

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
<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, 1993, 2/e.
<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 student 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.
<i>Class schedule:</i>	Three 50-minute lecture sessions per week, for one semester.
<i>Laboratory schedule:</i>	None
<i>Contribution to meeting the professional component:</i>	Engineering Topics

Relationship of course to program objectives:

Meets:

1. School of MME educational objectives: 1, 2, 3
2. School of MME program outcomes: (a), (h), (j), (l)
3. ABET EC2000, Criterion 3 program outcomes: (a), (h), (j), (l)

Prepared by: W.H. Katie Zhong

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POLICIES

A. Reasonable Accommodation (the nature of the particular course determines which one applies):

- **Pullman Campus.** Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.
- **WSU Online Course.** Reasonable accommodations are available in online classes for students with a documented disability. All accommodations must be approved through your WSU Disability Services office. If you have a disability and need accommodations, we recommend you begin the process as soon as possible. For more information contact a Disability Specialist on your home campus: Pullman or WSU Online (<http://accesscenter.wsu.edu>), Spokane (<http://spokane.wsu.edu/students/current/studentaffairs/disability/>), Tri-Cities (<http://www.tricity.wsu.edu/disability>), Vancouver (<http://studentaffairs.vancouver.wsu.edu/student-resource-center/disability-services>).

B. Academic Integrity

WSU expects all students to behave in a manner consistent with its high standards of scholarship and conduct. Students are expected to uphold these standards both on and off campus and acknowledge the university's authority to take disciplinary action. The Standards of Conduct for Students can be found at <http://conduct.wsu.edu>.

C. WSU Safety

WSU is committed to maintaining a safe environment for its faculty, staff, and students. Safety is the responsibility of every member of the campus community and individuals should know the appropriate actions to take when an emergency arises. In support of our commitment to the safety of the campus community the University has developed a Campus Safety Plan, <http://safetyplan.wsu.edu>. It is highly recommended that you visit this web site as well as the University emergency management web site at <http://oem.wsu.edu/> to become familiar with the information provided.