

BME180C BIOMEDICAL ENGINEERING DESIGN

(Required for BME)

- Catalog Data:** **BME180C Biomedical Engineering Design (Credit Units: 3)**
Design strategies, techniques, tools, and protocols commonly encountered in biomedical engineering; clinical experience at the UCI Medical Center and Beckman Laser Institute; industrial design experience in group projects with local biomedical companies; ethics, economic analysis, marketing, and FDA product approval. Prerequisites: BME 180B. BME 180A-B-C must be taken in the same academic year. Open only to senior BME majors. In- progress grading. (Design Units: 3)
- Textbook:** *Design of Biomedical Devices and systems*, King, P.H. and Fries, R.C. Marcel & Dekker, 2002, 1st edition.
- References:** Lecture Notes.
- Coordinator:** Abraham P. Lee and William C. Tang
- Relationship to Program Outcomes:** This course related to Program Outcomes
BME: a, b, c, d, e, f, g, h, i, j, and k as stated at:
<http://undergraduate.eng.uci.edu/degreeprograms/biomedical/mission>
- Course Outcomes / Performance Criteria:** Students will:
- Demonstrate leadership and teamwork skills in a project team environment. (BME d)
 - List and define the various steps in bringing a biomedical product from concept to market. (BME e)
 - Identify the realistic constraints of the team project. (BME c)
 - Identify the assess challenges in each of the steps. (BME e)
 - Incorporate regulatory and ethical aspects in the team project. (BME f)
 - Articulate the impacts of the project in a global, economic, environmental, and societal context. (BME h)
 - Use knowledge in mathematics, statistics, biological sciences, physical sciences, and engineering to solve the problems at the interface of engineering and biology whenever required. (BME a)
 - Use the appropriate computer tools to design, model, simulate, and/or operate the team projects. (BME k).
 - Apply engineering principles and practices to meet the challenges. (BME k),
 - Demonstrate oral communication skills in presenting team projects. (BME g)
 - Demonstrate written communication skills in documenting team projects (BME g)
 - Establish initial contacts with major local and national BME companies. (BME i)
 - Demonstrate knowledge of contemporary issues related to biomedical engineering. (BME j)
- Prerequisites By Topic:** Understand of quantitative and systematic physiology, biomedical signals and systems and analog and digital circuits in bioinstrumentation.

Lecture Topics: Introduction to biomedical engineering from bench to market.
Fundamental product design tools.
Computer-Aided Design (CAD) tools.
Strategies and protocols in product development.,
Coordination and leadership in product development team.
Design for quality, usability, manufacturability, reliability, and safety.
Food and Drug Administration approval process and regulatory issues.
Ethics and human factors in biomedical engineering.
Licensing, patents, copyright, and trade secrets.
Market forecast and economic analysis.

Class Schedule: Meets for 3 hours of lecture each week for 10 weeks.

Computer Usage: MATLAB, Labview, Cobalt, Microsoft Project, COMSOL

Laboratory Projects: Students will work in teams to design a solution to a real world biomedical engineering problem. Problem definition. Team building/ allocation of work. Synthesis of concepts, design of solution. Prototype fabrication analysis. Evaluation.

Professional Component: Contributes toward the Biomedical Engineering Major Design experience.

Design Content Description

Approach: Students will use learned skills to design systems and devices for biomedical engineering (30%). Specific discussions systems and device designs (30%). Team projects in design process flows. (40%)

Lectures: 60%

Laboratory Portion: 40%

Grading Criteria:

Homework: 40%

Project Reports : 60%

Estimated ABET Category Content:

Mathematics and Basic Science: ___credit units or ___%

Engineering Science: ___credit units or ___%

Engineering Design: 3 credit units or ___%

Prepared by: Abraham P. Lee and William C. Tang **Date:** June 2008

CEP Approved: Winter 2008