

MSE 201: Materials Engineering Fundamentals

Course description:	Introduce students broadly to the fundamental concepts of materials engineering.
Number of credits:	3. This course is required.
Course Coordinator	Scott Beckman
Prerequisites by course:	Chem 105
Prerequisites by topic:	<ol style="list-style-type: none">1. Basic knowledge of chemical bonding2. Electron configuration and structures leading to valence in atoms
Postrequisites:	MSE 202; MSE 318; MSE 321; MSE 331; MSE 332; MSE 333; MSE 404; MSE 413; MSE 406
Textbook/other required materials:	<ol style="list-style-type: none">1. Callister, W. Materials Science & Engineering: An Introduction. Wiley
Course objectives:	<ol style="list-style-type: none">1. Understanding the basic properties of a broad range of materials2. Understand the processing-structure-properties relationship as it pertains to common steels and alloys3. Understanding mechanical properties of materials, in particular steels4. Understand mechanisms of materials failure, wear, and fatigue
Topics covered:	<ol style="list-style-type: none">1. Cubic crystal structures2. Rudimentary microstructural analysis3. Engineering stress-strain diagrams and mechanical strength4. The properties of metallic materials and alloys5. Mechanisms of strengthening and toughening6. Reading simple engineering phase diagrams including carbon steel7. Using TTT and CCT curves to determine heat treatment of steels8. Fracture, fatigue, friction, and wear9. The properties of metals, ceramics, polymers, and composites
Expected learning outcomes:	<ol style="list-style-type: none">1. Be able to understand the basic material classes: metals, ceramics, polymers, and composites2. Demonstrate the ability to read stress-strain curves and extract and determine material properties including stiffness, hardness, toughness, ductility, and resiliency3. Be able to read phase diagrams, TTT, and CCT curves to quantitatively predict the relationship between heat treating and the microstructure of common steels
Class schedule:	Three 50-minute lecture sessions per week for one semester.
Laboratory schedule:	None

Contribution to meeting the Engineering Topics
professional component:

Relationship of course to student outcomes

Meets ABET EC2019, Criterion 3 program outcomes: 1, 6, 7, 8, 9, 10

Additional WSU policies found here:

<https://syllabus.wsu.edu/university-syllabus/>

Reviewed by T. Fuller and S. Beckman Date: Sept 20, 2024