

## Module specification

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**Refer to the module guidance notes for completion of each section of the specification.**

Module code	AUR541
Module title	Civil Engineering Mechanics and Materials
Level	5
Credit value	20
Faculty	FAST
Module Leader	Dr Gareth Carr
HECoS Code	100148
Cost Code	GABE

### Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BSc Civil Engineering Studies	Core

### Pre-requisites

N/A

### Breakdown of module hours

Learning and teaching hours	30 hrs
Placement tutor support	0 hrs
Supervised learning e.g. practical classes, workshops	0 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
<b>Total active learning and teaching hours</b>	<b>30 hrs</b>
Placement / work based learning	0 hrs
Guided independent study	170 hrs
<b>Module duration (total hours)</b>	<b>200 hrs</b>

<b>For office use only</b>	
Initial approval date	13/4/21
With effect from date	01/09/21
Date and details of revision	
Version number	1

## Module aims

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This module aims to allow students to develop analytical and problem-solving skills in relation to structural, soil and fluid mechanics and provide opportunities for students to evaluate the characteristic properties of construction materials and components, their manufacture, handling, storage, use and redundancy.

The module will investigate economic, environmental and life-cycle considerations in the selection, specification and use of construction materials through case-study detailing of civil engineering projects.

Performance requirements of structural materials will be determined through case-study analyses and the application of underpinning mechanical principles in the context of typical civil engineering scenarios.

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

1	Evaluate the characteristic properties and applications of metals, polymers, ceramics, natural and composite materials used in the construction industry.
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 and sustainability
3	Analyse material selection and design strategies in a civil engineering environment.
4	Determine by mathematical means, solutions to given civil engineering design scenarios.

## Assessment

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Indicative Assessment Tasks:

Assessment 1: An illustrated written essay (2,000 words) that investigates inherent material properties with regard to typology, manufacture and use, including associated implications for health, safety, welfare and environmental sustainability.

Assessment 2: An in-class test in the form of an 'open-book' on-line test requiring mechanical solutions to be determined through mathematical analysis. (2000 word equivalent)

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1,2	Written Assignment	50%
2	3,4	In-class test	50%

## Derogations

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N/A

## Learning and Teaching Strategies

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This module will provide opportunities for delivery of technical content in the categorisation, analysis and application of material technologies in the design and execution of civil engineering projects.

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 civil engineering mechanics.

## Indicative Syllabus Outline

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### **Materials Classification:**

Metals, Polymers, Ceramics, Natural materials, and Composites

### **Materials handling, storage and use**

Health, safety and welfare

### **Environmental sustainability:**

Innovative and Smart materials and their adaptive and intelligent behaviours as characterisation properties

Lifecycle assessments.

### **Material testing:**

Laboratory testing methods, interpreting test data.

### **Structural behaviours:**

strength, elasticity, toughness, hardness, creep, fatigue, porosity, brittleness, density, durability, bending, shear, deflection, frameworks, columns

### **Fluid Mechanics**

Hydraulic machines and structures

### **Soil Mechanics**

Embankments, bridges, foundations.

## Indicative Bibliography:

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### **Essential Reads**

Byfield, M. (2018) *Structural Design from First Principles*. Boca Raton. Taylor and Francis.

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

### Other indicative reading

Chadwick, A., Morfett, J. and Borthwick, M. (2021), *Hydraulics in Civil and Environmental Engineering*. 6th ed. Boca Raton: CRC Press.

Soutsos, M. and Domone, P. (eds.) (2018), *Construction Materials: Their Nature and Behaviour*. 5th ed. Boca Raton: CRC Press.

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

Smith, I. (2021) *Smith's Elements of Soil Mechanics*. Oxford. Wiley Blackwell.

BRE Digests

Papers from Cement and Concrete Association

Papers from TRADA

Papers from Steel Construction Institute

Websites:

[Institution of Civil Engineers](#)

[Institute of Structural Engineers](#)

[Institute of Highway Engineers](#)

[CIHT](#)

[IHSTI](#)

Other indicative reading will be made available via the VLE.

## Employability skills – the Glyndwr Graduate

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Each module and programme is designed to cover core Glyndwr Graduate Attributes with the aim that each Graduate will leave Glyndwr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

### Core Attributes

Engaged  
Enterprising  
Creative  
Ethical

### Key Attitudes

Resilience  
Confidence  
Adaptability

### Practical Skillsets

Digital Fluency  
Organisation  
Critical Thinking

