

ME(CHE,ECE) 4950(5950) Introduction to Microelectromechanical Systems (MEMS)

2007 Catalog Data: ME(CHE,ECE) 4050(5950) Intro Microelectromechanical Systems (MEMS) Lec.3 Cr. 3
Prerequisite: Senior standing in engineering or consent of instructor. Introduce the design, fabrication and performance of MEMS devices. Topics include bulk and surface micromachining, photolithography, sensors actuation systems, optical MEMS microcantilever based systems. [Elective Course]

Prerequisites by Topic: Senior or graduate level standing in any engineering department

Textbook and Resources: MEMS & Microsystems Design and Manufacture, Tai-Ran Hsu, McGraw Hill, 2001

Course Objectives: To introduce students to topics in the design, fabrication and performance assessment of microsystems, to prepare them to engage in research, further study or entry-level positions in microsystem technology industry.

Course Topics:

T1. Fabrication: bulk etching, surface micro-machining, etc.	(21%)
T2. Software-based design and analysis tools	(21%)
T3. Microcantilever based MEMS sensors	(12%)
T4. Microfluidics	(12%)
T5. Properties of semiconductors	(14%)
T6. Applications as sensors and actuators	(20%)

Class/Lab Schedule: Minimum student contact time - 2200 minutes

Course Outcomes: Upon completion of this class, the student will be able to:

- C1. Describe MEMS fundamentals and their applications [a,c,d,e,g,k,l]
- C2. Complete a MEMS design project [a,b,c,d,e,g,h,k,l]
- C3. Exhibit the ability to function on multidisciplinary (some semesters) teams [d]
- C4. Exhibit skills in technical communications through reports, specifications and Presentations [[g]
- C5. Exhibit the ability to plan, specify, design, implement and operate a system, component, or process to meet desired needs [a,c,e,k,l]

And have gained experience with and/or exposure to:

C6. Preparation and delivery of a technical oral presentation [g]

Professional Component: This is an elective course for Mechanical Engineering students who follow either Area of Concentration (AOC). It involves the integration of foundational course material in the area of microsystems.

Contribution of Course to Meeting the Professional Component:

Math and Basic Science:

General Education:

Engineering: 3 credit hours

Other:

Relation to Program Objectives: This course goes beyond the presentation of basic "analytical" skills, to incorporate experience in critical thinking (integration of analytical skills, quantitative and qualitative evaluation of alternatives) and communication (oral presentations). As a consequence, students who successfully complete this class should be more comfortable, confident and productive when engaged in career activities that involve: self-education and interaction with engineering and non-engineering communities and individuals.

5000-Level Credit: Students registered for 5000-level credit will be given additional assignments commensurate with a graduate-level course. The exact nature of these assignments will be specified by the instructor in the Course Policy for that semester.

Course Coordinator: Undergraduate Program Committee

Prepared by:

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Date: 1-15-08