Course Syllabus – Introduction to Bioengineering

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Office: 103 Anderson Hall
Office Hours: M 1:30-2:30, TWTh 3-4, F 11-12, and by appointment

Lecture: **Tu 1–2:45pm, Khoury 203**
Lab: **Th 1-2:45pm, 210 CTC**

**Please write your email in memo format. I will do my best to respond to you within 24 hours.

Course catalog description: This course introduces students to the various sub-disciplines (medical, chemical, electrical, and mechanical) of bioengineering. Prerequisite may be taken concurrently: ENGR 010 with a "C-" or better. ***BENG 5 is a 2-unit course.***

Required text: Readings will be assigned from electronic textbooks that are available for free via the Library website. The following texts will be used in this course:

- *Principles of Biomedical Engineering* by S.V. Madihally, Artech House, 2010
- *Biomedical engineering entrepreneurship* by J.-S. Lee, World Scientific, 2010
- *Medicine by design: the practice and promise of biomedical engineering* by F. Montaigne, Johns Hopkins University Press, 2006
- *Methods in Research and Development of Biomedical Devices* by K.K.L. Wong, Z.-H. Sun, and J. Tu, World Scientific Publishing Co., 2013

Course Website: Links to the electronic textbooks available from the Library as well as other materials for this course, such as annotated lecture notes, homework assignments, videos, etc., will be made available on the Canvas site. Additionally, announcements are sent via Canvas. To ensure that you receive important course announcements, you are required to check the Canvas site or set-up your Canvas interface to receive announcements via email at least once a day.

Learning objectives/outcomes: Upon completion of the course, the student should be able to:

- Identify current topics in their discipline
- Recognize the application of biological principles to modern advancements in engineering
- Apply fundamental engineering skills in unit conversion, estimation, data analysis, data interpretation, and problem solving
- Describe the different sub-disciplines of bioengineering
- Understand the co-op program from the Bioengineering student perspective
- Describe the resources available with Biomedical Engineering Society membership
- Understand the details of advising, courses, and paperwork

Program objectives/outcomes (*ABET criteria*):

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
3. an ability to communicate effectively with a range of audiences
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
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

University-wide core competencies:

- Critical Thinking
- Information Literacy
- Quantitative Reasoning
- Oral Communication

Grading: Your final grade is derived from the following components:

Attendance and participation	20%
Homework and Lab assignments	30%
Bioengineering topic presentation	20%
Biomimicry project presentation	30%

Grading will not be on a curve. Partial credit will be assigned at the discretion of the instructor. Extra credit is not available.

The following grading scale will be used: >93.0 = A, 90.0 to 93.0 = A-, 87.0 to 89.9 = B+, 83.0 to 86.9 = B, 80.0 to 82.9 = B-, 77.0 to 79.9 = C+, 73.0 to 76.9 = C, 70.0 to 72.9 = C-, 67.0 to 69.9 =D+, 63.0 to 66.9 = D, 60.0 to 62.9 = D-, <60.0 = F.

It is my policy not to estimate letter grades during the semester (unless it is requested directly by a University staff member). Since there is a strict letter grade scale and weighting, you may easily estimate your grade during the semester from your raw scores that are posted on Canvas.

Homework and Lab assignments: Homework will be assigned throughout the semester help you develop your understanding of bioengineering topics. Homework will be assigned in class and will typically be due in one week either in written form or electronically on Canvas. Homework is due at the start of the class period. You have a five-minute grace period in class for turning in homework. If turned in during the remainder of the class period, the homework will be accepted but can only receive a maximum of 50% of the total points. After class, late homework will not be accepted without official written medical or legal documentation as per the Student Handbook, if provided immediately following the missed class.

Lab assignments will be assigned in lab and will be collected at the end of the lab period.

Bioengineering topic presentation: An individual short presentation about a bioengineering topic will be assigned. The purpose of the presentation is to learn about the current status of bioengineering area and its related technology and applications and share with the class.

Biomimicry project: The purpose of this team project is to explore ways that designs that are inspired from nature can be applied to engineering technologies and share them with the class through an in-depth presentation.

Attendance policy: Attendance is expected for every lecture and lab. Each unexcused absence will result in points being deducted from the "Attendance and participation" grade.

Classroom environment:

- The classroom is a place where all students need to be engaged in learning. This means that it cannot be a place for casual conversations, reading the newspaper, doing homework for other classes, etc. Be ready to concentrate on biomechanics and discuss the day's material.
- Be respectful and polite. Listen to your instructor and your fellow students when they are talking.
- Be in your seat and ready to start when your class is scheduled to begin and remain until the class is dismissed.
- All portable electronic devices must be turned off and placed out of sight at all times during lecture and exams. Violation of this rule may result in the student being dismissed from class.

