

Liverpool John Moores University

Title: ADVANCED MATERIALS AND PROCESSING
Status: Definitive
Code: **6042ENG** (105532)
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

Academic Level: FHEQ6
Credit Value: 24
Total Delivered Hours: 51
Total Learning Hours: 240
Private Study: 189

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	AS1	Examination	70	3
Essay	AS2	A major materials coursework	30	

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
- 2 discuss the development of advanced materials and their processing method
- 3 select materials/process to meet the performance requirements of a range of engineering applications
- 4 recognise the use of life cycle analysis and practices with respect to recycling issues

Learning Outcomes of Assessments

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

EXAM	1	2	3	4
CW	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, grinding, parameter selection
Casting and powder metallurgy of metals and ceramics
Moulding processes of polymers and composites: extrusion, injection moulding, compression moulding
Destructive and non-destructive techniques (NDT): dye penetrant, ultrasonic, eddy current, magnetic particle and X-ray methods, application and limitations
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.