

MSE 202: Materials Science Fundamentals

Course description:	Introduce students broadly to the fundamental concepts of materials science.
Number of credits:	3. This course is required.
Course Coordinator	Min-Kyu Song
Prerequisites by course:	Chem 106 or concurrent enrollment; C or better in MSE 201
Prerequisites by topic:	<ol style="list-style-type: none">1. Basic knowledge of materials engineering including crystal structures, phase diagrams, microstructure, and structure-property relationships2. Basic understanding of chemistry including bonding and chemical thermodynamics
Postrequisites:	MSE 318; MSE 316; MSE 320; MSE 321; MSE 332; MSE 413; MSE 404; 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 bonding, crystal structure, and phases as it pertains to phase diagrams and microstructures2. Understanding the fundamentals of processing-structure relations in metals, ceramics, and polymers3. Understanding the multifunctional properties of metals, ceramics, and polymers and the fundamental structure-property relations4. Understanding the fundamental of mechanics necessary for materials science and engineering
Topics covered:	<ol style="list-style-type: none">1. Advanced crystal structures beyond cubic crystals2. The structure and properties of ceramics3. The structure and properties of amorphous materials4. The structure and properties of polymers, plastics, and composites5. Thermal properties of materials6. The fundamentals of oxidation and corrosion7. Reading binary and ternary phase diagrams8. Applied mechanics including point forces, bending forces, torque, and force equilibrium, and moments of inertia9. Isotropic elasticity, stress-strain diagrams, and material limits
Expected learning outcomes:	<ol style="list-style-type: none">1. Be able to demonstrate fundamental knowledge of the materials science of metals, ceramics, and polymers2. Show a quantitative understanding of materials properties including mechanical, thermal, and corrosion as well as an understanding of how to modify these properties

3. Demonstrate understanding of applied mechanics as is relevant for materials science and engineering

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

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Additional WSU policies found here:

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