Honor Code: The Honor Code at the University of the Pacific calls upon each student to exhibit a high degree of maturity, responsibility, and personal integrity. Students are expected to:

- act honestly in all matters
- actively encourage academic integrity
- discourage any form of cheating or dishonesty by others
- inform the instructor and appropriate university administrator if she or he has a reasonable and good faith belief and substantial evidence that a violation of the Academic Honesty Policy has occurred.

Violations will be referred to and investigated by the Office of Student Conduct and Community Standards. If a student is found responsible, it will be documented as part of her or his permanent academic record. A student may receive a range of penalties, including failure of an assignment, failure of the course, suspension, or dismissal from the University. The Academic Honesty Policy is located in Tiger Lore and online at http://www.pacific.edu/Campus-Life/Safety-and-Conduct/Student-Conduct/Tiger-Lore-Student-Handbook-.html

Accommodations for Students with Disabilities: If you are a student with a disability who requires accommodations, please contact the Director of the Office of Services for Students with Disabilities (SSD) for information on how to obtain an Accommodations Request Letter.

3-Step Accommodation Process:

1. Student meets with the SSD Director and provides documentation and completes registration forms.
2. Student requests accommodation(s) each semester by completing the Request for Accommodations Form.
3. Student arranges to meet with his/her professors to discuss the accommodation(s) and to sign the Accommodation Request Letter

To ensure timeliness of services, it is preferable that you obtain the accommodation letter(s) from the Office of SSD within the first 1-2 weeks of class. After the instructor receives the accommodation letter, please schedule a meeting with the instructor during office hours or some other mutually convenient time to arrange the accommodation(s).

The Office of Services for Students with Disabilities is located in the McCaffrey Center, Rm. 137. Phone: 209-946-3221. Email: ssd@pacific.edu. Online: www.pacific.edu/disabilities

Assessment: Copies of student work may be retained to assess how the learning objectives of the course are met.

Extra help: You are encouraged to get extra help during office hours.

Skills Development Matrix:

Experiential Assignment	Skills					
	Engineering Design	Internet Search	Oral Communication	Critical Thinking	Collaboration	Creativity
Class and Lab Activities	X		X	X	X	X
Homework	X	X		X		X
Bioengineering Topic Presentation	X	X	X	X		
Biomimicry Project/Presentation	X	X	X	X	X	X

BENG 5 – Introduction to Bioengineering
University of the Pacific, Fall 2019

Tentative Course Schedule

(Updated 8/21/19)

Week	Day	Date	Topics
1	Tues	8/27	• Intro to Bioengineering • Program Educational Objectives
	Thurs	8/29	• Bioengineering basics
2	Tues	9/3	• Sub-topics of bioengineering • Bioengineering at Pacific
	Thurs	9/5	• Estimation
3	Tues	9/10	• Self-reflection and connecting to purpose
	Thurs	9/12	• Solving Problems
4	Tues	9/17	• Self-reflection and connecting to purpose • Bioengineering Design and Capstone project
	Thurs	9/19	• Discussion on Design process and Teamwork
5	Tues	9/24	• Career direction: Research and Development
	Thurs	9/26	• Presentation Skills
6	Tues	10/1	• Cooperative Education office • Professional societies • Career Direction: Business and Project management
	Thurs	10/3	• Advising
7	Tues	10/8	• Fundamental Dimensions and Universal Units • Pacific Fellowship Office
	Thurs	***10/10***	• ***Bioengineering topic presentations***
8	Tues	10/15	• Career Resource Center • Biomimicry – Introduction
	Thurs	10/17	• Biomimicry – Project selection
9	Tues	10/22	• Innovation and Design Thinking
	Thurs	10/24	• Biomimicry – Project development
10	Tues	10/29	• Biomimicry – Project development
	Thurs	10/31	• Biomimicry – Storyboarding
11	Tues	11/5	• Excel skills and Graphing • Statistics
	Thurs	11/7	• Biomimicry – Storyboarding
12	Tues	11/12	• Standards and Regulation
	Thurs	11/14	• Biomimicry
13	Tues	11/19	• Models and Systems
	Thurs	11/21	• Biomimicry
14	**Tues**	**11/26**	• **No class**
	Thurs	***11/28***	• ***THANKSGIVING BREAK***
15	Tues	12/3	• Ethics
	Thurs	***12/5***	• ***Biomimicry team presentations***