ME/EE/MatE 169 MEMS Fabrication & Design

Semester Fall 2006

Credit Units 3 units

Prerequisites CE 112 or MatE 25 or EE 98, or instructor consent.

Class Hours and Class Codes Lecture on Tue & Thu 10:30-11:20 in E336; Lab on Thu 13:00-15:45 in E311
ME 169: Section 01 (Lecture) Code 46870, Section 03 (Lab) Code 49327
EE 169: Section 01 (Lecture) Code 48108, Section 03 (Lab) Code 49329
MatE 169: Section 01 (Lecture) Code 48110, Section 03 (Lab) Code 49328

Description Hands-on design, fabrication, and testing of micro electro-mechanical systems (MEMS). Processes including oxidation, photolithography, etching, wet processing, and metal deposition applied to MEMS. Design problems for MEMS transducer components such as cantilever beam actuators, membrane deflection sensors, and microfluidic flow channels.

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Office hours posted at http://www.engr.sjsu.edu/sjlee/

Course Website General Information: http://www.engr.sjsu.edu/sjlee/ME169/
Student Login: http://sjsu.webct.com/

Required Textbook *Fundamentals of Microfabrication: The Science of Miniaturization, 2nd ed.* by M. J. Madou, published by CRC Press (2002) ISBN 0849308267

Recommended Textbooks *MEMS & Microsystems: Design and Manufacture* by T. R. Hsu, published by McGraw-Hill (2002) ISBN 0071130519
Recommended: *The Science and Engineering of Microelectronic Fabrication, 2nd ed.* by S. A. Campbell, published by Oxford University Press (2001) ISBN 0195136055

Graded Work 15% for Reading Questions, approximately 8-10 sets distributed over the semester
15% for each of three Project Write-Ups
10% for Lab Notebook
5% for Lab Citizenship & Participation
25% for Final Exam, scheduled Tuesday, December 12, 09:45-12:00

Course Goals
1. To learn common processes used in MEMS fabrication via hands-on experience.
2. To develop skill in MEMS design by learning and understanding process capabilities and constraints.
3. To develop teamwork and communication skills in a cross-domain scenario involving disciplines such as mechanical, electrical, and materials engineering.

Student Learning Objectives *Upon successful completion of this course, the student should be able to...*
1. Explain the purpose, principle-of-operation, and major execution steps for oxidation, diffusion, photolithography, plasma etching, wet etching, metal deposition, and wafer bonding.
2. Demonstrate under guidance the correct execution of major steps in oxidation, diffusion, photolithography, plasma etching, wet etching, metal deposition, and wafer alignment.
3. Produce computer-aided design (CAD) geometry suitable for photolithography masks.
4. Develop a technically feasible MEMS design concept and fabrication process plan for an open-ended design problem involving a microsensor or microactuator.

Additional Pages to this Syllabus Course Topics and Schedule
Grading Scales

also: PDF version Instructor's Policies, Expectations, and Tendencies
University, College, & Department Policies