

Course Title	Course Code	Credit Hours
Aerospace Materials	AE-231	2-0

Textbooks:

- William D. Callister, and David G. Rethwisch, "Materials Science and Engineering", John Wiley and Sons
- Donald R. Askeland, Pradeep P. Fulay, Wendelin J. Wright, "The Science and Engineering of Materials", Cengage Learning

Reference Books/Materials:

- Lawrence Van Vlack, "Elements of Materials Science and Engineering", Pearson
- Herman W. Pollack, "Materials Science and Metallurgy." Prentice Hall
- EASA Part-66 Category B1 Maintenance License Module 2, "Physics"
- EASA Part-66 Category B1 Maintenance License Module 6, "Materials and Hardware"

Course Objectives:

The course aims to help students develop understanding of fundamental concepts of material science and engineering with a focus on internal atomic structure, crystal structures, crystal systems in metals, crystal imperfections, and diffusion in materials.

Course Outline:

- Introduction to Materials Science and Engineering, History, Conventional and Advanced Materials.
- Atomic Bonding, Crystal Structures and Crystal Geometry, (Planes, Direction Concepts, respective Densities).
- Introduction to 0,1,2-D Crystalline Imperfections, Introduction to Diffusion and Fick's Laws.
- Concepts of Hardness, Tensile Strength, Yield Strength, Toughness.
- Phase Diagrams, Iron-Carbon Phase Diagram.
- Intro to Solidification, TTT Diagrams.

- Aerospace Engineering Alloys – Ferrous.
- Heat Treatments and Surface Treatments.
- Non-ferrous Engineering Alloys.
- Concept of Manufacturing Processes.
- Introduction to Metal, Polymeric, and Ceramics.
- Introduction to Conductors and Magnetic Materials.