

MATSCEN 5641 (Approved): Structure-Property Relationships of Polymers

Course Description

An understanding of the structure/property relationships that drive the continued expansion of polymers into a wide array of applications.

Prior Course Number: MSE642 and MSE643

Transcript Abbreviation: Str-Prop Polymers

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: MSE2010, Organic Chemistry for Engineers or equivalent, 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

General Information

The light weight, durability, strength, toughness, relatively low cost, chemical resistance, and smaller energy requirements of modern plastics will be discussed using examples taken from a broad range of their applications.

Course Goals

To survey the broad field of polymer science and engineering associated with the behavior of plastics.

To introduce the student to important concepts that distinguish plastics from inorganic materials (e.g., ceramics, metals) and govern their behavior as solids.

Students will learn about crystallization and crystallization phenomena important in determining polymer 'architecture.'

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Introduction to bonding in polymers	3.0							
Polymer architecture and microstructure crystallization/thermal analysis	3.0							
Recycling and the Big 6	3.0							
Mechanical properties and additives	3.0							
Unit operations and properties	3.0							
Case studies and fracture; diffusion	6.0							
Polymer synthesis and chain structure	6.0							
Polymer solutions	3.0							
Polymer blends	3.0							
Polymer surfaces and interfaces	3.0							
Modern polymer topics	3.0							

Representative Assignments

In-class ConcepTests enabling peer-to-peer learning and comprehension.

Two midterm exams emphasizing the most recent third of the course.

Grades

Aspect	Percent
In-class quizzes	10%
Mid-term Exam 1	30%
Mid-term Exam 2	30%
Final Exam	30%

Representative Textbooks and Other Course Materials

Title	Author
<i>Introduction to physical polymer science</i>	L.H. Sperling

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.

Course Contribution		College Outcome
*	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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