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.  
Instructor  Prof. John Lee  |  ENG 310I  |  408-924-7167  |  sjlee@sjsu.edu  
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/  
Recommended Textbooks  MEMS & Microsystems: Design and Manufacture  
Recommended:  The Science and Engineering of Microelectronic Fabrication, 2nd ed.  
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  Course Topics and Schedule  
to this Syllabus  Grading Scales