

MSE-101 Fundamentals of Engineering Materials

Credit Hours: 3-0

Pre-requisites: None

Course Objectives

The course is designed to introduce the basic concepts of materials science and engineering. The specific course objectives are:

- To introduce the materials sciences and engineering concepts, classification of materials
- To teach the types of bonding in materials/solids
- To study the crystal structures and properties associated with them
- To introduce strengthening mechanisms and imperfections in solids.
- To introduce the mechanical properties of materials and their measurements.
- To study the processing of ceramics, composites, and polymeric materials.

Course Contents:

Introduction to materials science and engineering, Classifications of materials, Atomic Structure, Atomic bonding in solids, Crystal structures, Crystalline and non crystalline materials, crystallographic points, directions and planes, Imperfections in crystalline solids, Microscopic examinations. **Fundamentals of corrosion, Mechanical properties of solids, Elastic behavior of metals, Plastic behavior of metals, Compressive, shear and torsion, hardness, Property variability and design safety factor**, Phase diagram, Binary Phase diagrams, Iron-Carbon system, Ceramic structures, Processing of ceramics, Polymeric materials and their processing, composite materials and their processing.

Suggested Books

- Callister, W.D. and D.G. Rethwisch, Fundamentals of Materials Science and Engineering: An Integrated Approach 2012: Wiley.
- Allen, S. M., and E. L. Thomas, The Structure of Materials. New York, NY: J. Wiley & Sons, 1999