Liverpool John Moores University

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Title:	Materials and Processes
Status:	Definitive
Code:	**5119ENG** (120020)
Version Start Date:	01-08-2019
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Maritime and Mechanical Engineering

Team	Leader
Andy Pettit	Y
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Academic Level:	FHEQ5	**Credit Value:**	10	**Total Delivered Hours:**	38
Total Learning Hours:	100	**Private Study:**	62		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Tutorial	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS2	Examination	70	2
Test	AS1	Test with a V.L.E. Portfolio	30	

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 CNC removal processes including selection of tool and machining parameters

Learning Outcomes of Assessments

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

Examination	1	2	3	4	5	6
Test in VLE	1	2	3	4	5	6

Outline Syllabus

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, applictaions
Polymeric and composite materials: structure and property relationships, applications and slections
Structure, properties and applications of advanced materials, including CMCs and MMCs.
Factors affecting affecting materials propertiesand 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.