

BME 4882 Senior Design, Professionalism and Ethics I

Lecture: Monday 3:00pm – 6:00 pm in Turlington L011

Lab Location: Nuclear Science Building, room 408

Academic Term: Fall 2018

Course Syllabus and Outline

Instructor:

Dr. Lakiesha N. Williams

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All communications in Canvas (messaging and emails)

(352)273-8125

Office Hours: By Appointment, New Engineering Building, room 359

Website: UF course Canvas web site

Student Teacher:

Please contact through Canvas website

Bethsylvia (Bethsy) Soto Morales email: bsotomoraes@ufl.edu

Teaching Lab Specialist: TBD

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. Prototypes are developed in BME 4882. BME 4883 focuses on full product implementation and testing.

Course Pre-Requisites / Co-Requisites:

BME 4503, BME 4503L, and senior standing.

Course Objectives:

- a) Apply the design process in a project resulting in a prototype medical device, circuit, system, process or algorithm with commercial potential
- b) Learn the methods of identifying unmet clinical needs
- c) Demonstrate the process of inventing, designing, and commercializing new medical devices and instruments
- d) Learn to give effective, objective, and clear presentations
- e) Learn to communicate design through efficient and effective technical writing
- f) Understand the larger FDA regulatory framework for medical devices
- g) Understand the professional and ethical obligations of a biomedical engineer

The objective of the senior capstone is for teams to develop a tangible, validated novel engineering design solutions by the end of the academic year. **Passing BME 4882 requires proof of adequate progress toward this yearlong goal in the form of a written project proposal, a semester progress report, and a rough prototype.** Passing BME 4883 requires the development and validation of a final solution, which will be presented in the form of a final presentation and a written final report.

Materials and Supply Fees: None

Professional Component (ABET): 3 credits of engineering topics with a design component

Required Textbooks and Resources: Permanently bound and numbered laboratory notebook

Recommended Materials:

- a) Textbook: Product Design and Development, 3rd Edition
Ulrich, Eppinger Boston : McGraw-Hill/Irwin, c2004. ISBN number: 0072471468 Web:
<http://www.ulrich-eppinger.net>
- b) Textbook: Biodesign: The Process of Innovating Medical Technologies
Zenios, Makower, Yock Cambridge University Press, 2009, 1st Ed. ISBN number: 9780521517423
Web: <http://ebiodesign.org>
- c) Nuts & Bolts of Great Business Plans:
<https://warrington.ufl.edu/centers/cei/docs/NutsAndBoltsOfGreatBusinessPlans.pdf>

Semester Modules (Tentative):

1. **Problem Definition** – Students will be assigned a project and expected to decompose the problem, generate design specifications, and plan out the project.

Assignments: Build Problem Definition Statement

2. **Concept Generation and Evaluation** – Students will use brainstorming and decision evaluation tools to generate and evaluate solutions to reach a design consensus.

Assignments: Functional decomposition, Objective tree and other tools for generating solutions

3. **Detailed Design** – Students will generate a paper design of their proposed prototype including device specifications, key materials and components, detailed drawings, and principle of operation with all choices justified and supported through proof-of-concept.

Assignments: Drawings, dimensions, updated specifications, and written justification

4. **Fabrication and Validation** – Students will fabricate and conduct testing of their prototype, assess the degree to which the prototype meets the design specifications, and recommend design modifications to improve the prototype.

Assignments: Development of rough prototype, testing and recommendations

5. **Project Management** – Students will create and update a project timeline, budget, and maintain engineering notebooks throughout all phases of the project.

Assignments: Gantt Chart/Timeline and Responsibilities, Budget, Notebook evaluation

6. **Technical Communication** – Students will be required to describe, explain, and support the progress and solutions of their project at all phases of the design process.

Assignments: Design Review Paper and Presentation

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance is required for all scheduled lectures unless announced by instructor, graduate assistant, or Lab Technician. To successfully meet the objectives of this course, teams must meet outside of scheduled class periods to stay on track with prototyping.

Evaluation of Grades:

Homework/ In-class reports	35%
Peer Assessment	15%
Final Design Review	
Written Report	25%
Presentation	15%
Prototype	10%

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	S	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://www.dso.ufl.edu/sccr/process/student-conduct-honor-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.

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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.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 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>.