BME145 MEMS AND NANOTECHNOLOGY FOR BIOMEDICINE AND BIOTECHNOLOGY

(Elective)

Catalog Data:	**BME145 MEMS and Nanotechnology for Biomedicine and Biotechnology (Credit Units: 4)** Basic concepts of MEMS and nanotechnology, its application to biotechnology/biomedicine. Introduction to scaling laws as applied toward living systems and artificial devices; micro- and nanofabrication; sensor and actuator principles; drug delivery, implantable systems, minimally invasive surgery, total analysis systems. (Design units: 1)
Textbook:	*TBA*
References:	Class notes
Coordinator:	Abraham P. Lee
Course Outcomes:	Students will: 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:	Meets for 3 hours of lecture and 1 hour of discussion each week for 10 weeks.
Computer Usage:	Students will use word processors and spreadsheets to do homework assignments.
Laboratory Projects:	

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

Relationship to Program Outcomes: This course relates to Program Outcomes (a) and (b) as stated at: http://undergraduate.eng.uci.edu/degreeprograms/biomedical/mission

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:	0%

Grading Criteria:

Homework:	30%
Midterm:	30%
Final:	40%
	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: Abraham P. Lee **Date:** July 2007

CEP Approved: Fall 2004