WASHINGTON STATE UNIVERSITY
VANCOUVER
World Class. Face to Face.

School of Mechanical Engineering and Computer Science

Mech 431: Semiconductor Devices

Catalog Data:	**Mech 431 Semiconductor Devices;** 3 credits Crystal properties, energy bands, semiconductor charge carriers, p-n junctions, field-effect transistors, bipolar junction transistors, optoelectronic devices, integrated circuits.
Class Schedule:	Three 50-min lecture sessions per week, for one semester
Laboratory Schedule:	None
Prerequisites by Course:	Chem 106, Phys 202, Math 315
Prerequisites by Topic:	1. Crystal structures and bonds 2. Motion of particles 3. Electricity, DC and AC circuits 4. Differential equations
Required Texts:	Ben G. Streetman, Sanjay Banerjee, *Solid State Electronic Devices*, Sixth Edition, Prentice Hall, 2006 ISBN: 978-0131497269
Course Coordinator:	Dr. Wei Xue
Course Objectives:	1. Understand the crystal structures and semiconductor growth 2. Learn the physical models of atoms and electrons 3. Obtain fundamental knowledge and concepts of semiconductors 4. Learn how materials influence the device performance 5. Understand the construction and final structures of semiconductor electronic devices 6. Be familiar with different types of semiconductor electronic devices and their operation principles 7. Describe the practical applications and recent trends in semiconductor device design 8. Obtain fundamental knowledge of integrated circuits
Topics Covered:	1. Crystal properties and growth of semiconductors 2. Atomic structures 3. Bonding forces and energy bands in solids 4. Charge carriers in semiconductors 5. Carrier transport phenomena 6. p-n junctions 7. Metal-oxide-semiconductor field-effect transistors 8. Bipolar junction transistors 9. Optoelectronic devices 10. Integrated circuits
Lab Experiments and Activities	None

Course Outcomes:	Students will be able to:			
	Assessed for Program Outcomes	A-1. Apply mathematics to obtain numerical solutions for electron and hole concentrations in doped silicon. A-2. Demonstrate knowledge of semiconductor materials and devices. A-3. Apply scientific principles to estimate the properties of semiconductor devices. H-1. Aware of societal and global changes that semiconductor device innovations may cause.		
	Other	H-2. Examine economic tradeoffs in microelectronics systems. J-1. Describe emerging technologies in microelectronics and optoelectronics.		
Required or Elective Course:		Elective		
Contribution to Professional Component:		Engineering Topics		
Relationship of Course to Program:		Meets: Educational Objectives 1, 3, 4 Program Outcomes A, H, J		
Prepared by:		Dr. Wei Xue	Date:	October 10, 2008
Approved by CAC:				