

## Liverpool John Moores University

Title: Materials and Processes  
Status: Definitive  
Code: **5103SBC** (124866)  
Version Start Date: 01-08-2021

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

Team	Leader
Lisa Li	Y

**Academic Level:** FHEQ5      **Credit Value:** 10      **Total Delivered Hours:** 35  
**Total Learning Hours:** 100      **Private Study:** 65

### Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	22
Tutorial	11

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	60	2
Portfolio	AS2	Portfolio	40	

### Aims

*To have a thorough understanding of the properties and applications of a range of structural engineering materials and their associated manufacturing processes.*

### Learning Outcomes

After completing the module the student should be able to:

- 1 Explain the microstructural and macrostructural properties of metallic, ceramic, composite and polymeric structural engineering materials
- 2 Critically evaluate the typical mechanical properties of metallic, ceramic, composite and polymeric structural engineering materials
- 3 Make an informed choice with regards to the selection of appropriate structural engineering materials for particular applications
- 4 Select suitable methods from a range of manufacturing processes
- 5 Calculate processing parameters from processing data
- 6 Plan manufacturing strategies for a range of technologies

### Learning Outcomes of Assessments

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

Examination	1	2	3	4	5	6
Port	1	2	3	4	5	6

### Outline Syllabus

*A list of possible topics that may be covered is shown below*

#### *Materials*

*Microstructure and strengthening mechanisms in steels and ferrous materials : thermal treatments, alloying elements, high performance steels.*

*Mechanical properties of advanced metallic materials (including light weight –high strength alloys and super alloys).*

*Engineering ceramics: structures-property relationships, applications*

*Polymeric and composite materials: structure and property relationships, applications and selections*

*Structure, properties and applications of advanced materials, including CMCs and MMCs.*

*Factors affecting materials properties and performance; Materials developments.*

#### *Manufacturing*

*Moulding processes for polymers:-injection moulding and extrusion processes. Blow moulding/blown film extrusion. Design considerations when processing polymers*

*Powder metallurgy techniques applied to metals and ceramics.*

*Modern developments in metal cutting processes:-grinding theory and practice.CNC machining processes.*

*Hard turning versus grinding*

*Deformation processes:-evaluation of forming loads based on principal stresses and yield criteria.Extrusion and drawing. Sheet metal working processes, an investigation of*

*bending and shearing*

## **Learning Activities**

Lectures, tutorial and practicals

## **Notes**

This module builds on the knowledge gained from the level 4 materials and manufacture module and will deliver engineering students who have a good understanding of the main engineering materials and manufacturing processes. They will be able to make informed choices with regards to material and process selection.