

## Liverpool John Moores University

Title: ENGINEERING MATERIALS  
Status: Definitive  
Code: **4509NCCG** (129428)  
Version Start Date: 01-08-2021

Owning School/Faculty: Engineering  
Teaching School/Faculty: Nelson Campus

Team	Leader
Christian Matthews	Y

**Academic Level:** FHEQ4      **Credit Value:** 20      **Total Delivered Hours:** 60  
**Total Learning Hours:** 200      **Private Study:** 140

### Delivery Options

Course typically offered: S1, S2, Sum, NS2 (S2 for Jan)

Component	Contact Hours
Lecture	48
Practical	12

**Grading Basis:** 40 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	Assignment	Assignment	100	

<b>Competency</b>	NCC Group Pass/Fail
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### Aims

*This unit introduces students to the atomic structure of materials and the way it affects the properties, physical nature and performance characteristics of common manufacturing materials; how these properties are tested, and modified by various processing treatments; and problems that occur which can cause materials to fail in service.*

## Learning Outcomes

After completing the module the student should be able to:

- 1 Explain the relationship between the atomic structure and the physical properties of materials.
- 2 Determine the suitability of engineering materials for use in a specified role.
- 3 Explore the testing techniques to determine the physical properties of an engineering material.
- 4 Recognise and categorise the causes of in-service material failure.

## Learning Outcomes of Assessments

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

Assignment	1	2	4
NCC Group Pass/Fail			3

## Outline Syllabus

*Physical properties of materials: classification and terminology of engineering materials, material categories: metallic, ceramic, polymer and composites, atomic structure: electrostatic, covalent and ionic bonding, crystalline structures: body-centred and face-centred cubic lattice and hexagonal close packed*  
*Characteristics and function of ferrous, non-ferrous phase diagrams, amorphous and crystalline polymer structures*  
*Categorising materials by their physical, mechanical, electrical and thermal properties*  
*The effect heat treatment and mechanical processes have on material properties*  
*Environmental factors affecting material behaviour of metallic, ceramic, polymer and composite materials*  
*Selection of materials for engineering functions: properties, cost, supply concerns*  
*Testing techniques: destructive and non-destructive tests*  
*Material failure: common mechanisms of failure for metals, polymers, ceramics and composites, preventative measures to extend service life*

## Learning Activities

### Lectures

These will not normally be traditional didactic lectures in which the student plays little active part, but will be delivered in small groups of up to 20 students in which their interaction with their tutor is a key ingredient of their learning experience.

The material of this module requires the development of significant practical skill. This will be taught within the lecture time, making these sessions a blend of lecture and workshop time. The sessions will be timetabled in spaces with physical resources appropriate to the delivered content.

Students will receive approximately 30 hours of taught material, supported by in-class exercises and discussions designed to help student assimilate learning and to provide early informal feedback on their progress.

### Practical Work

This module contains directed practical work that students will undertake under the supervision of teaching staff and/or technicians. Some elements of this practical work will form part of the assessment for this module.

### Independent Study

Students are expected to undertake personal reading and research into topic areas that have been stimulated from the lectures and seminars. This reading will enhance their academic work and enable valid contribution to lectures and seminars.

### VLE support

This will provide links to academic web-sites and on-line journals, facilitate group discussion outside of the classroom, access to outline lecture notes, and provide students with assessment details.

### Notes

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