

MSE 331: METALLIC MATERIALS

Course description: Major alloy systems and manufacturing processes; materials selection.

Number of credits: 3. This course is required.

Course Coordinator: Dave Field

Prerequisites by course: MSE 201

Prerequisites by topic:

1. Phase equilibrium and phase diagram interpretation.
2. Elementary crystallography and crystal structure.
3. Metallography.
4. Mechanical behavior of materials.
5. Inorganic chemistry.

Postrequisites: None

Textbooks/other required materials:

1. Hosford, W. *Physical Metallurgy*, Taylor, 2010.

Course objectives:

1. The objective of this course is to develop an understanding of the processing of important commercial metals and alloys and to gain an appreciation for the breadth of applications for which metals are used.

Topics covered:

1. Review of the mechanical behavior of material.
2. Review of the binary iron-carbon system.
3. Analysis of the heat treatment of steel.
4. Discussion of ferrous and nonferrous alloys.
5. Discussion of important industrial metal processes, and analyze processing-structure-property relationships.
6. Discussion of metals applications and requirements in the microelectronics and storage media industries.

Expected learning outcomes:

1. Understanding the nature of important families of commercial metals and alloys.
2. Understanding the practice of heat treatment.
3. Recognition of the effect of processing on microstructure and that of microstructure on properties.
4. Understanding the interplay of strength, toughness, and formability in metals and alloys.
5. Understanding the structure of metallic thin film microstructures and their relationship to requirements in microelectronics.
6. Appreciation of cost 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:* Meets ABET EC2019, Criterion 3 program outcomes:1,3,5,8,9

Prepared by: Teresa Fuller and Dr. Indranath Dutta *Date:* Sept. 20, 2024

Additional WSU policies found here:

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