

Module Code:	AUR409/AURH409
---------------------	----------------

Module Title:	Science and Materials 1
----------------------	-------------------------

Level:	4	Credit Value:	20
---------------	---	----------------------	----

Cost Centre(s):	GABE	JACS3 code:	K190 (ADT) K220 (CM)
		HECoS code:	100122 (ADT) 100149 (CM)

Faculty	FAST	Module Leader:	Dr Gareth Carr
----------------	------	-----------------------	----------------

Scheduled learning and teaching hours	36 hrs
Guided independent study	164 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered (not including exit awards)	Core	Option
BSc (Hons) Architectural Design Technology	✓	<input type="checkbox"/>
BSc (Hons) Construction Management	✓	<input type="checkbox"/>
HNC Architectural Design Technology	✓	<input type="checkbox"/>
HNC Construction Technology	✓	<input type="checkbox"/>
HNC Civil Engineering	✓	<input type="checkbox"/>

Pre-requisites
None

Office use only

Initial approval: 29/08/2019

Version no: 1

With effect from: 01/09/2019

Date and details of revision: 02/04/20 APSC approved HNC awards

Version no: 4

25/11/20 HNC title change to HNC Construction Technology with effect from

Sep 21

13/4/21 Approved addition of HNC Civil Engineering as part of BSC Civil

Engineering Studies validation

18/06/21 Administrative change to module code

Module Aims

The principal aim of this module is to provide opportunities for students to evaluate the characteristic properties of construction materials and components, their manufacture, handling, storage, use and redundancy.

A wider purpose is to complement the content of contemporaneous and subsequent technology modules in providing detailed analysis of the materials and components used in the design and specification of buildings and associated infrastructure.

Intended Learning Outcomes

Key skills for employability

KS1	Written, oral and media communication skills
KS2	Leadership, team working and networking skills
KS3	Opportunity, creativity and problem solving skills
KS4	Information technology skills and digital literacy
KS5	Information management skills
KS6	Research skills
KS7	Intercultural and sustainability skills
KS8	Career management skills
KS9	Learning to learn (managing personal and professional development, self-management)
KS10	Numeracy

At the end of this module, students will be able to

Key Skills

At the end of this module, students will be able to		Key Skills	
1	Evaluate the characteristic properties and applications of metals, polymers, ceramics, natural and composite materials used in the construction industry.	KS1	KS2
		KS5	KS6
		KS7	
2	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.	KS1	KS5
		KS6	
3	Evaluate the environmental impact of construction materials through their manufacture, use and redundancy.	KS1	KS5
		KS7	
4	Determine by mathematical means, solutions to given structural and environmental design scenarios.	KS1	KS3
		KS10	

Transferable skills and other attributes

- Students will appreciate the implications of the material choices they make;
- Students will understand the wider processes involved in the production and manufacture of goods;
- Students will use various analytical skills to determine suitable outcomes to presented scenarios.

Derogations

None

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; such tasks will accumulate to comprise one overall assessment.

The tasks will collectively reflect the breadth of the syllabus in terms of coverage and will comprise not less than five discrete pieces of coursework. 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 (%)	Duration or Word count (or equivalent if appropriate)
1	1,2,3 & 4	Coursework	100%	4,000 eq.

Learning and Teaching Strategies:

This module will provide opportunities for didactic delivery of technical content in the categorisation, analysis and application of material technologies in the design and execution of buildings and associated infrastructure.

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.

Contemporary case-study projects should be incorporated within the delivery as far as possible, to ensure that students are given opportunities to appreciate material performance in use. Site visits should also form part of the student experience in this regard, should such opportunities present themselves as part of the general delivery of the curriculum.

Module content will be underpinned by selection, measurement and computation to ensure that students become familiar with established methods of structural and environmental mathematical analysis.

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

Human comfort and functional convenience:

- thermodynamics,
- fluid mechanics
- natural and artificial illumination,
- acoustics,
- ventilation.
- passive design solutions

Indicative Bibliography:**Essential reading**

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

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

Indicative Bibliography:**Other indicative reading**

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.