

School of Engineering and Computer Science
MECH 438: Microfabrication Technology

Catalog Data:	438 Microfabrication Technology 3 Course Prerequisite: CHEM 105; MATH 315; PHYSICS 202. Microelectronic fabrication technology, semiconductor material, diffusion, thermal oxidation, ion implantation, lithography, etching, thin film deposition, CMOS integration and MEMS. Credit not granted for both MECH 438 and MECH 538. Offered at 400 and 500 level. Typically offered Fall.	
Class Schedule:	Three 50-min lecture sessions per week, for one semester	
Laboratory Schedule:	None	
Prerequisites by Course:	CHEM 105; PHYSICS 202; MATH 315	
Prerequisites by Topic:	<ol style="list-style-type: none"> 1. Crystal structures 2. Dynamic of particles 3. Differential equations 	
Textbook:	Stephen A. Campbell, <i>The Science and Engineering of Microelectronic Fabrication</i> , Second Edition, Oxford University Press, 2001	
Course Coordinator:	Dr. Jong-Hoon Kim	
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 Student Outcomes	<ol style="list-style-type: none"> 1-a. Demonstrate knowledge of semiconductor materials and microfabrication techniques. 4-a. Evaluate microfabrication processes and products in consideration of economic and environment factors. 7-a. Use multiple resources to learn new material not taught in class for term papers.
	Other	<ol style="list-style-type: none"> 3-a. Produce term papers in the microfabrication area using appropriate format and grammar for professional audiences. 3-b. Deliver well-organized, logical oral presentations, including good explanations when questioned.
Required or Elective Course:	Elective	

<i>Relationship of Course to Program:</i>	Meets: Educational Objectives <u>1, 2, 3, 4</u> Student Outcomes <u>1, 3, 4, 7</u>		
<i>Prepared by:</i>	Dr. Jong-Hoon Kim	Date:	April 5, 2018 (4/6/2018 mb)
<i>Approved by USC:</i>	4/9/18		