

BME170 BIOMEDICAL ENGINEERING LABORATORY

- Catalog Data:** **BME170 Biomedical Engineering Laboratory (Credit Units: 4) S.** Laboratory experiments involving living systems with the emphasis on biophotonics, nanoscale systems, and physiological systems. Five laboratories are planned including image processing, optical computed tomography, dynamic cooling, respiratory gas exchange, and electroosmotic transport phenomena. Study of possible errors. Prerequisites: BME111, BME120, BME121, BME130, BME140. (Design units: 1)
- Textbook:** <http://eee.uci.edu>
- References:** *Medical Instrumentation: Application and Design*, G. Webster (ed.), 3rd edition, John Wiley & Sons.
Handouts.
- Coordinator:** Zhongping Chen.
- Course Outcomes:** Students will be able to:
Design and perform experiments involving biological tissues.
Describe the approval process involved in animal protocol.
Describe the approval process involved in human subject studies.
Collect, analyze and interpret data collected.
Write comprehensive experimental reports.
Work in a team environment to perform experiments and solve bioengineering problems.
- Prerequisites By Topic:** Design of biomaterials, biosystems and control, design of biomedical electronics, sensory motor systems and organ transport systems.
- Lecture Topics:** Measurement theory, signal, noise, statistical analysis, and design of experiments (Zeng).
Optical spectroscopy and imaging (Chen).
MEMS biofluidic chips and sensors (Jeon).
Cardiovascular physiology (Kassab).
Neurorehabilitation engineering.
Students in a group of 5 or 6 rotate through 4 laboratories. Each laboratory rotation requires 2 weeks. There will be one lecture given by the TA on the experimental procedure.
- Class Schedule:** Each class meets 1 hour per week for 10 weeks and students are assigned to a 6 hour lab session per week and to a 1 hour discussion session per week.
- Computer Usage:** MATLAB, Labview.
- Laboratory Projects:** Optical spectroscopy and imaging
Biophotonics Laboratory (Zhongping Chen)
BioMEMS fabrication and characterization
BioMEMS Laboratory (Noo Li Jeon)

Cardiovascular physiology measurement, animal studies
Cardiovascular Engineering Laboratory (Ghassan Kassab)
Auditory evoked neural potentials, human studies
Human Neuroengineering Laboratory (Fan-Gang Zeng)

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

Relationship to Program Outcomes: This course relates to Program Outcomes 1, 2, 3, and 4 as stated at: http://www.eng.uci.edu/dept/objective_biomedical.

Design Content Description

Approach: Students in a group of 5 or 6 rotate through 4 laboratories. In each laboratory rotation, students will design and perform experiments involving living systems with the emphasis on biophotonics, BioMEMS, and physiological systems. (30%) Measurement theory, signal, noise, statistical analysis, and design of experiments, as well as specific topics in each rotation lab. (30%) Students will rotate through four labs, including optical spectroscopy and imaging, BioMEMS fabrication and characterization, cardiovascular physiology, and neuroengineering. (40%)

Lectures: 60%

Laboratory Portion: 40%

Grading Criteria:

Laboratory reports:	80%
Exams:	<u>20%</u>
	100%

Estimated ABET Category Content:

Mathematics and Basic Science: 0 credit units or 0%

Engineering Science: 3 credit units or 75%

Engineering Design: 1 credit units or 25%

Prepared by: Zhongping Chen **Date:** July 2005

CEP Approved: Fall 2004