Module Specification

Advanced Structural Analysis

Version: 2028-29, v3.0, 07 Apr 2025

Contents

Part 1: Information

Module title: Advanced Structural Analysis

Module code: UBGMM3-15-3

Level: Level 6

For implementation from: 2028-29

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: Geography and Environmental Management

Module type: Module

Pre-requisites: Applications of Mathematics in Civil and Environmental Engineering 2028-29, Integrated Structural Engineering 2025-26

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Pre-requisites: 60 credits at Level 2. To include: UBGIFQ-30-2 Integrated Structural Engineering.

Features: Not applicable

Educational aims: In this module students will develop the necessary knowledge, understanding and skills to analyse and solve problems relating to multi-variable

structural systems of both statically determinate and indeterminate structure types, including plates.

In addition the educational experience may explore, develop, and practise but not formally discretely assess the following:
Appreciation of the importance of validation and verification in interpretation of computer output.
Appreciation of the uncertainties inherent in selection of material properties, loadings and boundary conditions.

Outline syllabus: The syllabus includes:

Matrix methods in structural analysis: matrix algebra, matrix displacement method.
Stiffness method of structural analysis of pin-jointed structures and frames: nodes, elements, stiffness matrix, loads and restraints.
Introduction to finite elements analysis: nodes, elements, meshes, stiffness matrix, boundary conditions and loads.
Practical finite elements techniques: element types, mesh generation, pre-processing, post-processing.
Influence line analysis.
Modelling dynamic systems: single degree of freedom systems, multi degree of freedom systems, interpreting dynamic response.

Part 3: Teaching and learning methods

Teaching and learning methods: This module will be delivered through lecture sessions aimed at establishing the discipline context, key definitions/concepts, and also at establishing a framework for learning. The lectures will be supported by e-learning using computer-based learning exercises. Through these mechanisms learners will also build upon the fundamental concepts covered in the lectures and start applying new understanding through the tasks and activities provided. Regular formative feedback is built into the weekly contact sessions.

Contact Hours:

On average students will receive 4.5 hours of contact time per week. This will be in a range of formats, including lectures, laboratory practicals, field work, tutorial or computer-based sessions, formative feedback sessions and support via e-mail.

The amount of time spent on activities in this module is:

Activity:
Contact time (lectures/feedback/practical sessions): 36 hours
Assimilation and development of knowledge: 84 hours
Coursework preparation: 30 hours
Total study time: 150 hours

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

MO1 Use matrix methods to carry out elastic structural analysis

MO2 Use the stiffness method to carry out elastic structural analysis of trusses and frames

MO3 Use the finite element method to model frames and plates to investigate their response to different load conditions

MO4 Use of single and multi-degree of freedom models to assess the dynamic response of structures

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link
https://uwe.rl.talis.com/modules/ubgmm3-15-3.html

Part 4: Assessment

Assessment strategy: Examination (2 hours).
Learning outcomes 1,2 and 4. Demonstration of learning outcomes 1, 2 and 4 is via solving unseen questions in a written examination. This allows the fundamental processes associated with these learning outcomes to be assessed with the assurance the work is individual. (2 hours)

Report (1000 words). Learning outcome 3. To allow the students to demonstrate learning outcome 3 a coursework task, requiring application of a finite element modelling to an engineering problem is used. The input parameters of the problem can be adjusted allowing for a unique problem for each student. The submission is a concise technical report.

Students work on the above tasks throughout the module and receive regular formative feedback in tutorial sessions.

Resit is the same as the first sit

Assessment tasks:

Report (First Sit)
Description: Report (1,000 words)
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO3

Examination (First Sit)
Description: On campus Exam in controlled conditions (2 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO4

Report (Resit)
Description: Report (1000 words)
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO3

Examination (Resit)
Description: On campus Exam in controlled conditions (2 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Civil Engineering {Foundation} [Frenchay] BEng (Hons) 2024-25

Civil Engineering {Foundation} [Frenchay] - Withdrawn BEng (Hons) 2024-25

Civil Engineering {Foundation} [Frenchay] BEng (Hons) 2025-26

Civil Engineering [Frenchay] BEng (Hons) 2025-26

Civil Engineering [Frenchay] BEng (Hons) 2025-26

Civil Engineering {Apprenticeship-UWE} [Frenchay] BEng (Hons) 2025-26

Civil Engineering [Frenchay] MEng 2025-26

Civil Engineering {Apprenticeship-UWE} [Frenchay] BEng (Hons) 2025-26

Civil Engineering [Frenchay] BEng (Hons) 2026-27

Civil Engineering [Frenchay] MEng 2026-27

Civil Engineering {Foundation} [Frenchay] BEng (Hons) 2025-26

Civil Engineering [Frenchay] BEng (Hons) 2026-27

Civil Engineering [Frenchay] MEng 2026-27