

Course Title Composite Materials and Structures	Course Code: AE-485	Credit Hours: 3-0
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Textbooks:

- Callister and David G. Rethwisch, "Materials Science and Engineering: An Introduction", John Wiley & Sons, Incorporated
- T. W. Clyne and D. Hull, "An Introduction to Composite Materials", Cambridge University Press

Reference Materials:

- F. L. Matthews, Rees D. Rawlings, "Composite Materials: Engineering & Science", CRC Press
- Source: <https://www.pec.org.pk/wp-content/uploads/2024/07/MECHANICAL-ENGINEERING.pdf>

Course Objective(s):

This course aims to equip students with a thorough understanding of both fundamental and advanced concepts in composite materials. Students will gain expertise in evaluating fiber reinforcements, polymer matrices, and commercial composites. Additionally, they will develop practical skills in manufacturing techniques and applying composite knowledge to design projects.

Course Outline:

- Introduction and classifications to Composite Materials
- Particle Reinforced Composites Overview
- Large Particle Composites Characteristics
- Rule of Mixtures for Particle Composites
- Dispersion-Strengthened Composite Materials
- Fiber-Reinforced Composites Fundamentals
- Influence of Fiber Strength on Composites
- Fiber Orientation and Concentration Effects
- The Fiber Phase in Composites
- The Matrix Phase in Composites

- Polymer Matrix Composites Types
- Carbon Fiber Reinforced Composites
- Aramid Fiber Reinforced Composites
- Metal Matrix Composites Overview
- Ceramic Matrix Composites Characteristics
- Carbon-Carbon Composites Applications
- Hybrid Composites Design and Uses
- Process of Fiber-Reinforced Composites
- Structural Composites: Types and Uses
- Laminar Composites Structural Properties
- Sandwich Panel Design and Applications