

# ES2F4-15 Structural Analysis

**20/21**

**Department**

School of Engineering

**Level**

Undergraduate Level 2

**Module leader**

Justin Russell

**Credit value**

15

**Module duration**

24 weeks

**Assessment**

30% coursework, 70% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

ES2F4-15 Structural Analysis

[Module web page](#)

### 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.

Structures:

- 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

## Learning outcomes

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

- Demonstrate detailed understanding of stress and strain states in structural elements.
- Extend understanding of how structures behave, and can be analysed.
- Perform qualitative and quantitative structural analysis.
- Analyse systems with more than one degrees of freedom.
- Explain the elastic analysis of statically indeterminate structures, and to show key implications of redundancy.

## Indicative reading list

Kassimali, A., Structural Analysis, International 5th Ed., Cengage Learning, 2015.  
 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.

## 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 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

Communicate (written and oral; to technical and non-technical audiences) and work with others

## Study

### Study time

Type	Required
Lectures	16 sessions of 1 hour (11%)
Total	150 hours

Type	Required
Practical classes	3 sessions of 1 hour (2%)
Other activity	17 hours (11%)
Private study	114 hours (76%)
Total	150 hours

## Private study description

114 hours of guided independent learning (including VLE use and support from Employer)

## Other activity description

5x1h examples classes  
 2x1h revision lectures  
 10x1h of Webinars

## Costs

No further costs have been identified for this module.

## Assessment

You must pass all assessment components to pass the module.

### Assessment group D1

	Weighting	Study time	Eligible for self-certification
Assessment component			
Indeterminate Structures Report	30%		No
Indeterminate structure calculations and discussion (6 pages length)			

Reassessment component is the same

Assessment component		
Online Examination	70%	No
QMP test - Part Multiple Choice Questions, part longer calculation style questions.		

## **Weighting   Study time   Eligible for self-certification**

- Online examination: No Answerbook required
- Engineering Data Book 8th Edition
- Students may use a calculator

Reassessment component is the same

### **Feedback on assessment**

- Feedback in example classes.
- Model solutions to questions for exam preparation.
- Laboratory report: provide individual written comments.
- Written examination: Cohort level feedback.

[Past exam papers for ES2F4](#)

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## **Availability**

### **Courses**

This module is Core for:

- Year 2 of DESA-H221 Undergraduate Civil and Infrastructure Engineering (Non-integrated Degree Apprenticeship)