

BME145 MEMS AND NANOTECHNOLOGY FOR BIOTECHNOLOGY

Catalog Data:	BME145 MEMS and Nanotechnology for Biomedicine (Credit Units: 4) F. Basic concepts of MEMS and nanotechnology and its interaction with the human body. Introduction to biocompatibility, reliability, signal transduction, and sensitivity as it relates to MEMS/nanotechnology. MEMS-based biotransducers and nanotechnology, physiological monitoring, drug delivery, implantable systems, and prostheses. (Design units: 1)
Textbook:	Required: TBA.
References:	Class notes.
Coordinator:	Abraham Lee.
Course Outcomes:	Students will be able to: Understand the basic micro/nanofabrication and scaling principles of MEMS and nanotechnology. Analyze the operation principles for miniaturized (micro and nano) devices and instrumentation for treatment and diagnosis of human diseases. Apply the essential techniques in MEMS and nanotechnology to biomedicine including device design, fabrication, testing, and characterization.
Prerequisites By Topic:	Freshman level chemistry and physics.
Lecture Topics:	Introduction to micro/nanofabrication. Introduction to scaling laws and principles. Introduction to transduction (sensors and actuators) principles. Introduction to MEMS and nanotechnology devices (sensors, actuators, biomaterials). System and integration aspects of MEMS/nanotechnology. Cells and biomolecules as biotransducers. Microfluidics. Biosensors. In vivo MEMS and nanotechnology (surgical tools, drug delivery, implantable systems). In vitro MEMS and nanotechnology (point of care diagnostics). MEMS and nanotechnology for understanding biology. Challenges and limitations of MEMS and nanotechnology in biomedicine.
Class Schedule:	Each class meets 3 hours per week for 10 weeks and students are assigned to a 1 hour discussion session per week.
Computer Usage:	Students will use word processors and spreadsheets to do homework assignments.
Laboratory Projects:	None.

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

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

Design Content Description

Approach: Specific discussions on system and device designs. (50%) Students will use learned skills to design systems and devices for biotechnology. (50%)

Lectures: 100%

Laboratory Portion: 50%

Grading Criteria:

Homework assignments:	30%
Midterm exam:	30%
Final exam:	<u>40%</u>
	100%

Estimated ABET Category Content:

Mathematics and Basic Science: 0 credit units or 0%

Engineering Science: 1 credit units or 25%

Engineering Design: 3 credit units or 75%

Prepared by: Abraham Lee **Date:** July 2005

CEP Approved: Fall 2004