

Summary Information

Module Code	4538BEKL
Formal Module Title	Science and Materials
Owning School	Civil Engineering and Built Environment
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
International College IMPERIA

Learning Methods

Learning Method Type	Hours
Lecture	42
Practical	18
Tutorial	10

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-PAR	PAR	January	12 Weeks

SEP-PAR	PAR	September	12 Weeks
SEP_NS-PAR	PAR	September (Non-standard start date)	12 Weeks

Aims and Outcomes

Aims	To provide students with an appreciation of the common scientific principles associated with environmental conditions inside buildings, and the properties and behaviour of common building materials. To enable students to apply appropriate scientific and analytical methods to investigate the internal environment in buildings and the performance and behaviour of common building materials.
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After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Apply appropriate scientific and analytical methods to investigate scientific problems related to the environmental conditions and processes in buildings.
MLO2	2	Describe and evaluate factors which influence human comfort juxtaposed with the utility, sustainability and energy efficiency of buildings, with respect to temperature, humidity, air movement, lighting and noise levels.
MLO3	3	Identify the properties of common building materials and classify their performance characteristics, with due regard to the natural environment and potential environmental impacts.
MLO4	4	Describe the thermal properties of common building structures and evaluate heat losses from simple buildings.

Module Content

Outline Syllabus	<p>Environmental Science:• Light; scientific properties of light, units and measurement of light, lighting levels for buildings.Artificial lighting systems and equipment; lamps & luminaires, Lumen system of lighting design, colour rendering.Use of natural light; daylight factors. • Acoustics; nature of sound, nature of hearing, properties of sound (frequency, pitch, amplitude etc), measurement of sound levels, logarithms to base 10 and the decibel system. Noise in buildings; measurement of noise, noise transfer, noise control, sound insulation & absorption, attenuation.Room acoustics; reflection, absorption, reverberation. • Heat and heat transfer; radiation, conduction & convection. Thermal properties in buildings; thermal insulation, thermal capacity, thermal resistance of building components, thermal bridging. Energy use in buildings; thermal comfort, heat losses and gains, energy balance, energy regulations. • Properties of air, moisture in air, vapour, humidity and condensation. Condensation in buildings, interstitial condensation.Materials:• Properties, design criteria and specification of a range of materials including bricks and brickwork, cement, mortar, concrete, plaster, metals, alloys, timber (including engineered timbers), clay products, insulation materials and polymers including vapour and damp-proofing barriers. • Thermal properties of common materials and structures, thermal conductivities and U values • Use of protective coatings including paints, stains and renders. • Maintenance and replacement of building components, • Sustainability and environmental issues relating to procurement of materials and construction methods.Analytical methods (integrated within above):• Geometry: Calculation of areas and volumes of common shapes. • Algebra: linear, simultaneous and quadratic equations, laws of indices, manipulation of formulae. • Basic statistics and graphical representation: data collection methods, interpretation of data and constructing cumulative frequency tables, line graphs, histograms and bar charts. • Trigonometry: basic trigonometric ratios and their inverses, trigonometric ratios for the four quadrants, solution of triangles.</p>
Module Overview	
Additional Information	<p>The module is designed to provide students on a range of Built Environment study programmes with a sound basic understanding of the principal materials used in construction and the scientific principles related to environmental services within buildings. Alongside this the student will be encouraged to apply appropriate analytical methods.</p>

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Report	50	0	MLO2, MLO3, MLO4
Exam	Examination	50	2	MLO1, MLO3, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Ana Armada Bras	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings
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