

Course number	ECE 3200
Course title	Introduction to Semiconductor Physics
Required/elective	Required
Catalog description	Introduces fundamental properties of electronic materials from atoms to p-n junctions. Begins with crystal structure, bonding, and classical theory of electrical conductivity. Introduces elementary quantum mechanics concepts such as particle/wave duality, the Schrodinger equation, potential wells, tunneling and hydrogenic atoms. Discussion of real-space and reciprocal space. Introduces phonons and bandstructure of solids and basics of quantum theory of solids. Introduces basics of semiconductor doping, growth, and processing. Discusses carrier processes: equilibrium carrier statistics, interactions with light, generation and recombination, and transport. Discusses fundamental of semiconductor p-n junctions and simple transistors. Additional topics in epitaxy, heterojunctions, reduced-dimensional and nano- structures, modern devices, and other current topics will also be discussed.
Pre-requisite(s)	Major status in ECE
Textbook(s) and/or required material	<p>Readings and homework will be from S.O. Kasap, <i>Principles of Electronic Materials and Devices</i>, 3rd edition (McGraw Hill, 2006, ISBN-10: 0071244581 or ISBN-13: 978-0071244589). Available from the UU bookstore and other retailers.</p> <p>Suggested Supplemental Texts (it is not required to buy these, most are on reserve at Marriott library): H.C. Ohanian, <i>Modern Physics</i>, 2nd Ed. S.M. Sze, <i>Semiconductor Devices: Physics and Technology</i> B.G. Streetman & S. Banerjee, <i>Solid State Electronic Devices</i> R.F. Pierret, <i>Semiconductor Fundamentals</i> (Modular Series on Solid State Devices, Pierret & Neudeck, Eds.) G.W. Neudeck, <i>The P-N Junction Diode</i> (Modular Series on Solid State Devices, Pierret & Neudeck, Eds.)</p>
Course objectives	<p>Through this course, students will:</p> <ol style="list-style-type: none"> 1) Gain an understanding of the electronic structure and properties of materials. 2) Gain an understanding of fundamental semiconductor physics and technology. 3) Gain an understanding of elements of modern physics required for goals 1 and 2.
Topics covered	See Course description.
Class schedule	Tu,Th 3:40-5:00 PM, WEB 2250
Lab schedule	None
Contribution of course to meeting the requirements of ABET Criterion 5	This is a course electrical engineering course that teaches fundamental semiconductor physics and electronic structure and properties.
Relationship to program outcomes	<p><i>HIGH (a) An ability to apply mathematical, scientific, and engineering knowledge to solve electrical engineering problems.</i></p> <p><i>HIGH (e) An ability to identify, formulate, and solve electrical engineering problems.</i></p>

	<p><i>MODERATE (h) The broad education necessary to understand the impact of engineering solutions in a global and societal context.</i></p> <p><i>HIGH (i) A recognition of the need for, and an ability to engage in, lifelong learning. HIGH</i></p> <p><i>HIGH (j) An awareness of current events and trends affecting the electrical engineering profession. HIGH</i></p> <p><i>MODERATE (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.</i></p>
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