

# POLYMER SCIENCE AND POLYMER ENGINEERING

An undergraduate minor in Polymer Science and Polymer Engineering is available for undergraduate science and engineering majors. Research experiences for one to three credits per semester are also offered, starting at the freshman level.

- Polymer Science and Polymer Engineering, Minor (<https://bulletin.uakron.edu/undergraduate/colleges-programs/engineering-polymer-science/polymer-science-polymer-engineering/polymer-science-polymer-engineering-minor/>)

## Polymer Engineering (9841)

### 9841:321 Polymer Fluid Mechanics (3 Credits)

Prerequisite: 4600:310 or equivalent. Rheological properties and flow characteristics of polymer fluid systems; non-Newtonian viscosity, viscoelasticity.

### 9841:422 Polymer Processing (3 Credits)

Prerequisites: [4200:321 and 4200:351] or [4600:310 and 4600:315]. Polymer processing technology. Basic studies of flow in extrusion, molding, and other processing methods.

### 9841:425 Introduction to Blending & Compounding Polymers (3 Credits)

Prerequisites: 4200:321 or 4600:310 or permission. Nature of polymer blends and compounds and their applications. Preparation and technology using batch and continuous mixers, mixing mechanisms.

### 9841:427 Mold Design (3 Credits)

Prerequisites: 4200:321 or 4600:310 or permission. Molding methods to manufacture polymeric products. Machinery, materials, molds, equipment, computer-aided design.

### 9841:450 Engineering Properties of Polymers (3 Credits)

Prerequisites: 4200:408 or 4300:202 or 9821:301. Mechanical behavior of solid polymers including elastic and plastic deformation, viscoelasticity, fatigue and failure.

### 9841:451 Polymer Engineering Laboratory (2 Credits)

Prerequisite: 4200:408 or 9821:202. Laboratory experiments on the rheological characterization of polymer melts, fabrication of engineering products, structural investigation of polymeric parts.

### 9841:497 Honors Project (2 Credits)

Prerequisite: Senior standing in the Honors Program. Individual creative project in mechanical polymer engineering, supervised by faculty member of the department. This course must be designed oriented if used in place of 4700:499.

### 9841:498 Research Problems in Polymer Engineering (1-9 Credits)

Prerequisite: Permission of Department Chair. Faculty-supervised undergraduate research problems in polymer engineering culminating in a written report.

### 9841:499 Polymer Engineering Design Project (2 Credits)

Corequisite: 4600:400. Analysis and design of mechanical polymer systems.

## Polymer Science (9871)

### 9871:313 Physics of Living Systems (3 Credits)

Introduction to the interdisciplinary study of biological systems through the lens of the physical sciences. Learn how discovery-driven research between biology and physics leads to biomimetic advances and applications.

### 9871:401 Introduction to Elastomers (3 Credits)

Prerequisites: 3150:314 (or equivalent) or permission. An introduction to the science and technology of elastomeric materials and gels, including hydrogels. Lecture and laboratory.

### 9871:402 Introduction to Plastics (3 Credits)

Prerequisite: 3150:314 (or equivalent) or permission. An introduction to the science and technology of plastic materials. Lecture and laboratory.

### 9871:403 Polymer Chemistry (3 Credits)

Prerequisites: 3150:263 and 3150:313 or permission. Mechanisms of polymerization reactions of monomers and molecular mass distributions of products; principles of molecular mass determination; relationship of physical properties/applications to structure and composition.

### 9871:404 Polymer Physics (3 Credits)

Prerequisites: 4200:408 or 9821:301 or [3150:313 and 3450:223]. Advanced overview of polymer physics including scaling theories, chain dynamics, rubber elasticity, glassy polymers and crystallization.

### 9871:405 Polymer Science Laboratory (3 Credits)

Prerequisites: 4200:408 or 9821:301 or 9871:403 or permission. Laboratory course with experiments on the synthesis and characterization of polymers.

### 9871:407 Polymer Science (4 Credits)

Prerequisite: 3150:314 or 3650:301 or permission. Principles of polymerization processes and relationships between molecular structures and physical behavior of polymers. Molecular weight distributions of macromolecules discussed and methods of determining molecular weights utilized.

### 9871:497 Honors Project in Polymer Science (1-3 Credits)

Prerequisites: Sophomore, junior, or senior standing in Honors College and permission of honors preceptor in the home department. Independent research leading to completion of honors thesis under guidance of project adviser. May be repeated for a total of 10 credits.

### 9871:499 Research Problems in Polymer Science (1-9 Credits)

Prerequisite: Permission. Faculty-supervised undergraduate research problems in polymer science, culminating in a written report.