

MATSCEN 6740 (Approved): Practical Scanning Electron Microscopy Laboratory

Course Description

Provides basic understanding of scanning electron microscopy characterization methods, understanding of sample preparation & compatibility, various imaging modes, and analytical techniques. This course focuses primarily on the practical operation of a scanning electron microscope, and not on its theoretical background.

Transcript Abbreviation: SEM Lab

Grading Plan: Satisfactory/Unsatisfactory

Course Deliveries: Classroom

Course Levels: Graduate

Student Ranks: Masters, Doctoral

Course Offerings: Autumn, Spring, May, Summer

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 2.0

Repeatable: No

Time Distribution: 1.0 hr Lec, 2.0 hr Lab

Expected out-of-class hours per week: 3.0

Graded Component: Laboratory

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: Graduate standing; or permission of instructor

Exclusions:

Cross-Listings: None

Course Rationale: Provides training for students making use of scanning electron microscopes in their research.

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: 14.1801

Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
MATSCEN	Materials Science and Engineering

General Information

Scanning electron microscopy is a fundamental characterization method in modern materials science and engineering. The ability to characterize the microstructure of modern structural, functional and biological materials by scanning electron microscopy is key to understanding the basic facts, principles, and theories of materials science and engineering.

Course Goals

Basic SEM operation
Sample preparation
Electron Beam Alignment; Electron imaging modes and detectors; Image acquisition
Energy dispersive spectroscopy; Electron backscatter diffraction

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Overview of Scanning Electron Microscopy	1.0		1.0					
Introduction to Scanning Electron Microscopy	2.0		2.0					
Scanning Electron Microscopy Alignment and Parameters	1.0		4.0					
Scanning Electron Microscopy Imaging	2.0		2.0					
Scanning Electron Microscopy Energy Dispersive Spectroscopy	1.0		2.0					
Scanning Electron Microscopy Electron Backscatter Diffraction	1.0		1.0					
Scanning Electron Microscopy Electron Sample Preparation	2.0		4.0					
Scheduled paired student practice sessions			4.0					
Scheduled one-hour individual Laboratory Practical Examination			1.0					

Representative Assignments

Two hours per week of In-Class Activities
Five two-page Laboratory Assignments
Single one-hour Laboratory Practical Examination

Grades

Aspect	Percent
In-class activities	25%
Lab assignments	25%
Lab practical exam	50%

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.

Course Contribution		College Outcome
	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.

Additional Notes or Comments

Correction to credit hours for initial entry of 6740. Was 1 cr, should have been 2 cr.

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