

School of Engineering and Computer Science
ECE 466: Semiconductor Material and Device Characterization
Master Syllabus

Catalog Data:	ECE 466: Semiconductor Material and Device Characterization ; 3 credits Modern semiconductor material and device characterization techniques; electrical, optical, and physical characterization methods commonly used in semiconductor industry. Typically offered Fall.
Class Schedule:	Three lecture hours per week, for one semester
Laboratory Schedule:	None
Prerequisites by Course:	ECE 349
Prerequisites by Topic:	<ol style="list-style-type: none"> 1. Resistivity, conductivity 2. Carrier concentration 3. Energy band 4. Carrier diffusion and drift 5. Principles of p-n diode, BJT, MOSFET, metal-semiconductor contact
Required Texts:	Dieter K. Schroder, <i>Semiconductor Material and Device Characterization</i> , 3 rd Edition, Wiley-IEEE Press, 2006, ISBN: 978-0471739067
Course Coordinator:	Dr. Feng Zhao
Course Objectives:	<p>Students will:</p> <ol style="list-style-type: none"> 1. Learn the physical theory of electrical, optical, and physical characterization methods. 2. Interpret the operation of measurement techniques.
Topics Covered:	<ol style="list-style-type: none"> 1. Introduction, Resistivity 2. Sheet Resistance 3. Series, Contact Resistance 4. Doping profiling 5. Threshold voltage, Channel length 6. MOS charges 7. Defects characterization 8. Mobility measurement 9. Charge-based probe measurement 10. Optical Characterization 11. Ion beam, X-ray 12. Electron beam characterization 13. Reliability 14. Failure analysis
Lab Experiments and Activities	None.

Course Outcomes:	Students will be able to:		
	Assessed for Student Outcomes	3-b. Deliver well-organized, logical oral presentations on device characterization techniques, including good explanations when questioned. 6-a. Identify models for semiconductor material and device characterization techniques. 7-a. Use resources to learn characterization techniques not taught in class.	
	Other	1-a. Demonstrate knowledge of semiconductor material and device characterization techniques. 3-a. Produce presentation documents with appropriate format and citations.	
Relationship of Course to Program:	Meets: Educational Objectives <u>1, 2, 4</u> Student Outcomes <u>1, 3, 6, 7</u>		
Prepared by:	Dr. Feng Zhao	Date:	March 14, 2018; 3/21/18 (mb)