

MSE 402: Polymeric Materials

This is a cooperative course taught by WSU, open to University of Idaho students

<i>Course description:</i>	Structural characterization, syntheses, and reactions of polymeric materials; relationships between structure and properties, viscoelasticity, deformation, and physical behavior of polymers.
<i>Number of credits:</i>	3. This course is required.
<i>Course Coordinator:</i>	W.H. Katie Zhong
<i>Prerequisites by course:</i>	MSE 201
<i>Prerequisites by topic:</i>	<ol style="list-style-type: none">1. Knowledge of thermodynamics, organic and inorganic chemical structures.2. Knowledge of stress/strain, fracture and creep behavior of materials.3. Understanding of basic crystal systems.
<i>Postrequisites:</i>	MSE 404
<i>Textbooks/other required materials:</i>	<ol style="list-style-type: none">1. Rosen, S.L. <i>Fundamental Principles of Polymeric Materials</i>. Wiley.
<i>Course objectives:</i>	<ol style="list-style-type: none">1. Polymer characteristics, basic synthesis and molecular weight effects.2. Polymer structures and properties (mechanical viscoelastic, thermal, etc.) as well as their relationship.3. Polymer rheology concepts, processing and additives for engineering polymers.
<i>Topics covered:</i>	<ol style="list-style-type: none">1. Basics of polymer synthesis and classification of polymers.2. Structures: crystallinity, molecular weight and their effects.3. Properties: thermal transitions; solubility; viscoelasticity and rubber elasticity.4. Processing: rheological behavior and basic methods: extrusion and injection.5. Additives: types and effects.6. Applications and developments of polymer materials.
<i>Expected learning outcomes:</i>	<ol style="list-style-type: none">1. Know how polymers are made.2. Be able to relate the mechanical qualities of polymeric materials to the type of primary or secondary bonding present.3. Understand the relationship between crystalline structures and physical and mechanical properties of polymers.4. Understand the importance of primary thermal transitions on polymer performance.5. Understand concepts of viscoelasticity, solubility and rubber elasticity.6. Understand effects of molecular weight on mechanical properties and processability of polymers.

7. Know basic processing for polymers.
8. Understand influences of additives.
9. Know different applications of polymer materials.
10. Understand the global and societal impacts of polymer engineering and recycling.
11. Gain knowledge of contemporary issues on polymer materials and processing.

Class schedule: Three 50-minute lecture sessions per week, for one semester.

Laboratory schedule: None

Contribution to meeting the professional component: Engineering Topics

Relationship of course to student outcomes:
3 strongly supported; 2 supported; 1 minimally supported

Student Outcomes Pre-Fall 2018 (ABET EC2000)														Student Outcomes Fall 2018 forward (ABET EC2019)											
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	1	2	3	4	5	6	7	8	9	10	11
3							2		3		3				3	1		1		2	3				

Prepared by: Andrea Butcherite and Dr. W.H. Katie Zhong *Date:* May 30, 2018