Module Proforma

Approved, 2022.02

Summary Information

Module Code	4611IYO
Formal Module Title	Materials
Owning School	Engineering
Career	Undergraduate
Credits	10
Academic level	FHEQ Level 4
Grading Schema	40

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Lonnie Readioff	Yes	N/A

Module Team Member

Contact Name	Applies to all offerings	Offerings
Mohamed Kara-Mohamed	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
Study Group

Learning Methods

Learning Method Type	Hours
Lecture	12
Seminar	24

Module Offering(s)

Offering Code	Location	Start Month	Duration
JAN-PAR	PAR	January	12 Weeks
SEP-PAR	PAR	September	12 Weeks

Aims and Outcomes

Aims	The module aims to introduce the essential principles of material science and engineering with reference to an essential element in mechanical design and materials selection. The overall module aim is to enable students to gain knowledge and skills for further studies or employment.

Learning Outcomes

After completing the module the student should be able to:

Code	Description
MLO1	Review the range of available materials, their applications and properties and demonstrate knowledge of the basic structures of different groups of materials.
MLO2	Apply different materials testing and analysis data methods for design and product development.
MLO3	Demonstrate knowledge of materials and processing methods.

Module Content

Outline Syllabus
Materials Materials Structures and Applications Structure 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 thermosets Properties, testing and selection Materials properties and design: stiffness. strength and toughness; stress strain curves, Young's modulus, yield strength, toughness, fracture toughness. Factors affecting 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. Manufacturing Metal materials and processing Classification 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 forming Rapid prototyping and 3D printing methods Mould design

Module Overview

Additional Information
An introduction to materials

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Learning Outcome Mapping
Exam	Exam/test	100	2	MLO2, MLO3, MLO1