

School of Mechanical Engineering and Computer Science
Mech 438/538: Microfabrication Technology

Catalog Data:	Mech 438/538 Microfabrication Technology; 3 credits Microelectronic fabrication technology, semiconductor materials, diffusion, thermal oxidation, ion implantation, lithography, etching, thin film deposition, CMOS integration, fundamentals of microelectromechanical systems (MEMS). Credit not granted for both Mech 438 and Mech 538.
Class Schedule:	Three 50-min lecture sessions per week, for one semester
Laboratory Schedule:	None
Prerequisites by Course:	Chem 106, Phys 201, Math 315
Prerequisites by Topic:	<ol style="list-style-type: none"> 1. Crystal structures 2. Dynamic of particles 3. Differential equations
Required Texts:	Stephen A. Campbell, <i>The Science and Engineering of Microelectronic Fabrication</i> , Second Edition, Oxford University Press, 2001 ISBN: 978-0195136050
Course Coordinator:	Dr. Wei Xue
Course Objectives:	<ol style="list-style-type: none"> 1. Understand semiconductor material properties 2. Understand principles and mechanisms of microfabrication techniques 3. Learn the bulk and surface micromachining technology 4. Be familiar with CMOS and integrated circuit fabrication process 5. Obtain fundamental knowledge of MEMS devices
Topics Covered:	<ol style="list-style-type: none"> 1. Introduction to microelectronic fabrication 2. Semiconductor material properties, crystal growth, and wafer preparation 3. Dopant diffusion 4. Thermal oxidation and Si/SiO₂ interface 5. Ion implantation 6. Lithography: photolithography, photoresist, and nonoptical lithography 7. Etching: wet etching and dry etching 8. Thin film deposition: evaporation, sputtering, chemical vapor deposition, and epitaxial growth 9. CMOS integration and integrated circuit manufacturing 10. Fundamentals of MEMS
Lab Experiments and Activities	None

Course Outcomes:	Students will be able to:		
	Assessed for Program Outcomes	G-2. Deliver well-organized, logical oral presentations, including good explanations when questioned. H-3. Evaluate microfabrication processes and products consider environment factors. I-1. Able to use resources to learn new material not taught in class. J-1. Describe emerging technologies in micro/nano fabrication.	
		Other	A-2. Demonstrate knowledge of semiconductor materials and microfabrication techniques. G-1. Produce term papers in the microfabrication area using appropriate format and grammar. H-1. Aware of societal and global changes that micro/nano technology innovations may cause.
Required or Elective Course:	Elective		
Contribution to Professional Component:	Engineering Topics		
Relationship of Course to Program:	Meets: Educational Objectives <u>1, 2, 3, 4</u> Program Outcomes <u>A, G, H, I, J</u>		
Prepared by:	Dr. Wei Xue	Date:	October 10, 2008
Approved by CAC:			