

# POLYMER FUNDAMENTALS

*eLearning courses designed to increase productivity and profits*



## Learning made Simple, Visual, and Interactive

The Polymer Fundamentals course provides a comprehensive overview of the fundamental aspects of polymers. Using graphics and animations, users are able to learn more about polymers' unique characteristics, structures, properties, and classifications, as well as the most common processing methods available to manufacture polymer products.

Credit Hours **3**

## Learning Objectives

- Discuss the different characteristics of polymers.
- Distinguish between the methods of polymerization.
- Identify the chain architectures, chain chemistries, and chain sequences of polymers.
- Differentiate between the mechanical, thermal, and functional properties of polymers.
- Contrast the physical states of polymers and the methods of polymer solidification.
- Discuss the classifications of polymers and understand their key differences.
- Recognize and understand the polymer processing methods discussed in the course.

## Table of Contents

### I. Characteristics of Polymers

- Natural vs. Synthetic Polymers
- Advantages and Limitations of Polymers
- Naming Conventions
- Degree of Polymerization

### II. Polymer Synthesis and Structure

- Synthesis of Polymers
  - Chain Growth
  - Step Growth
- Polymer Structure
  - Chain Architecture
  - Chain Chemistry
  - Chain Sequence

### III. Polymer Properties

- Polymer Mechanical Properties
- Polymer Thermal Properties
  - Glass Transition Temperature
  - Melting Transition Temperature
  - Thermal Conductivity
  - Thermal Expansion Coefficient
  - Decomposition Temperature
- Polymer Functional Properties
  - Electrical Properties: Arc Resistance
  - Electrical Properties: Dielectric Constant
  - Electrical Properties: Dielectric Strength
  - Optical Properties: Luminous Transmittance

- Optical Properties: Specular Gloss

### IV. Polymer Physical States and Classifications

- Liquids
- Solids
  - Crystalline Solids and Amorphous Glasses
  - Chemically Crosslinked
  - Physically Crosslinked

### V. Polymer Processing Methods

- Extrusion
- Molding
- Pultrusion

