MATSCEN 3271 (Proposed): 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: Matscen 2010 and either Math 1151 or Math 1161 and either Physics 1251 or Physics 1261 and enrollment as MATSCEN-BS student; or permission of instructor
Exclusions: Not open to students with credit for MSE 371
Cross-Listings:

Course Rationale: Existing course.

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
Principles of Electronic Materials, 7th Edition	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.

Course Contribution		College Outcome
**	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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