

MATSCEN 5571 (Approved): Electroceramics

Course Description

Functional ceramics covering electrical, magnetic and optical properties of oxides. Emphasis is on the processing-microstructure-property correlation.

Prior Course Number: MSE614

Transcript Abbreviation: Electroceramics

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

Student Ranks: Junior, Senior, Masters, Doctoral, Professional

Course Offerings: Autumn

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: MSE3271 or permission of instructor.

Exclusions:

Cross-Listings:

The course is required for this unit's degrees, majors, and/or minors: No

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.3101

Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
MATSCEN	Materials Science and Engineering

Course Goals

Students will learn basics of electrical, optical and magnetic properties of ceramic materials.
Students will learn how processing affect crystal structure, microstructure and properties of functional ceramics.
Students will learn how point defects influence properties of functional ceramics.
Students will learn non-lithographic processing routes to create ceramic nano-structures and their potential applications.

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Review of band theory and electrical conductivity	3.0							
Resistors, varistors and thermistors	4.0							
Dielectrics, ferro- and piezo-electrics	9.0							
Magnetic ceramics, ferro- and ferri-magnetics	8.0							
Optical properties, optical waveguides and fiber-optics	8.0							
Electro-optics, magneto-optics	6.0							
Nano-structured oxides and their applications	4.0							

Representative Assignments

Homework problems will be assigned based on lecture content.
--

Grades

Aspect	Percent
Homework and quizzes	25%
Midterm	35%
Final	40%

Representative Textbooks and Other Course Materials

Title	Author
<i>Electroceramics</i>	Moulson and Herbert

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.

Prepared by: Sheikh Akbar