

Materials

Module Information

2022.01, Approved

Summary Information

Module Code	5200CIV
Formal Module Title	Materials
Owning School	Civil Engineering and Built Environment
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Civil Engineering and Built Environment

Learning Methods

Learning Method Type	Hours
Lecture	33
Practical	10
Tutorial	11
Workshop	11

Module Offering(s)

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

Aims and Outcomes

Aims	To introduce the students to a range of advanced materials, and to a more fundamental understanding of how their micro- and mesoscale structures determine their macroscale properties. To explore how effects such as electrical, thermal and acoustic conduction are mediated through a range of materials, and how careful selection of such materials can control and guide these effects. To understand how and why the treatment and environment to which a material is exposed can alter its properties and working life, e.g. fire, salt water, thermal cycling. To understand how photovoltaic and solar thermal power are generated and why combining the two is a challenge; to understand suitable locations for photovoltaic panels in buildings.
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After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Evaluate how a material's manufacture, growth or downstream treatment alters its microscale and macroscale properties, and be able to broadly predict a material's behaviour from microscale inspection and a history of its manufacture and treatment.
MLO2	2	Explain conduction and insulation of temperature, sound, light and electricity, and be able to predict whether a material will conduct, insulate or semi-conduct based upon its properties.
MLO3	3	Describe and explain the function and principles of photovoltaic electricity production, and design structures using photovoltaics in order to achieve the optimum conditions for their function and usage.
MLO4	4	Demonstrate an understanding of novel and innovative construction materials and their applications.
MLO5	5	Demonstrate hands-on skills in a variety of physical and electrochemical measurement techniques in a laboratory environment.

Module Content

Outline Syllabus	The Advanced Materials syllabus will cover the properties of a broad range of specialised and functional materials in a course designed to build upon the structural materials elements of the course taught in level 4. The mechanism(s) behind each material's function will be explored in detail, taking in elements of the chemistry and physics underpinning each. Insulation and high strength-to-weight materials will be explored in detail, incorporating pervasive foams, honeycomb and cellular structures. A range of material treatments and finishes will also be explored, incorporating paints, varnishes, and glass treatments such as tempering, alongside thin-layer and/or surface functionalisations such as silicon solar cells and self-cleaning coatings. The properties, and potential applications of, novel and innovative materials will be considered. Students will consider the practical application of solar panels, strength-to-weight ratios of various materials, acoustic properties of materials, different polymerisation processes and polymer formation, thermoplastics and Thermoset plastics and crystal grain boundaries.
Module Overview	This module helps you develop your techniques for evaluating and understanding the mechanisms and behaviour of engineering materials. You will develop an understanding of novel and innovative materials. You will be introduced to a range of advanced materials, and to a more fundamental understanding of how their micro and mesoscale structures determine their macroscale properties.
Additional Information	This module develops techniques for evaluating and understanding the mechanisms and behaviour of engineering materials. Students will develop an understanding of novel and innovative materials. Where this module is part of a Degree Apprenticeship programme, the knowledge learning outcomes are K1, K2, K4 and K5, the skills learning outcomes are S3 and S7.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	JOURNAL STYLE LAB REPORT	25	0	MLO1, MLO2, MLO3, MLO4, MLO5
Centralised Exam	Examination	75	2	MLO1, MLO2, MLO3, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Rafal Latif Al-Mufti	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings
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