

MSE 318: Materials Design

Course description:	Materials selection and processing design routes to develop new materials for engineering applications
Number of credits:	3. This course is required.
Course Coordinator	John McCloy
Prerequisites by course:	MSE 201 with a C or better; Stat 370, Econ 102, MSE 241 or concurrent enrollment
Prerequisites by topic:	<ol style="list-style-type: none">1. Fundamental understanding of Materials Science and Engineering2. Understanding the processing-structure-property paradigm3. Ability to read and use phase diagrams, TTT and CCT curves4. Understanding of mechanical properties and basic functional properties5. Understanding of basic differences among metals, polymers, and ceramics
Postrequisites:	ME 416, MSE 425
Textbook/other required materials:	<ol style="list-style-type: none">1. <i>Materials Selection in Mechanical Design</i>, 5th Edition. Michael F. Ashby; Oxford: Elsevier Butterworth-Heinemann (2017); ISBN: 9780081005996
Course objectives:	<ol style="list-style-type: none">1. Understand the materials design and selection process, including use of Ashby diagrams2. Perform material trade studies in a variety of design problems3. Integrate MSE into broader engineering disciplines
Topics covered:	<ol style="list-style-type: none">1. Materials trade studies2. Design of experiments3. Engineering economics4. Lifecycle design and sustainability5. Ethical and environmental considerations
Expected learning outcomes:	<ol style="list-style-type: none">1. Demonstrate the ability to apply understanding of processing-structure-properties relations to propose an optimized experimental plan to design a new material.2. Demonstrate the ability to use economic, environmental, and safety considerations to select materials for a multi material system.3. Demonstrate the ability to identify regions of Ashby space where there exist entrepreneurial opportunities, identifying the cost limits for success or failure.
Class schedule:	Two 75-minute lecture sessions per week for one semester.
Laboratory schedule:	None

Contribution to meeting the Engineering Topics
professional component:

Relationship of course to Meets ABET EC2019, Criterion 3 program outcomes: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
student outcomes

Additional WSU policies found here:

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