



Module Specification

Design of Structural Elements

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Part 1: Information

Module title: Design of Structural Elements

Module code: UBGMVQ-15-2

Level: Level 5

For implementation from: 2024-25

UWE credit rating: 15

ECTS credit rating: 7.5

College: College of Arts, Technology and Environment

School: CATE School of Engineering

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Mathematics for Civil and Environmental Engineering 2024-25

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module will introduce students to the scheme design of structural elements in reinforced concrete, steel and timber. The design procedures introduced will use standard codes of practice.

This module will require you to create a structural scheme design for a small multi-storey building against an open-ended design brief.

Students will be required to select appropriate materials for a building structure

taking appropriate regard to the structural performance of materials and also to mitigate the contribution the design would make to embodied carbon emissions

The design processes introduced will use standard codes of practice and appropriate industry guidance.

Features: Not applicable

Educational aims: See Learning Outcomes

Outline syllabus: Students will cover:

Principles of permanent, variable and wind loads on structures

Limit and Service State design principles

Assessment of embodied carbon in a structure

Design of a simple bracing system to resist horizontal forces (wind and notional out-of-plane forces)

Design of structural steel beams and columns

Principles of laterally unrestrained steel beam design

Design of reinforced concrete beams, columns and slabs

Principles of RC flanged beam design

Design of timber beams

Part 3: Teaching and learning methods

Teaching and learning methods: The module will support the Assessment Strategy which is progressive through the module, problems - relatable but not identical to the Assessment requirements will be set with appropriate lecture, tutorial and worked example support.

The design process is heavily codified by industry and therefore there is an element of traditional lecturing but the objective is to minimise this through the problem solving element

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Create a design solution for a simplistic structurally stable building

MO2 Select appropriate engineering properties for structural design in a range of materials

MO3 Design basic reinforced concrete elements

MO4 Design basic structural steel elements

MO5 Design basic timber elements

MO6 Produce and submit clear, neat and presentable hand calculations

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 0

Reading list: The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://uwe.rl.talis.com/modules/ubgmvq-15-2.html) via the following link <https://uwe.rl.talis.com/modules/ubgmvq-15-2.html>

Part 4: Assessment

Assessment strategy: The assessment strategy for the module aims to create an experiential based learning environment where students work in design teams of 4-6 students to create a solution to an open-ended real world structural engineering design challenge.

Students will produce a solution in three structural materials. Their solution will follow

real-world industry practice and will require the students to produce a safe solution.

The group work overall mark will be adjusted by peer-review formal Contribution Factors - these factors allow students to assess other members of the group's contribution to the work.

The assessment is a Group work Task – a compiled report – 3000 equivalent word

Each group member will undertake the design of a discrete element of the building structure in the following three materials:

1. Timber beam design
2. Steel column and beam design
3. Reinforced concrete beam and column design

These discrete elements of design will be compiled into a single group report which includes the building structure, along with an embodied carbon assessment of the structure and a Health and Safety risk assessment

The resit strategy for this module is the same as the first sit. It will require students to complete a similar project challenge working in groups. Resit deliverable(s) will be scaled appropriately to group size and task complexity.

Assessment tasks:

Report (First Sit)

Description: Report up to 3000 words

Weighting: 100 %

Final assessment: Yes

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Report (Resit)

Description: Report up to 3000 words

Weighting: 100 %

Final assessment: Yes

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Civil Engineering [Frenchay] BEng (Hons) 2023-24

Civil Engineering [Frenchay] MEng 2023-24

Civil Engineering [Frenchay] MEng 2023-24

Civil and Environmental Engineering [Sep][PT][Frenchay][5yrs] - Not Running BEng (Hons) 2022-23

Civil and Environmental Engineering {Foundation} [Sep][FT][Frenchay][4yrs] - Not Running BEng (Hons) 2022-23

Civil and Environmental Engineering {Foundation} [Sep][SW][Frenchay][5yrs] - Not Running BEng (Hons) 2022-23

Civil Engineering {Apprenticeship-UWE} [Frenchay] BEng (Hons) 2022-23

Civil Engineering [Frenchay] BEng (Hons) 2022-23

Civil Engineering [Frenchay] MEng 2022-23

Civil Engineering {Foundation} [Frenchay] BEng (Hons) 2022-23