

MATSCEN 5541 (Approved): Structure and Properties of Amorphous Materials

Course Description

Provide basic knowledge about the structure and properties of oxide, metallic, semiconducting and polymeric glasses emphasizing viscosity, glass transition, structural relaxation and microstructure.

Prior Course Number: MSE618

Transcript Abbreviation: Amorph Mater

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

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

Course Offerings:

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: MSE2241, MSE2251, MSE3151, and MSE3261 or permission of instructor.

Exclusions: Not open to students with credit for MSE 618

Cross-Listings:

Course Rationale: Existing course.

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 atomic level structure and defects of amorphous materials including oxide, metallic, semiconducting, and polymeric glasses.
Students will learn about important theories of the temperature dependence of the viscosity of melts and of super-cooled liquids.
Students will learn about the factors that promote glass formation in systems.
Students will learn about microstructure that is present in many (but not all) glass forming systems.

Students will learn about the factors that influence the properties of amorphous materials.

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Introduction to amorphous materials	3.0							
Glass formation from liquid state	3.0							
Formation of amorphous solids from vapor and solid states	3.0							
Viscosity and visco-elastic properties of glass forming melts	6.0							
Glass transition	3.0							
Structural relaxation	3.0							
Phase Separation	6.0							
Atomic level structure of noncrystalline solids	6.0							
Atomic motions in glassy state	3.0							
Thermal properties of amorphous solids	3.0							
Optical properties of amorphous solids	3.0							

Representative Assignments

Reading assignments, Homeworks and Quizzes

Grades

Aspect	Percent
In class quizzes and homework	30%
Mid-term exam	35%
Final Exam	35%

Representative Textbooks and Other Course Materials

Title	Author
<i>Fundamentals of Inorganic Glasses</i>	A. K. Varshneya

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.
	i A recognition of the need for, and an ability to engage in life-long learning.
	h The broad education necessary to understand the impact of engineering solutions in a global and societal context.
	j A knowledge of contemporary issues.

Course Contribution		College Outcome
	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

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