

BME180A BIOMEDICAL ENGINEERING DESIGN

(Required for BME)

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| Catalog Data: | BME180A Biomedical Engineering Design (Credit Units: 4) 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 111, BME 120, BME 121 and BME140; BME180A is the prerequisite for BME180B. Open only to senior BME majors. In-progress grading. (Design Units: 4) |
| Textbook: | King, P. H. and Fires, R. C., <i>Design of Biomedical Devices and Systems</i> . Marcel Dekker, 2002. |
| References: | Lecture notes |
| Coordinator: | Abraham P. Lee and William C. Tang |
| Course Outcomes: | Students will: Demonstrate leadership and teamwork skills in a project team environment. List and define the various steps in bringing a biomedical product from concept to market. Identify and assess challenges in each of the steps. Apply engineering principles and practices to meet the challenges. Establish initial contacts with major local BME companies. |
| Prerequisites by Topic: | Understanding 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, copyrights, and trade secrets. Market forecast and economic analysis. |
| Class Schedule: | Meets for 3 hours of lecture and 3 hours of lab 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.

Relationship to Program Outcomes: This course relates to Program Outcomes (a), (b), (c), (d), (e), (f), (g), (h), (j), and (k) as stated at:
<http://undergraduate.eng.uci.edu/degreeprograms/biomedical/mission>

Design Content Description:

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

Lectures: 60%

Laboratory Portion: 40%

Grading Criteria:

Homework: 40%

Project report: 60%

100%

Estimated ABET Category Content:

Mathematics and Basic Science: 0 Credit units or 0%

Engineering Science: 0 Credit units or 0%

Engineering Design: 4 Credit units or 100%

Prepared by: Abraham P. Lee and William C. Tang **Date:** July 2007

CEP Approved: Fall 2004