

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. This course is required.
<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 learning 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.

Class schedule: Three 50-minute or two 75-minute lecture sessions per week, for one semester.

Laboratory schedule: None.

Contribution to meeting the professional component: Engineering Topics

Relationship of course to student outcomes:
3 strongly supported; 2 supported; 1 minimally supported

Student Outcomes Pre-Fall 2018
(ABET EC2000)

Student Outcomes Fall 2018 forward
(ABET EC2019)

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	1	2	3	4	5	6	7	8	9	10	11
3				3						3	3	3			3	3					3	3	3	3	

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