University of Wisconsin - Madison
College of Engineering [EGR]
Last Offered: 2014-2015 Fall [1152]
Direct Link to this Syllabus:

1. **E C E 542, Introduction to Microelectromechanical Systems**
2. **Credits :** 3  **Contact Hours :** 2.5
3. **Textbook and Materials :**

   Hongrui Jiang, ECE542 course notes.

   a. **Other Supplemental Materials :** None

   • **Specific Course Information :**

   a. **Brief description of the content of the course (Course Catalog Description) :**

   
   Introduction to MEMS technology, devices and systems. Fundamentals of MEMS in fabrication, process integration, material mechanics of MEMS structures, sensors and actuators. Main topics in MEMS - microfluidics, optical MEMS, RF MEMS, BioMEMS, packaging, and CAD.

   b. **Pre-requisites or Co-requisites :** CE 335 or 340, or cons inst

   c. **This is a Selected Elective course.**

   • **Specific Goals for the Course :**

   a. **Course Outcomes :**

   1. Students will understand and be able to design fabrication process flows for microelectromechanical systems (MEMS)

   2. Students will understand the design, fabrication and characterization of MEMS devices and systems

   3. Students will be able to design basic MEMS devices especially microsensors.
• ABET Student Learning Outcomes:

(a) Ability to apply mathematics, science and engineering principles.
(b) Ability to design and conduct experiments, analyze and interpret data.
(c) Ability to design a system, component, or process to meet desired needs.
(d) Ability to function on multidisciplinary teams.
(e) Ability to identify, formulate and solve engineering problems.
(g) Ability to communicate effectively.
(i) Recognition of the need for and an ability to engage in life-long learning.
(j) Knowledge of contemporary issues.
(k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

• Brief List of Topics to be Covered:

1. Basic MEMS fabrication and packaging techniques
2. Mechanical microsensors and microactuators
3. Inertial sensors and pressure sensors
4. Thermal transducers
5. Magnetic transducers
6. Optical Microdevices and Microsystems
7. Wireless sensing and telemetry
8. Microfluidics, lab on a chip and bioMEMS
9. Radio-frequency MEMS