Materials

Module Information

2022.01, Approved

Summary Information

Module Code	4505MECBHG
Formal Module Title	Materials
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 4
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
Beaconhouse Group

Learning Methods

Learning Method Type	Hours
Lecture	44
Tutorial	22

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
SEP-PAR	PAR	September	12 Weeks

Aims and Outcomes

Aims	The module will introduce the essential principles of material science.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Review the range of available materials, their applications, processing methods and demonstrate knowledge of the basic structures of different groups of materials.
MLO2	2	Understand the properties of engineering materials and factors affecting materials properties and selection.
MLO3	3	Apply different materials testing and analysis data methods for design and product development
MLO4	4	Review the range of metal casting processes and know the techniques for preventing defects.
MLO5	5	Demonstrate knowledge of primary metal forming and removal processes including appropriate selection.
MLO6	6	Understand polymer and composite processing methods and their applications

Module Content

Outline Syllabus	MaterialsMaterials Structures and ApplicationsStructure of atoms, Bohr theory. primary and secondary bondings and their relationships with material properties.Classification of engineering materials: metals, ceramics, polymers and composites and typical applications.Ideal crystalline solids: basic crystallography; Microstructure of metals and ceramics: grains, grain size, defects and their influence on mechanical and physical properties.Structure of polymers: molecule chains, curing, thermoplastic and thermosetsProperties, testing and selectionMaterials properties and design: stiffness. strength and toughness; stress strain curves, Young's modulus, yield strength, toughness, fracture toughness.Factors affect the behaviour and properties of materials.Destructive and non-destructive tests; tensile, hardness, ductile and brittle failure.Analysis and interpretation of materials testing data.Material selection: Introduction to computer-based techniques for material selection. ManufacturingMetal materials and processingClassification of materials processing methods: forming, shaping, and processing.Casting processes: Fluid flow and solidification; casting mould design; prevention of casting defects. Metal cutting processes: Milling, turning and grinding theory, preparation of data and tool selection.Overview of cold working process of metals.Processing of plastics and composites Fundamentals of moulding processes of plastics and composites. Injection moulding, compression moulding, blow moulding, vacuum formingRapid prototyping and 3D printing methodsMould design
Module Overview	
Additional Information	This module covers the essential elements of materials science and manufacturing technology required by engineers studying mechanical, marine, design disciplines. The students will develop a good understanding on the structures, properties and processing methods of different groups of materials and be able to apply basic techniques for materials testing and selection.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Exam	Examination	60	2	MLO1, MLO2, MLO3, MLO4, MLO5, MLO6

Presentation	VLE Based Test	40	0	MLO1, MLO2, MLO3, MLO4, MLO5, MLO6

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Russell English	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings