

BME170 BIOMEDICAL ENGINEERING LABORATORY
(Required for BME)

Catalog Data:	BME170 Biomedical Engineering Laboratory (Credit Units: 4) Introduction to the measurement and analysis of biological systems using engineering tools and techniques. Laboratory experiments involve living systems with emphasis on biophotonics, BioMEMS, and physiological systems. Labs include Optical Spectroscopy, BioMEMS Fabrication and Characterization, Principles of the Pulse Oximeter, and Neuroengineering. Prerequisites: BME111, BME120, BME121, BME130, BME140. (Design units: 1)
Textbook:	TBA
References:	G. Webster (ed.), <i>Medical Instrumentation: Application and Design</i> , 3 rd edition, John Wiley & Sons. Handouts.
Coordinator:	Enrico Gratton
Relationship to Program Outcomes:	This course relates to the Program Outcomes for BME: a, b, c, d, e, f, g, j, and k as stated at: http://undergraduate.eng.uci.edu/degreeprograms/biomedical/mission
Course Outcomes / Performance Criteria:	Students will: Design and perform experiments involving biological tissues. (BME c, b, j) Describe the approval process involved in animal protocol. (BME f) Describe the approval process involved in human subject studies. (BME f) Collect, analyze and interpret data collected. (BME h, e, j, k) Write comprehensive experimental reports. (BME e, g) Work in a team environment to perform experiments and solve bioengineering problems. (BME d, e)
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). Photon migration in tissues (Gratton). 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:	Meets for 1 hour of lecture, 6 hours of lab, and 1 hour of discussion each week for 10 weeks.
Computer Usage:	MATLAB and Labview.

Laboratory Projects: Optical spectroscopy and imaging
Biophotonics Laboratory (Chen)
BioMEMS fabrication and characterization
BioMEMS Laboratory (Jeon)
Spectroscopy and principles of the common pulse oximeter (Gratton)
Auditory evoked neural potentials, human studies
Human Neuroengineering Laboratory (Zeng)

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

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, assembling of the optics and programming of a pulse oximeter, and neuroengineering. (40%)

Lectures: 60%

Laboratory Portion: 40%

Grading Criteria:

Laboratory reports:	80%
<u>Exams</u>	<u>20%</u>
Total	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: Enrico Gratton

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CEP Approved: Winter 2006