

Liverpool John Moores University

Title: ADVANCED MATERIALS AND PROCESSING
Status: Definitive
Code: **6500ENGRIV** (117224)
Version Start Date: 01-08-2016

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

Team	Leader
James Ren	Y
Russell English	

Academic Level: FHEQ6 **Credit Value:** 20 **Total Delivered Hours:** 51
Total Learning Hours: 200 **Private Study:** 149

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	36
Practical	4
Tutorial	8

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam		70	3
Report	Materials	Materials design	15	
Report	Manufactur	Manufacturing study	15	

Aims

To develop a wide knowledge of advanced materials and manufacturing; To study the materials and process selections involved in the design and manufacture of engineering products.

Learning Outcomes

After completing the module the student should be able to:

- 1 Critically review the mechanical performance and application of a range of engineering materials and advanced materials
- 2 Discuss the use of life cycle analysis and practices with respect to recycling issues and green design
- 3 Critically analyze modern processing methods and their application in the modern manufacturing environment
- 4 Select appropriate material-removal processes and machines for cost effective manufacturing

Learning Outcomes of Assessments

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

Exam	1	2	3	4
Materials	1	2		
Manufacturing	3	4		

Outline Syllabus

Properties and application of advanced materials, light weight materials, high performance alloys
High strength steels - strengthening mechanisms, heat treatment, surface hardening, and structure-properties relationships
Nonferrous materials - aluminium alloys and titanium alloys – phase diagram, microstructure, heat treatment, properties and performances
Plastics and composites: fibre reinforced composites, structure-properties relationships, and design for strength
Machining processes of metal materials: turning, milling, grinding, parameter selection
Casting and powder metallurgy of metals and ceramics
Moulding processes of polymers and composites: extrusion, injection moulding, compression moulding
Non-traditional manufacturing processes: laser cutting/machining, water jet cutting, EDM, ECM, chemical machining etc.
The selection of materials and process on basis of performance requirements: strength, stiffness, toughness, fatigue resistance and energy absorption.
New materials development, life cycle analysis and recycling issues.

Learning Activities

A series of lectures supported by tutorials, videos and practical laboratory work

Notes

Explores the combination of modern manufacturing techniques using a knowledge of process parameters and the properties and behaviour of advanced materials which govern the design of manufacturing processes. Life cycle analysis and recycling issues will also be investigated.