

ES2H4-15 Structural Analysis and Design

25/26

Department

School of Engineering

Level

Undergraduate Level 2

Module leader

Reyes Garcia

Credit value

15

Module duration

12 weeks

Assessment

100% exam

Study location

University of Warwick main campus, Coventry

Description

Introductory description

Structural Analysis and Design

Module aims

The aim of the module is to introduce the rationale behind appraisal and design of structures; the main activity of many professional civil engineers. The module will lay the foundations for more advanced and specific structure design modules, since it will review and more deeply explain fundamental structural analysis concepts such as stress and strain, statically determinacy and bending moment/shear forces.

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.

- o Stress and Strain: combination and failure criteria
- o Static determinacy.

- o Statically indeterminate 2D frames.
- o Elastic theory of bending and torsion
- o Linear elastic analysis of statically determinate and indeterminate structures
- o Qualitative structural analysis
- o Introduction to eurocodes: design of primary structural elements
- o Loads patterns
- o Partial factors

Learning outcomes

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

- Demonstrate detailed understanding of stress and strain states in structural elements and it's implications for the design of structural systems. [M1(M), M2(M), M3(M)]
- Extend understanding of how structures behave, and can be analysed and designed to meet specific requirements. [M1(M), M2(M), M3(M), M5(D)]
- Perform qualitative and quantitative structural analysis. [M1(M), M2(M), M12(D)]
- Analyse systems with various degrees of indeterminacy [M1(M), M2(M), M3(M)]
- Demonstrate detailed understanding of the elastic analysis and behaviour of statically indeterminate structures, and to show key implications of redundancy. [M1(M), M2(M), M3(M)]

Indicative reading list

Megson, T. H. G., Structural and Stress Analysis, Elsevier, 3rd Ed., Oxford, 2014.
 Millais, M., Building Structures: from Concepts to Design, 2nd Ed., Routledge, 2005.
 Kassimali, A., Structural Analysis, International 5th Ed., Cengage Learning, 2015.

Subject specific skills

Knowledge and understanding of the need for a high level of professional and ethical conduct in engineering. Knowledge and understanding of risk issues related to structural failure.

Ability to use and interpret structural analysis outcomes for the preliminary design of structural members.

Ability to apply relevant practical skills.

Transferable skills

Numeracy: apply mathematical and computational methods to communicate parameters, model and optimize solutions
 Plan self-learning and improve performance, as the foundation for lifelong learning/CPD

Study

Study time

Type	Required
Lectures	30 sessions of 1 hour (20%)
Supervised practical classes	1 session of 3 hours (2%)
Other activity	10 hours (7%)
Private study	107 hours (71%)
Total	150 hours

Private study description

114 hours of guided independent learning

Other activity description

2hrs Revision
8hrs Example Classes

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group B

	Weighting	Study time	Eligible for self-certification
Online examination	100%		No
Online examination			
~Platforms - QMP			

- Online examination: No Answerbook required

Feedback on assessment

- Feedback in example classes.
- Model solutions to questions for exam preparation.
- Cohort level feedback.

Availability

Pre-requisites

To take this module, you must have passed:

- All of
 - [ES196-15 Engineering 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 Optional for:

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