME 4503, BME 4503L, BME 4409, BME 4882 and senior standing.

Course Specific Aims

1. Students will apply the design process methodology to the development of a solution to a biomedical engineering problem.
2. Students will demonstrate the process of ideating, designing, prototyping, and verifying a biomedical engineering related technology, device, or method.
3. Students will become effective communicating technical details and rationale for design decisions.
4. Students will gain experience working on teams, initiating tasks and reporting deliverables.
5. Students will appreciate the professional and ethical obligations of a professional biomedical engineer.

Materials and Supply Fees

A semester fee of \$ 155.20 is allocated for project supply material and equipment costs.

Professional Component (ABET)

This course will prepare students to apply the design process to solve problems at the interface of engineering and medicine. Specific to the UF BME program educational outcomes, students will gain experience applying a knowledge of the design process to solving open problems and proving the feasibility of a prototype solution. An integral part of this experience will be the professional communication with industry, clinical and faculty experts as well as technical writing and presentations.

Relation to Program Outcomes (ABET)

Outcome	Coverage*	**Teaching Level
1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	Low	Emphasized
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.	High	Emphasized

3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	High	Emphasized
4. An ability to communicate effectively with a range of audiences	High	Emphasized
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.	High	Emphasized
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.	Medium	Emphasized
7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty	High	Emphasized

*Coverage is given as high, medium, or low. **Teaching Level corresponds to the sequential fit in the curriculum and is given as introduced, reinforced, or emphasized.

Recommended Textbooks

Biodesign: The Process of Innovating Medical Technologies. Stefanos Zenios, Josh Makower, Paul Yock, Todd J. Brinton, Uday N. Kumar, Lyn Denend, and Thomas M. Krummel. 2nd Edition. 2015. Cambridge Press. (ISBN-13: 978-1107087354) Web: <http://ebiodesign.org>.

*Note – this book is free online via UF library. The website above also has videos, case studies and more.

Product Design and Development, 3rd Edition. Ulrich, Eppinger Boston : McGraw-Hill/Irwin, c2004. ISBN number: 0072471468 Web: <http://www.ulrich-eppinger.net>

Nuts & Bolts of Great Business Plans:

<https://warrington.ufl.edu/centers/cei/docs/NutsAndBoltsOfGreatBusinessPlans.pdf>

Course Topics (see course schedule for specific class dates, assignments, presentations and exams)

Design Process

Problem Definition

Brainstorming

Concept Generation and Evaluation

Detailed Design

Fabrication and Validation

Experimental Design

Detailed Design

Project Management and Team Dynamics

Regulations and Standards

Intellectual Property

Bioethics

Technical Communication

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is expected, required, and noted by the instructors each class. Excess absences, class disruption, and lack of engagement will influence the class participation grade. All assignments are due at the beginning of class. Late work will not be accepted.

Evaluation of Grades

Assignment	Percentage of Final Grade
Deliverable Presentations (Team + Individual)	35%
Technical Blitz Presentation	5%
In Class Participation	8%
Design Showcase Demonstration	25%
Final Project Report	15%
Peer Evaluation (Individual)	10%
Course Evaluation	2%
TOTAL	100%

Grading Policy

Final grades will be influenced by the class average, the guiding grade range below, and the instructor's discretion.

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
≥92	90-91	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	< 60

This course is not a *critical tracking course*. 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. 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 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/>.

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.

Plagiarism

Plagiarism is a common infraction to the UF Honor Code. If you are confused as to what constitutes plagiarism, see here: <https://guides.uflib.ufl.edu/copyright/plagiarism>. Plagiarism on any of your assignments will be reported to the Dean of Students as a UF Student Honor Code violation. Also, note that copying solutions for any assignment, regardless of the source (e.g. other students, pirated website solutions), will be treated as plagiarism. If you have any questions or concerns, please consult with the instructor in this class. Note that failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures.

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>.