

## Liverpool John Moores University

Title: ADVANCED MATERIALS AND PROCESSING  
Status: Definitive  
Code: **6000ENGFRI** (116998)  
Version Start Date: 01-08-2018

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	Exam	70	3
Report	Materials	Materials Design and Selection	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.