

Liverpool John Moores University

Title: Material Properties and Selection
Status: Definitive
Code: **4001AMCPD** (126475)
Version Start Date: 01-08-2019

Owning School/Faculty: Maritime and Mechanical Engineering
Teaching School/Faculty: Maritime and Mechanical Engineering

Team	Leader
James Ren	Y

Academic Level: FHEQ4 **Credit Value:** 10 **Total Delivered Hours:** 20
Total Learning Hours: 100 **Private Study:** 80

Delivery Options

Course typically offered: Summer

Component	Contact Hours
Online	12
Tutorial	8

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Test	AS1	VLE Test	100	1

Aims

The module will introduce the essential principles of material science and factors affecting their selection for a product or application. Understanding will be developed further by application to a work related learning project.

Learning Outcomes

After completing the module the student should be able to:

- 1 Review the range of available materials, their applications, processing methods and demonstrate knowledge of the basic structures of different groups of materials.
- 2 Apply a knowledge of the properties of engineering materials, materials testing methods and factors affecting materials properties to select a material for design and product development.

Learning Outcomes of Assessments

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

VLE Test	1	2
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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 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.

Learning Activities

Online lectures, online tutorials, work-related learning

Notes

This is a single module CPD - programme code 36248

This module covers the essential elements of materials science. The students will develop a good understanding of structures, properties and basic techniques for materials testing and selection. This knowledge will then be developed further by application to a work related learning project.

Candidates applying for the module must hold the prerequisite relevant engineering qualifications at Level 3 totaling at least 90 credits. In addition, many will already have a HE level qualification and may use this CPD module to extend or update their existing skill set.

Intake entry point for study onto the CPD module will occur in summer.
The CPD module will not have any formal PSRB accreditation.
Subject benchmark statement - Aligns to Engineering Council UK SPEC
The module is a CPD version based on part of 4505MTC, which is part of the Advanced Manufacturing BEng.

The module will be delivered by remote study of on-line lecture content. Delivery of the module is intended to last approximately 12 weeks.

Learners are allocated a personal tutor, who may be drawn on to deal with any support requirements they may have. This support is delivered virtually using online virtual tutorial sessions.

Formative assessment will be facilitated through tutorial feedback, plus through engagement with online study material and assessment tasks.

The programme is assessed and run in line with the Academic Framework (<https://www.ljmu.ac.uk/about-us/public-information/academic-qualityandregulations/academic-framework>).

The methods for improving the quality and standards of learning are as follows:

- Continuous Monitoring and Enhancement
- Liaison and feedback from the students
- Reports from the External Examiner
- Programme team ensuring the module reflects the values of the current teaching and learning strategy
- Module/Programme Leader updating knowledge and skills to ensure these remain current and relevant.

As the content of this CPD is derived from the Advanced Manufacturing BEng, it will share the same external examiner as that programme.