

MATSCEN 3271 (Approved): Electronic Properties

Course Description

Introduction to electronic materials' structure-property-applications: electronically and ionically conducting materials, dielectrics, optical and magnetic materials.

Prior Course Number: MSE371

Transcript Abbreviation: Electronic Prop

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad

Student Ranks: Junior

Course Offerings: Spring

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 3.0

Repeatable: No

Time Distribution: 3.0 hr Lec

Expected out-of-class hours per week: 6.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: MSE2010; Physics 1251 or 1261; Calculus I; or permission of instructor

Exclusions: Not open to students with credit for MSE 371

Cross-Listings:

The course is required for this unit's degrees, majors, and/or minors: Yes

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: No

Subject/CIP Code: 14.3101

Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
MATSCEN	Materials Science and Engineering

Course Goals

The students will learn the physical principles of electronically and ionically conducting materials, dielectrics, optical and magnetic materials.
The students will learn the influences of composition, structure and microstructure on conducting, dielectric, optical and magnetic materials.
The students will learn about applications of conducting, dielectric, optical and magnetic materials.

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Electrical conduction in metals: microstructure and temperature dependence.	6.0							
Elementary quantum physics, wave properties and band structures.	6.0							
Electrical conduction in semiconductors. N- and p- type doping. Temperature dependence. Photoexcitation of carriers.	3.0							
Semiconductor devices.	6.0							
Ionic conductivity in materials and applications.	3.0							
Low, medium and high permittivity dielectric and applications.	6.0							
Optical materials and applications.	6.0							
Magnetic materials and applications.	6.0							

Representative Assignments

One homework will be assigned every week.

Grades

Aspect	Percent
Homework (one per week)	10%
Weekly quizzes	10%
Midterm examination 1	25%
Midterm examination 2	25%
Final examination	30%

Representative Textbooks and Other Course Materials

Title	Author
<i>Principles of Electronic Materials, 7th Edition</i>	S. O. Kasap

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
*	g	An ability to communicate effectively.
*	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
**	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

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