

EMCH 371 Engineering Materials

Catalog Data:

EMCH 371--Engineering Materials

Credit: 4

Prerequisite: EMCH 260

Structures and properties of engineering metals, ceramics, and polymers; atomic bonding, crystalline structures and microstructures; mechanical behavior and deformation mechanisms; processes for controlling structures and properties; corrosion.

Course Objectives

- Students will demonstrate an understanding of the nature of bonding in solids and how the bonding relates to the macroscopic behavior.
- Students will demonstrate a rudimentary knowledge of how materials can be “engineered” through alloying, heat treatment, or other types of processing to produce desired properties.
- Students will demonstrate an understanding of how materials selection is critical to optimization of a device or structure.
- Students will demonstrate an understanding of the basic experimental techniques used in materials characterization.

Topics Covered

- Primary and secondary bonding
- Arrangement of atoms in solids
- Elastic moduli
- Stress/strain behavior of ductile materials
- Fracture and fracture toughness
- Time dependent phenomena
- Phase diagrams: thermodynamics
- Heat treatment: kinetics
- Corrosion/oxidation/abrasion/wear

Assessment Methods

- Written tests
- Homework
- Lab reports

Class/Laboratory Schedule

- Lecture: Three 50-minute sessions per week
- Recitation: Not applicable
- Laboratory: One 3-hour session per week