ELEC 5820/6820/6826 – MEMS TECHNOLOGY
(Elective for ELEC, ECPE, WIRE)

Proposed Catalog Data:  ELEC 5820/6820/6826. MEMS TECHNOLOGY (3) LEC. 3. Pr., senior standing or departmental approval. Introduction to Micro-Electro-Mechanical Systems (MEMS), the study of the materials and microfabrication processes used to fabricate MEMS devices, the principles of operation of MEMS devices, and an introduction to the different application areas of MEMS devices.


Coordinator: R. Dean, Assistant Professor of Electrical and Computer Engineering

Course Objectives:
1. To understand the operation principles of MEMS Devices.
2. To understand the various micromachining techniques used to fabricate MEMS devices.
3. To become familiar with a wide variety of MEMS application areas such as MEMS sensors, RF MEMS, Optical MEMS, and Fluidic MEMS.

Prerequisites by topic:
1. Linear algebra, Calculus, and differential equations
2. Basic engineering physics concepts (from first and second core Physics courses)

Topics:
- MEMS Overview (1 class)
- Characteristics of the Microscale Environment (2 classes)
- MEMS Materials (3 classes)
- MEMS Fabrication Processes (5 classes)
- Mechanics of MEMS Structures (3 classes)
- Dynamics of MEMS Structures (3 classes)
- MEMS Electrostatic Actuators (3 classes)
- Other MEMS Actuators (3 classes)
- Designing Micro Systems (3 classes)
- MEMS Sensors (2 classes)
- RF MEMS (2 classes)
- Optical MEMS (2 classes)
- Fluidic MEMS (2 classes)
- MEMS Energy Scavenging (2 classes)
- MEMS Packaging (2 classes)
- MEMS Testing (2 classes)
Typical methods for evaluating student performance:

**ELEC 5820**
- Homework & Quizes: 20%
- Class Exams: 40%
- Final Exam: 40%

**ELEC 6820**
- Homework & Quizes: 20%
- Project: 10%
- Class Exams: 35%
- Final Exam: 35%

**Justification for Graduate Credit:**
Students enrolled in ELEC 6820/6826 will be required to do a MEMS design project. That project will also require outside reading, beyond that required of students enrolled in ELEC 5820.

**Homework:**
Assignments will consist of reading in preparation for each lecture, as well as assigned problems based on lecture material that will be graded.

**Class attendance:**
Class attendance is encouraged, but not explicitly accounted for in assigning grades.

**Policy on unannounced quizzes:**
Unannounced quizzes may be given at any class meeting to encourage students to attend class and to keep up with the class reading.

**Project:**
Students in the ELEC 6820 class will be required to do a class project related to the content of the class.

**Special Accommodations:**
It is the policy of Auburn University to provide accessibility to its programs and activities, and reasonable accommodation for persons defined as having a disability under Section 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act of 1990. Students who need special accommodations should make an appointment to see the instructor as soon as possible or contact the Students with Disabilities Office at (334) 844-5943 (Voice/TT).

**Contribution of course to meeting the professional component:**
- Engineering topics: 3 credits
  - 66.67% engineering science (2 credits)
  - 33.33% engineering design (1 credits)
Primary program outcomes related to this course:

Outcome 1: Ability to apply knowledge of math, science and engineering to solve problems.
Outcome 2: Ability to apply in-depth knowledge in one or more disciplines.
Outcome 3: Ability to select and/or design an MEMS component or system to meet desired needs.
Outcome 4: Appreciation of the need for, and an ability to learn new concepts as required for the continuing practice of engineering.

Prepared by: Robert Dean 1/09/2008