

## ESM 369/CME 369/ESM 533 POLYMERS (ELECTIVE)

Credit: 3

**Course Catalog description:** An introductory survey of the physics, chemistry and engineering processes of polymers. Topics covered included classification of polymers, structures of polymers, morphology of polymers, thermodynamics of polymers, phase separation and phase transition of polymers, crystallization of polymers. Case studies of commercial polymer production and processing.

**PRE- OR COREQUISITE(S):** ESG 332 Materials Science I: Structure and Properties of Materials

**TEXT(S) OR OTHER REQUIRED MATERIAL:** R. J. Young, P. A. Lovell, Introduction to Polymers, 2nd Ed., Chapman & Hall, 1991. ISBN# 0412306409

COURSE LEARNING OUTCOMES	SOS	ASSESSMENT TOOLS
Statistical physics and thermodynamics of polymers	a,b,e	Competency problem, Homework assignment, Quiz
Polymer structures	A,b,j	Competency problem, Homework assignments
Characterization techniques	a,b,e,f,i,k	Competency problem
Glass transition and crystallization	A,b,c,e,k	Competency problem
Polymerization	c,d, g,j	Oral presentations
Viscoelastic behavior	A,b,e,k	Exam Problem
Industrial production and processing	b,c,f,h, i,j	Written report
Liquid crystals	c,f,h,i,j	Competency problem

### COURSE TOPICS:

- Polymer Definitions:
- Dimensions of Polymeric molecule
- Structure of Polymers
- Thermodynamics of Polymeric Systems
- Phase Diagrams in Polymer Blends and Solutions
- Characterization of Polymers
- Glass transition
- Crystalline vs. Amorphous Polymers
- Elastomers
- Mechanical Properties
- Introduction to viscoelasticity
- Green process
- Polymer thin film (fundamentals and applications)
- Liquid Crystals

**CLASS/ LABORATORY SCHEDULE:**

ESM	369	Polymer Engineering/ESM 533	LEC	1	TUTH	11:20 AM	12:40 PM
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**CURRICULUM**

This course contributes 3 credit hours toward meeting the required 48 hours of engineering topics.

**STUDENT OUTCOMES (SCALE 1-3):**

A	B	C	D	E	F	G	H	I	J	K
3	3	2	2	2	2	2	2	1	2	2

**3 – Strongly supported****2 – Supported****1- Minimally supported****LEAD COORDINATOR(S) WHO PREPARED THIS DESCRIPTION AND DATE OF PREPARATION:**

Tadanori Koga, May 17, 2010