BME180A BIOMEDICAL ENGINEERING DESIGN
(Required for BME)

Catalog Data: **BME180A 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 111, BME 120, BME 121 and BME140; BME180A is the prerequisite for BME180B. Open only to senior BME majors. In-progress grading. BME 180 A-B-C must be taken in the same academic year. (Design Units: 3)

Textbook: King, P. H. and Fires, R. C., *Design of Biomedical Devices and Systems*. Marcel Dekker, 2002.

References: Lecture notes

Coordinator: Abraham Lee and William C. Tang

Relationship to Program Outcomes: This course relates to the Program Outcomes for **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 and assess challenges in each of the steps. 9BME e)
Incorporate regulatory and ethical aspects in the team projects. (BME f)
Articulate the impacts of the project in a global, economic, environmental and societal context. (BME h)
Design and conduct experiments to verify team projects requirements. (BME b)
Use knowledge in mathematics, staticstics, biological sciences, physical sciences, and enegineering to solve the problems at the interfae of engineering and biology whenevr 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)
Establish initial contacts with major local BME companies. (BME j)
Demonstrate knowledge of contemporary issues related to biomedical engineering. (BME j)

Prerequisites By Topic: Understanding of quantitative and systematic physiology.
Biomedical signals and systems.

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 each week for 10 weeks.

Computer Usage: Students will use the computer to develop essential skills in CAD for biomedical product design, solve homework problems, and prepare design reports. They will be trained in Cobalt, Matlab, and Microsoft Project utilizing the Computer Laboratory.

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.
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 on system and device designs. (30%) Team projects in design process flows. (40%)
Lectures: 60%
Laboratory Portion: 40%

Grading Criteria:

Homework assignments:	40%
First quarter project report:	60%
Total	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 Lee & William C. Tang **Date:** July 2008

CEP Approved: Fall 2004