

MSE 222 – Introduction to Materials Science

Credits and contact hours:	3 credits and 45 contact hours.
Indicate: math, basic science, engineering topic or other	Engineering topics
Instructor's or course coordinator's name:	Dr. Barrett Potter
Textbook, title, author and year:	<u>Fundamentals of Materials Science and Engineering, an Integrated Approach, 5th Edition</u> , W.D. Callister, Jr. (John Wiley and Sons, Inc.) OR older Editions.
Other Supplemental materials:	<u>The Science and Engineering of Materials</u> , D.R. Askeland and P.P. Phule (Thomson Engineering, 2002) and other editions. Other materials: Lecture slides and supplementary information provided in handouts and through electronic delivery methods (CD-ROM, Desire-2-Learn website).
2020-2021 catalog description:	Introduction to the structure of materials and how structure influences properties. Examples of materials properties are discussed for metals, ceramics, glasses, polymers and semiconductors.
Prerequisites:	MSE 110 or CHEM 103b or MATH 129, CHEM 103a (CHEM 151)
Co-requisites:	none
Required, Elective, or Selected Elective:	Required
Instruction Outcomes:	Provide an introduction to the basic concepts and principles involved in the description, evolution, and characterization of multi-length scale structure in materials systems. Develop an appreciation for the link between these issues, their manipulation through material formulation and processing, and the resulting material properties and performance.

Student Outcomes

Listed in Criterion 3 or any other outcomes are addressed by the course:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

Topics covered:

- Materials classifications (2)
- Atomic structure and bonding (4)
- Crystalline structure, description, characterization (includes inorganic metals, ceramics and organic polymers) (10)
- Imperfections in material structure (6)
- Solid-state diffusion in materials (6)
- Phase Stability and Transformations (8)
- Mechanical behavior (including elastic/plastic behavior, failure modes) (6)