



MEMS Processing - ME/ECE 141B
Fall 2010
TTh 12:30 - 1:45pm
Cooper Lab (Engineering Science Building 1003)

Instructor: Sumita Pennathur

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Office: ESB 3231C
Office Hours: Tuesday and Thursday 11am-12

Optional Text: Stephen Campbell. *Fabrication Engineering of the Micro- and Nanoscale*, The Oxford Series in Electrical and Computer Engineering, 2009.

Course Description:

The goal of this course is introduce the subject of microelectromechanical devices and systems (MEMS). MEMS devices include pressure sensors, accelerometers, opto-mechanical assemblies and displays, and microfluidic bioanalytical systems, and require knowledge of a broad range of disciplines, from microfabrication to mechanics to electromagnetism. Lectures will cover microfabrication technologies and process flow development, material properties, structural behavior, actuation and sensing. Student teams will design, fabricate and test a microfluidic device using a realistic microfabrication process. Modeling and simulation in the design process with me emphasized.

Teaching Assistant: Tom Wynne

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Tel: 805-893-7902
Office Hours: Wednesday 11am-12 at ESB room 2415

Grading:

Homeworks:	10%
Take-Home Midterm Exam	10%
Lab reports	30%
Multiple Choice Final:	20%
Final Lab Report:	30%

Homework: There will be one officially graded HW assignment, and two assignments that will be given full credit if completed on time. Students are responsible to grade his/her own assignments.

Exams: There will be a take-home exam stressing the modeling and design that is covered in class lectures, and a multiple-choice final exam that will cover both processing done in lab and lectures taught in class.

Lab Reports: There will be 2 interim lab reports due throughout the quarter as well as a final lab report. Note that these lab reports consist of the bulk of your grade for the quarter.

Additional:

- Attendance is optional.
- If you are a student with a disability and would like to discuss special academic accommodations, please contact me at your convenience.
- October 20 is the last day for undergraduates in Letters & Science and Engineering to drop classes at the Registrar. For more info, see <http://www.registrar.ucsb.edu/passinfo.htm>.

Learning Objectives: During this course, students will be provided with information to better able them to:

- Converse in the subject of MEMS with physical and real-world applications
- Understand the basics of MEMS processing, including lithography, etching, deposition, oxidation and sputtering.
- Describe current applications and opportunities in the industry and understand the potential offered by MEMS, and understand how MEMS will impact manufacturing, processing and design in all industries.
- Understand the design constraints and modeling steps required for classic MEMS devices.

Measurable Outcomes: Through this course, students will gain information allowing them to:

- Explain the basic processing steps involved in fabrication of MEMS devices.
- Use information gained to design, fabricate and test a microfluidic MEMS device.
- Evaluate different MEMS designs and determine optimal fabrication schemes.
- Cite examples and case studies of typical MEMS devices.