Prifysgol Wrecsam
Wrexham University

Module specification

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Module Code	AUR499_AURH499
Module Title	Science & Materials
Level	4
Credit value	20
Faculty	Faculty of Arts, Computing and Engineering
HECoS Code	100225
Cost Code	GABE

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
HNC Construction Technology	Core
BEng(Hons) Civil Engineering Degree Apprenticeship	Core
BSc(Hons) Architectural Design Technology	Core
BSc(Hons) Building Surveying Degree Apprenticeship	Core
BSc(Hons) Building Surveying	Core
BSc(Hons) Construction Management Degree Apprenticeship	Core
BSc(Hons) Construction Management	Core
BSc(Hons) Quantity Surveying Degree Apprenticeship	Core
BSc(Hons) Quantity Surveying	Core

Pre-requisites

N/A

Breakdown of module hours

Learning and teaching hours	26 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	10 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	**36** hrs
Placement / work based learning	0 hrs
Guided independent study	164 hrs

Learning and teaching hours	26 hrs
Module duration (total hours)	200 hrs

For office use only	
Initial approval date	3rd July 2024
With effect from date	September 2024
Date and details of revision	
Version number	1

Module aims

The module aims to provide students opportunities to evaluate fundamental properties of materials used in construction, their manufacture, handling, storage, use and redundancy. The module acts as a foundation to other modules concerned with construction materials and technologies, facilitating detailed analysis of such components utilised in the design and specification of buildings and infrastructure.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Investigate the manufacture, handling, storage and use of construction materials and components, with particular emphasis upon the health, safety and welfare of those involved in such processes be able to evaluate the performance requirements of buildings and facilities, identifying key material factors influencing their design and construction.
2	Evaluate the characteristic properties and applications of metals, polymers, ceramics, natural and composite materials used in the construction industry and evaluate the environmental impact of construction materials through their manufacture, use and redundancy.
3	Determine by mathematical means, solutions to given structural and environmental design scenarios.

Assessment

Indicative Assessment Tasks:
Assessment will be undertaken as a series of separate class- or field-based tasks of equal weighting, derived to keep pace with the coverage of the syllabus; there will also be a presentation-based assessment.

The tasks will collectively reflect the breadth of the syllabus in terms of coverage. The precise nature of the coursework is at the discretion of the module tutor, though its design should accommodate the academic verbs that define each Intended Learning Outcome specified above.

The types of evidence expected of students in undertaking coursework is also at the discretion of the module tutor, though these should as far as possible reflect the key skills associated with each Intended Learning Outcome specified.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 2, 3	Coursework	100%

Derogations

None

Learning and Teaching Strategies

The module will be delivered through a series of formal lectures which details the fundamental materials used in construction; Ceramics, Polymers, Metals, Composites and Natural Products, their manufacture and handling, storage, use and disposal, their application with buildings, and the context in which they are used.

Laboratory-based activities will provide students with experiential learning in the preparation and testing of a variety of materials and will provide data for the subsequent analysis of material performance and industrial application.

Site visits undertaken as part of this, or other associated modules will provide appropriate vehicles for aspects of building services to be considered in site-specific contexts.

Delivery will incorporate the principles of the University's Active Learning Framework (ALF), so that learning opportunities are both synchronous and asynchronous, and are supported by an accessible range of material resources.

The assessments will provide an opportunity for summative feedback to help enhance and develop the student skillset required for Level 4 studies.

Indicative Syllabus Outline

Performance requirements of materials will be determined through case-study analyses and the application of underpinning scientific principles in the context of typical constructional arrangements. The syllabus will include:

Materials Classification:

- Metals,
- Polymers,
- Ceramics,
- Natural materials, and
- Composites.

Materials handling, storage and use:

- Health, safety and welfare.

Environmental sustainability:

- Lifecycle assessments,
- Embodied energy,
- Waste management,

- Renewable and non-renewable materials.

Material testing:

- Testing methods,
- interpreting test data.

Structural behaviours:

- strength,
- elasticity,
- toughness,
- hardness,
- creep,
- fatigue, porosity,
- brittleness,
- density,
- durability.
- bending,
- shear,
- deflection,
- frameworks.
- Concepts of plane stress and plane strain
- Multi-axial stress and strain
- Stress-strain curves
- Human comfort and functional convenience:
- thermodynamics,
- fluid mechanics,
- natural and artificial illumination,
- acoustics,
- ventilation,
- passive design solutions.

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads

Soutsos, M. and Domone, P. (eds.) (2017), *Construction Materials: Their Nature and Behaviour.* 5th ed. Boca Raton, FL: CRC Press.

Other indicative reading

Thomas, R. (ed.) (2006), *Environmental design: An introduction for architects and engineers.* 3rd ed. London: Taylor & Francis.

Claisse, P, A. (2015), *Civil Engineering Materials.* Kidlington: Butterworth Heinemann.

Dean, Y. (1996), *Materials Technology. (Mitchells Building Series)*, Abingdon: Routledge.

Doran, D. and Cather, B. (2013), *Construction Materials Reference Book.* Abingdon, Routledge.

Everett, A. (1994), *Materials. (Mitchells Building Series),* 5th Ed. Abingdon: Routledge.

Lyons, A. (2014), *Materials for Architects and Builders.* 5th ed. Abingdon, Oxon: Routledge.

BRE Digests

Papers from Cement and Concrete Association

Papers from TRADA

Papers from Steel Construction Institute.