

ES2G8-15 Materials for Net Zero

26/27

Department

School of Engineering

Level

Undergraduate Level 2

Module leader

Justin Russell

Credit value

15

Module duration

10 weeks

Assessment

100% coursework

Study location

University of Warwick main campus, Coventry

Description

Introductory description

Materials for Net Zero

Module aims

The aims of the module are to introduce students to a range of materials (concrete, steel, timber, masonry, asphalt, fibre reinforced polymers and strawbale/rammed earth) in terms of structural behaviour, analysis and design within the context of sustainable construction. Primarily focusing on concrete the module will provide knowledge and understanding on its constituent materials, their properties and those of fresh and hardened concrete. Variables that affect these properties in the short and long term will be identified. Furthermore, this module will focus on the impact of the production and use of materials for civil engineering on global carbon emissions and on how such emissions can be reduced in different ways including reusing/repurposing where possible, contributing to a more sustainable development and reducing waste by saving primary resources.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Introduction to construction materials (with links to durability, sustainability, H&S, construction)

Timber for construction: Properties and applications.

Concrete Constitutions

- Types of Cement: Classification, Manufacture, Properties and Uses
 - Aggregates and admixtures
- Testing of concrete: Fresh, hardened, NDT
- Structural Steel: properties, production and sustainability
- Introduction to Structural Glass, Masonry, Fibre Reinforced Polymers, Asphalt, and strawbale/rammed earth
- Durability of Materials
- End of life, life extension and reusing/repurposing of materials.

Learning outcomes

By the end of the module, students should be able to:

- Appreciate the sustainability and ethical issues and latest regulatory framework surrounding the production, use, management, disposal and reuse of materials to minimise the impact of carbon emissions. [M4(M), M7(M), M8(D)]
- Critically evaluate the structural behaviour of a range of civil engineering materials including concrete, steel, timber, masonry and fibre reinforced polymers.[M4(M), M7(M)]
- Analyse the effects of material and process variables on the mechanical properties and durability of concrete. [M12(M), M13(M)]
- Cast, de-mould, cure and test concrete samples to assess the property and quality of concrete. [C9-M9(D), M12(M), M13(M)]

Indicative reading list

[Reading lists can be found in Talis](#)

Subject specific skills

Knowledge and understanding of the need for a high level of professional and ethical conduct in engineering and the use of technical literature, other information sources including appropriate codes of practice and industry standards Ability to apply relevant practical and laboratory skills

Transferable skills

Communicate (written and oral; to technical and non-technical audiences) and work with others
Appreciation of the global dimensions of engineering, commerce and communication Plan self-learning and improve performance, as the foundation for lifelong learning/CPD

Study

Study time

Type	Required
Lectures	21 sessions of 1 hour (14%)
Seminars	5 sessions of 1 hour (3%)
Practical classes	2 sessions of 3 hours (4%)
Private study	118 hours (79%)
Total	150 hours

Private study description

118 hours of guided independent learning

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time	Eligible for self-certification
Assessment component			
Poster on Lab Activities	30%		Yes (extension)
Poster on Lab Activities (Individual)			

Reassessment component is the same

Assessment component

Written Reflective Report	70%	Yes (extension)
Reflective report on materials for net zero and sustainability (maximum 15 pages length)		

Reassessment component is the same

Feedback on assessment

Poster and reflective report: Individual oral and written comments.

Availability

Post-requisite modules

If you pass this module, you can take:

- ES3D1-15 Concrete Structures

Courses

This module is Core for:

- Year 2 of UESA-H216 BEng Civil Engineering
- Year 2 of UESA-H217 MEng Civil Engineering

This module is Option list A for:

- Year 2 of UESA-H113 BEng Engineering
- Year 2 of UESA-HN15 BEng Engineering Business Management
- Year 2 of UESA-H112 BSc Engineering
- Year 2 of UESA-H114 MEng Engineering