Department of Electrical and Computer Engineering

EEL 4XXX – MEMS I

Catalog Description

This course will give the students an introduction to MEMS-based microsystems with an emphasis on design and analysis of interdisciplinary systems at microscale. (3 credits)

Catalog Objectives

- To give the students an understanding of the standard microfabrication techniques and the issues surrounding them.
- To give the students an overview of the major classes, components and applications of microsystems and the fundamental principles behind the operation of these systems.
- To apply the knowledge of microfabrication techniques for designing a microsystem.

Prerequisites

EEE 3396 Introduction to solid state devices

Textbooks

- Marc Madou, “Fundamentals of microfabrication”, CRC Press NY
- Stephen D.Senturia, “Microsystem Design”

Topics covered

- Introduction to MEMS
- Mechanical and Electrical properties of MEMS materials
- Microfabrication technology- Surface micromachining, Bulk micromachining
- Sensors – Capacitive pressure sensors, piezoelectric devices, Chemical sensors
- Actuators – Electrostatic, Thermal, magnetic, mechanical
- MEMS and microfluidics – Implantable devices, Lab-on-chip
- Packaging, assembly and testing

Class schedule

Twice a week, 75 minutes each session

Contribution of course to meeting the professional component

Engineering science – 30% (math/science required for creative applications)
Engineering design – 70% (decision making process of devising a system, component or process to meet a desired need).

Relationship of course to program outcomes:

In the course EEL 4XXX – MEMS I the student will have to show

(a) an ability to apply knowledge of mathematics, science, and engineering

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(e) an ability to identify, formulate, and solve engineering problems

(f) an understanding of professional and ethical responsibility

(j) a knowledge of contemporary issues

(l) an ability to apply probability and statistics

Person who prepared this description and date of preparation:

Dr.Shekhar Bhansali
R110915 – HW