

## Liverpool John Moores University

Title: ADVANCED MATERIALS AND PROCESSING  
Status: Definitive  
Code: **6505ENGSBC** (113915)  
Version Start Date: 01-08-2018

Owning School/Faculty: Maritime and Mechanical Engineering  
Teaching School/Faculty: The Sino-British College

Team	Leader
Russell English	Y

**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
Report	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.