

Liverpool John Moores University

Title: Properties and Applications of Engineering Materials
Status: Definitive
Code: **5010ENGFRI** (117028)
Version Start Date: 01-08-2018

Owning School/Faculty: Maritime and Mechanical Engineering
Teaching School/Faculty: Maritime and Mechanical Engineering

Team	Leader
Russell English	Y

Academic Level: FHEQ5 **Credit Value:** 20 **Total Delivered Hours:** 40
Total Learning Hours: 200 **Private Study:** 160

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	20
Tutorial	10
Workshop	10

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Essay	Essay		40	
Essay	Essay		20	
Essay	Essay		40	

Aims

To provide students with knowledge and understanding of the properties of the main structural engineering materials so they can subsequently make informed decisions with regards to their applications.

Learning Outcomes

After completing the module the student should be able to:

- 1 Explain the microstructural and macrostructural properties of metallic, composite and polymeric structural engineering materials.
- 2 Understand the typical mechanical properties of metallic, composite and polymeric structural engineering materials.
- 3 Make informed choices with regards to the selection of appropriate structural engineering materials for particular applications.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Essay 1	1	2	
Essay 2	1	2	
Essay 3	1	2	3

Outline Syllabus

Introduction to engineering materials - why they are important, the main properties that need to be considered when choosing a material for a specific application, cost and environmental issues.

Structure of materials – atomic structure and bonding, crystalline solids, imperfections in solids.

Metallic materials – general overview of the structure and properties of metallic materials including dislocations and strengthening mechanisms.

Steels – general properties, phase diagrams, heat treatments, overview of processing routes.

Aluminium – microstructure and macrostructure, general properties and applications, strain hardening, heat treatments, overview of processing routes.

Polymers and plastics (to include both thermoplastics and thermosetting plastics) – microstructure and macrostructure, general properties and applications, overview of processing routes.

Composite materials (to concentrate on glass reinforced plastics and carbon reinforced plastics) – macrostructure, general properties and applications, overview of processing routes.

Learning Activities

A series of lectures, case studies, tutorials and laboratories. Four courseworks will be undertaken, three minor ones will be experimental laboratory based exercises and a major one will be a group based case study involving the critical analysis of engineering materials with respect to typical applications.

Notes

The module covers the properties, manufacturing processes and applications of the main structural engineering materials, metals, plastics and composites. Typical applications of the materials are discussed in relation to their properties and manufacturing routes.