

# ES3E2-15 Civil Engineering Design II

**23/24**

**Department**

School of Engineering

**Level**

Undergraduate Level 3

**Module leader**

Merih Kucukler

**Credit value**

15

**Module duration**

12 weeks

**Assessment**

100% coursework

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

ES3E2-15 Civil Engineering Design 2

[Module web page](#)

### Module aims

The principal aims are to introduce practice and reporting on civil engineering structural analysis by application of software packages and develop ability and skills to be able to apply design procedures informed by structural Eurocodes to design building and other structures and solutions of geotechnical and water engineering design problems using numerical computing tools.

### 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.

Analysis software (SAP 2000, PLAXIS2D)

Numerical modelling methodologies as applied to civil engineering design problems. Lecture content will not be mathematical; the focus shall be on how to model and correctly interpret results to assist in the design decision making process. Lectures will include:

- Introduction to software, scope and limitations (SAP 2000, PLAXIS2D)
- Types of analysis from linear elastic small displacement to material and geometrical non-linearities, and from static to instability and dynamics
- 2D vs. 3D
- Solid, shell and column-beam elements
- Boundary conditions – loading, displacements and contact modelling
- Mesh design and specification
- Constitutive material models
- Validation and numerical error checking. Interpretation and presentation of numerical results

Labs will introduce students on how to use the three software packages of SAP 2000, PLAXIS 2D, and for students to practise working on introductory examples to be completed during a session.

## **Learning outcomes**

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

- Model and analyse civil engineering structures for the purpose of design.
- Distinguish the scope and limitations of different type of analyses and how to interpret numerical results for assisting the design decision making process.
- Examine and apply design procedures for designing buildings and other structures.
- Produce and present a professional technical report outlining the applied numerical modelling methodology and presenting output results of numerical analysis.
- Produce and present a professional technical report including a set of design calculations for a design of building structure

## **Subject specific skills**

1. Ability to conceive, make and realise a component, product, system or process
2. Ability to develop economically viable and ethically sound sustainable solutions
3. Ability to be pragmatic, taking a systematic approach and the logical and practical steps necessary for, often complex, concepts to become reality
4. Ability to seek to achieve sustainable solutions to problems and have strategies for being creative and innovative
5. Ability to be risk, cost and value-conscious, and aware of their ethical, social, cultural, environmental, health and safety, and wider professional engineering responsibilities

## **Transferable skills**

1. Numeracy: apply mathematical and computational methods to communicate parameters, model and optimize solutions
2. Apply problem solving skills, information retrieval, and the effective use of general IT facilities
3. Communicate (written and oral; to technical and non-technical audiences) and work with others
4. Exercise initiative and personal responsibility, including time management, which may be as a team member or leader
5. Awareness of the nature of business and enterprise in the creation of economic and social

value

6. Overcome difficulties by employing skills, knowledge and understanding in a flexible manner
  7. Ability to formulate and operate within appropriate codes of conduct, when faced with an ethical issue
  8. Appreciation of the global dimensions of engineering, commerce and communication
  9. Be professional in their outlook, be capable of team working, be effective communicators, and be able to exercise responsibility and sound management approaches.
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## Study

### Study time

Type	Required
Lectures	9 sessions of 1 hour (6%)
Seminars	3 sessions of 1 hour (2%)
Practical classes	6 sessions of 3 hours (12%)
Private study	120 hours (80%)
Total	150 hours

### Private study description

120 hours of guided independent learning

### Costs

No further costs have been identified for this module.

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## Assessment

You must pass all assessment components to pass the module.

### Assessment group A3

	Weighting	Study time
Design and Analysis report	100%	
Design and analysis of a building structure (individual; no longer than 20 pages).		

### Feedback on assessment

Individual and cohort level feedback on the assignments (two formative online computer-based

tests (Moodle quizzes and/or group presentation) and one technical report). Formative feedback on using software will be delivered during the laboratories and seminar programme. Seminars will involve invited external speakers on the use of computational methods for design problems in civil and environmental engineering.

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## Availability

### Post-requisite modules

If you pass this module, you can take:

- ES4F4-15 Advanced Structural Engineering
- ES4E3-15 Structural Dynamics and Vibration

## Courses

This module is Core for:

- Year 3 of UESA-H216 BEng Civil Engineering
- Year 4 of UESA-H215 BEng Civil Engineering with Intercalated Year
- Year 3 of UESA-H217 MEng Civil Engineering
- Year 4 of UESA-H218 MEng Civil Engineering with Intercalated Year

This module is Core optional for:

- Year 3 of UESA-H218 MEng Civil Engineering with Intercalated Year
- Year 3 of UESA-H115 MEng Engineering with Intercalated Year
- Year 3 of UESA-H11L Undergraduate Engineering (with Intercalated Year)

This module is Optional for:

- Year 3 of UESA-H113 BEng Engineering
- Year 3 of UESA-H114 MEng Engineering
- Year 4 of UESA-H115 MEng Engineering with Intercalated Year
- UESA-H11L Undergraduate Engineering (with Intercalated Year)
  - Year 3 of H11L Engineering (with Intercalated Year)
  - Year 4 of H11L Engineering (with Intercalated Year)

This module is Option list A for:

- Year 4 of UESA-H111 BEng Engineering with Intercalated Year
- UESA-H112 BSc Engineering
  - Year 3 of H112 Engineering
  - Year 3 of H112 Engineering