

# ES3G0-15 Concrete Structures

**22/23**

**Department**

School of Engineering

**Level**

Undergraduate Level 2

**Module leader**

Georgia Kremmyda

**Credit value**

15

**Module duration**

24 weeks

**Assessment**

100% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

ES3G0-15 - Concrete Structures

[Module web page](#)

### Module aims

The analysis and design of concrete structures is a main stream activity of professional civil engineers. The subject, therefore, forms a principal part of civil engineering courses and is essential for professional accreditation. Structural engineering is a substantial economic activity; many concrete structures are of such a scale and complexity that they require extensive management for their procurement, maintenance and later reuse, or demolition.

### 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.

Design process; structural form and action; choice of material; uncertainties in design: partial safety

factors. Limit States.

Design of reinforced concrete beams to ULS: design assumptions; resistance to bending; stress and

strain blocks; design formulae for singly and doubly reinforced rectangular sections; examples.

Design of T- and L-beam sections in bending; examples

Design for shear; truss analogy; examples

Serviceability limit state (SLS): elastic theory; deflections, cracking; bond and anchorage; calculation

and control of crack widths; examples

Design of reinforced concrete columns; axially loaded short columns; eccentric load; principles of column interaction diagrams; slender columns; biaxial bending; examples.

Reinforced concrete slabs; one-way and two-way spanning elements, flat slabs. Shear in slabs: punching shear; examples

Torsion in reinforced concrete; prismatic members; St.Venant torsional constant; Poisson's equation; membrane analogy; sand heap analogy; design of reinforcement; examples.

## Learning outcomes

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

- Understand the background theory of concrete structures design, knowledge of principles of Limit State Design, and margins of uncertainty associated with loading, material properties and type of structural action.
- Analyse the response of main structural elements to a variety of load and boundary conditions and determine the size of structural elements.
- Critically examine the results of structural analysis and design of concrete sections
- Compare the relationship between design, durability and cost, ease of construction.
- Critique what is safe design and execution of concrete structures.

## Indicative reading list

Millais, M., 'Building Structures: from Concepts to Design,' 2nd Ed., Taylor & Francis, 2005.

Arya, C., Design of Structural elements, Spon Press, 2009.

Mosley, W.H., Hulse, R., Bungey, J.H. Reinforced Concrete Design: to Eurocode 2, 7th ed. Palgrave

Macmillan, 2012

## Subject specific skills

Design, make and break activities, lectures, examples classes, and webinars.

## Transferable skills

No transferable skills defined for this module.

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## Study

### Study time

Type	Required
Lectures	20 sessions of 1 hour (13%)
Seminars	7 sessions of 1 hour (5%)
Practical classes	3 sessions of 1 hour (2%)
Other activity	12 hours (8%)
Private study	108 hours (72%)
Total	150 hours

### Private study description

108 hours of private study

### Other activity description

Revision classes - 2 hours

Student-led learning comprising of:10 hours of webinars

## Costs

No further costs have been identified for this module.

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## Assessment

You do not need to pass all assessment components to pass the module.

### Assessment group B

	Weighting	Study time	Eligible for self-certification
Assessment component			
Online Examination	100%		No
QMP			
~Platforms - AEP,QMP			

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

Reassessment component is the same

## **Feedback on assessment**

Advice and feedback are available on the lecture material and examination questions, via online web-forum based in module support Moodle pages

[Past exam papers for ES3G0](#)

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## **Availability**

### **Pre-requisites**

Construction Materials  
Structural Analysis.

## **Courses**

This module is Core for:

- Year 3 of DESA-H221 Undergraduate Civil and Infrastructure Engineering (Non-integrated Degree Apprenticeship)