

EAS107 Introduction to Engineering Materials and Aeromaterials

Level: 1

Credit Units: 5 Credit Units

Language: ENGLISH

Presentation Pattern: EVERY SEMESTER

Synopsis:

The course will provide students the basic foundation on the characteristics and applications of the more commonly used materials in the engineering and aerospace industries, including ferrous and non-ferrous metals, ceramic materials, polymers and composites. The various material designation systems will be covered as this will facilitate materials selection.

The significance of mechanical behaviours in the performance of the materials and the test methods to determine these behaviours will be taught. The effects of mechanical, thermal and thermo-mechanical treatments on properties will be examined. These include cold and hot working, solidification and heat treatment processes. Phase diagrams will be used to explain the transformations which occur when materials are being strengthened.

Imperfections in atomic arrangements, diffusion mechanisms and their applications in materials processing will also be highlighted.

Topics:

- Atomic & Ionic Imperfections and Movements in Materials
- Mechanical Properties, Strain Hardening and Annealing
- Principles of Solidification and Phase Equilibrium
- Dispersion Strengthening, Eutectic Phase Diagrams and Phase Transformations
- Heat Treatment of Steels, Nonferrous Alloys and Composites
- Ceramic Materials and Polymers

Textbooks:

Askeland, D R; Fulay, P P: The Science & Engineering of Materials (eTextbook) 7th edition Cengage Learning
ISBN-13: 9789814844482

Learning Outcome:

- Describe characteristics and applications of common engineering and aero materials.
- Recall how the behaviours of the materials may be altered.
- Interpret mechanical tests results to determine properties of the materials.
- Identify methods to enhance the properties of the materials.
- Execute metallographic preparation and examination.
- Apply heat treatment to alter properties of metals.
- List common mechanical testing.

Assessment Strategies (Evening Class):

Components	Description	Weightage Allocation (%)
Overall Continuous Assessment	TUTOR-MARKED ASSIGNMENT 1	8
	LAB REPORT 1	12
	QUIZ 1	10
Overall Examinable Components	Written Exam	70
Total		100