

Semester:	8				
Course Code:	ME5160				
Course Name:	Composite Materials				
Credits Value:	3 (Notional hours: 150)				
Pre-requisites:	None				
Core/ Optional:	Optional				
Hourly Breakdown	Lectures (hours)	Tutorials (hours)	Practical classes (hours)	Assignments (hours)	Independent Learning & Assessment (hours)
	26	6		26	92

Course Aim:

To provide the students an opportunity to analyze and design composite materials and failure criterion.

Intended Learning Outcomes:

On successful completion of the course, students will be able to:

- **develop** and **demonstrate** understanding of engineering composite materials, their classification and structure
- **demonstrate** composite manufacturing techniques
- **analysis** of composites' mechanical properties in micro level
- **evaluate** macro mechanical behavior of composites and failure criterion

Course Content:

- **Introduction:** Classification and definition, comparison with conventional materials, applications.
- **Fibres and matrices:** Different types and architecture of fibre reinforcement, polymer, metal and ceramic matrix composites; fibre-matrix interface: Significance of the interface to the mechanical properties of the composites, measurement of bond strength.
- **Geometric aspects:** Fibre architecture, volume fraction, fiber length distribution, voids. And composite manufacturing techniques
- **Micro-mechanics of composites:** Density, mechanical properties, thermal properties, mechanics of load transfer.
- **Laminate theory:** Elastic constants of isotropic materials and lamina
- **Macro-mechanics of composites:** Analysis of laminated composites, stresses and strains in laminated composites, inter-laminar stresses.

- **Mechanical properties of composites:** polymer, metal and ceramic matrix composites; fabrication, structure and properties, fibre-matrix interface.

Teaching/ Learning Methods:

Classroom lectures, tutorials and in-class exercises and assignments

Assessment Strategy:

Continuous Assessment 40%		Final Assessment 60%		
Details:		Theory (%)	Practical (%)	Other (%) (Project)
Assignments/Quizzes	20%	60%		
Mid Semester Examination	20%			

Recommended Reading:

- Richard M. Christensen (2005), *Mechanics of Composite Materials*, Dover Publications Inc, New York.
- R. M. Jones (1998), *Mechanics of Composite Materials*, Hemisphere Publications.
- M.F. Ashby and D. R. H. Jones (1998), *Engineering Materials (Series)* (2nd Edition), Butterworth-Heinemann, Oxford.

Note: Mini project will be done utilizing self-learning hours.