

- Course Number and Title: M E 458. Properties and Mechanical Behavior of Materials
- Catalog Description: Understanding the microstructure of engineering materials and their influence on mechanical behavior. Topics include Material Structure and Physical Properties, Thermodynamics and Kinetics of Materials, Mechanical Properties, Strengthening Mechanisms, Time and Temperature Dependent Behavior, Degradation, Fatigue, and Fracture. Crosslisted with M E 558.
- Credit Hours: 3 Credits (3)
- Prerequisite(s) / Corequisite(s): Prerequisite(s): CHME 361  
Corequisite(s): None
- Required: Elective for BSME or BSAE Degree
- Course Availability: N/A
- Instructor (Usual): Dr. Vimal Chaitanya (See <https://mae.nmsu.edu/people/faculty.html>)
- Textbook: *Materials Science and Engineering Properties*, Charles M. Gilmore, 1<sup>st</sup> Edition, Cengage Learning, ISN-13: 978-1-111-98860-9
- Course Learning Objectives: After completing this course, a student should be able to:
  - 1) Correlate mechanical behavior of materials with their microstructure, processing history and composition.
  - 2) Recognize impact of operating conditions, predict life span, and design materials to improve reliability and efficiency.
  - 3) Select appropriate materials for a given application from class of materials such as metals, polymers, ceramics and composites.
- Topics Covered:
  - Materials Classification and Development
  - Material Structure and Physical Properties
  - Material Defects
  - Thermal Effects on Materials
  - Phase Diagrams and Phase Transformations
  - Mechanical Behavior of Materials
  - Strengthening of Materials
  - Time and Temperature Dependent Behavior of Materials
  - Material Degradation
  - Fatigue and Fracture
  - Composite Materials
  - Experimental Methods