

Liverpool John Moores University

Title: ADVANCED MATERIALS AND PROCESSING
Status: Definitive
Code: **6505ENGCBT** (118462)
Version Start Date: 01-08-2016

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

Team	Leader
James Ren	Y
Stephen Ebbrell	

Academic Level: FHEQ6 **Credit Value:** 12 **Total Delivered Hours:** 37
Total Learning Hours: 120 **Private Study:** 83

Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	20
Practical	5
Tutorial	10

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	2
Report	AS2	Coursework	30	

Aims

*To develop a wide knowledge of advanced materials and manufacturing methods.
To study the materials and process selection 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 methods
- 3 Select materials/processes to meet the performance requirements of a range of engineering applications.

Learning Outcomes of Assessments

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

EXAM	1	2	3
CW	2	3	

Outline Syllabus

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.

Precision machining processes: turning, milling, abrasive processes, hard-turning. Mechanics of cutting. Mechanics of grinding.

Polymers and composites: structure-properties relationships, applications and design for strength.

Forming and shaping plastic and composite materials: extrusion, injection moulding, compression moulding blow moulding, compression moulding, etc.

Powder metallurgy of metals and ceramics: production of metal powders, compaction, sintering, secondary and finishing processes, design considerations, shaping ceramics etc.

Destructive and non-destructive techniques (NDT): dye penetrant, ultrasonic, eddy current, magnetic particle and X-ray methods, application and limitations.

Learning Activities

A series of lectures supported by tutorials 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.