

MSE-461 Composite Materials

Credit Hours: 3-0

Pre-requisites: MSE101-Fundamentals of Engineering Materials

Course Objectives

The course is designed to deal primarily with the fundamental aspects of the composite materials, their processing and manufacturing methods. The main objectives of the course are:

- To introduce the rudimentary concepts of the composite systems and their classifications.
- To understand the properties and their specific applications
- To introduce the manufacturing and processing methods of forming composite materials.
- To study the reinforcement effect of fillers in the matrix for the development of composite systems.

Course Contents

- Introduction to Composite materials
- Classification, Mechanical Behavior, potential advantages, specific stiffness and strength
- Types of polymer Matrix composites, glass fiber and carbon fiber composites, processing and manufacturing of polymer matrix composites, ceramic matrix composites, metal matrix composites, machining of composites, specific applications and case studies
- Composites in aerospace applications

Course Outcome

At the conclusion of this course, the student should have:

Develop knowledge of:

- Nature of reinforcing materials - fibers, whiskers, platelets, etc.
- Overview of mechanical and physical properties of a range of composite materials systems
- Fabrication of composite materials, and how this relates to microstructure and properties
- How new materials are developed and become accepted by industry Develop skills in:

- Assessment of the applicability of a specific material for a specific application
Rational selection of materials
- Self-directed learning, incorporating researching properties of commercial materials

Suggested Books

- Richard M. Christensen, *Mechanics of Composite Materials, Dover Publications, Incorporated, 2005.*
- Krishan K. Chawla, *Composite Materials: Science and Engineering, 3rd Edition, Springer Publishing House 2012.*