Module Specification

Non Linear Structural Analysis

Version: 2025-26, v4.0, Approved

Contents

Part 1: Information

Module title: Non Linear Structural Analysis

Module code: UBGMUA-15-M

Level: Level 7

For implementation from: 2025-26

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: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: In this module students will examine the analysis of non-linear behaviour of structures.

Features: Not applicable

Educational aims: The educational aim of this module is to develop students' proficiency in geometric and material non-linearities, non-linear dynamic responses,

their practical application in the non-linear analysis of complex structures, and capacity design principles for earthquake engineering.

Outline syllabus: Topics covered are likely to include, but not limited to:

Geometric non-linearity, buckling and geometric stiffness.

Equilibrium paths.

P-delta effects.

Material non-linearity.

Inelastic buckling.

Numerical solutions for non-linear structural analysis.

Non-linear dynamic response of structures.

Capacity design principles for earthquake engineering.

Part 3: Teaching and learning methods

Teaching and learning methods: Scheduled learning on this module includes lectures, practical works and computational practices.

Independent learning includes time engaged with essential and further reading, use of e-learning resources, assessment preparation and assessment completion.

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

MO1 Define geometric and material non linearity for structural systems and implement them to assess structures subject to dynamic loads.

MO2 Calculate the dynamic non-linear response of simple structural systems.

MO3 Use non-linear finite element analysis to seismic design of structure according to capacity design principles.

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/ubgmua-15-m

Part 4: Assessment

Assessment strategy: Task: Report (3000 words excluding appendices and references).

A coursework submission to demonstrate the ability to use numerical modelling to analyse and design a structure under complex loading that includes earthquakes. The report must show ability to present the design outcomes in professional drawings and sketches.

Resit strategy: Students will submit a report which will be a variation agreed with the module leader.

Assessment tasks:

Report (First Sit)
Description: Coursework (3000 words report, excluding appendices and references).
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Report (Resit)
Description: Coursework (3000 words report, excluding appendices and references)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Civil Engineering [Frenchay] MSc 2025-26

Civil Engineering [Frenchay] MSc 2025-26

Civil Engineering {Foundation} [Frenchay] MEng 2021-22

Civil and Environmental Engineering [Sep][PT][Frenchay][7yrs] - Withdrawn MEng 2020-21

Civil Engineering [Sep][PT][Frenchay][7yrs] MEng 2020-21

Civil Engineering [Sep][SW][Frenchay][5yrs] MEng 2021-22

Civil Engineering [Frenchay] MEng 2022-23