

MSE 302: Electronic Materials

<i>Course description:</i>	Structure of materials; electronic structure of solids; thermal, electrical, dielectric, and magnetic properties of materials; semiconductors processing.
<i>Number of credits:</i>	3
<i>Course Coordinator:</i>	Amit Bandyopadhyay
<i>Prerequisites by course:</i>	Chem 105; Physics 202 or concurrent enrollment
<i>Prerequisites by topic:</i>	Atomic structure, electricity and magnetism
<i>Postrequisites:</i>	Recommended but not required for EE 478, Phys 303
<i>Textbooks/other required materials:</i>	1. Kasap, S.O. <i>Principles of Electronic Materials and Devices</i> . McGraw-Hill
<i>Course objectives:</i>	<ol style="list-style-type: none">1. Provide an introduction to materials and their properties as used in non-structural applications, particularly semiconductors, electrical, optical, and magnetic properties.2. Provide an introduction to the processing methods for materials used in the semiconductor industry.
<i>Topics covered:</i>	<ol style="list-style-type: none">1. Crystal structures and bonding2. Electrical and thermal conductivity3. Introduction to quantum mechanics4. Band gaps and structure5. Intrinsic and extrinsic semiconductors, p-n junction6. Magnetic properties7. Dielectric and piezoelectric properties8. Optical properties9. Semiconductor fabrication
<i>Expected student outcomes:</i>	<ol style="list-style-type: none">1. Understand bonding types, crystal structures, and defects.2. Relate temperature and energy, energy and electromagnetic spectra.3. Understand the role of defects in the electrical properties of materials.4. Determine electrical conductivities of metals.5. Determine conductivity in semiconducting materials and dopants influence6. Understand the principle of operation in p-n junction7. Have a basic knowledge of the processing steps in modern semiconductor fabrication techniques.
<i>Class schedule:</i>	Three 50-minute or two 75-minute lecture sessions per week, for one semester.
<i>Laboratory schedule:</i>	None.
<i>Contribution to meeting the professional component:</i>	Engineering Topics
<i>Relationship of course to program objectives:</i>	Meets: <ol style="list-style-type: none">1. School of MME Educational Objectives: 1, 2, 32. ABET, Criterion 3 Program Outcomes: 1, 2, 73. School of MME MSE Program Outcomes: 1, 2, 7, 8, 9, 10

Prepared by: Andrea Butcherite and Dr. A. Bandyopadhyay *Date:* May 30, 2018

POLICIES

A. Reasonable Accommodation (the nature of the particular course determines which one applies):

- **Pullman Campus.** Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations **MUST** be approved through the Access Center.
- **WSU Online Course.** Reasonable accommodations are available in online classes for students with a documented disability. All accommodations must be approved through your WSU Disability Services office. If you have a disability and need accommodations, we recommend you begin the process as soon as possible. For more information contact a Disability Specialist on your home campus: Pullman or WSU Online (<http://accesscenter.wsu.edu>), Spokane (<http://spokane.wsu.edu/students/current/studentaffairs/disability/>), Tri-Cities (<http://www.tricity.wsu.edu/disability>), Vancouver (<http://studentaffairs.vancouver.wsu.edu/student-resource-center/disability-services>).

B. Academic Integrity

WSU expects all students to behave in a manner consistent with its high standards of scholarship and conduct. Students are expected to uphold these standards both on and off campus and acknowledge the university's authority to take disciplinary action. The Standards of Conduct for Students can be found at <http://conduct.wsu.edu>.

C. WSU Safety

WSU is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, <http://safetyplan.wsu.edu>. It is highly recommended that you visit this web site as well as the University emergency management web site at <http://oem.wsu.edu/> to become familiar with the information provided.