

Liverpool John Moores University

Warning: An incomplete or missing proforma may have resulted from system verification processing

Title: Materials and Processes
Status: Definitive
Code: **5503USST** (126441)
Version Start Date: 01-08-2021

Owning School/Faculty: Engineering
Teaching School/Faculty: University of Shanghai For Science and Technology

Team	Leader
Lisa Li	Y
Sam Tammas-Williams	

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 Interpret 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 Apply 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 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 and tutorials

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.