

ES3G0-15 Concrete Structures

21/22

Department

School of Engineering

Level

Undergraduate Level 3

Module leader

Georgia Kremmyda

Credit value

15

Module duration

24 weeks

Assessment

30% coursework, 70% exam

Study location

University of Warwick main campus, Coventry

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.

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.

Assessment

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

Assessment group D1

	Weighting	Study time
Case study	30%	
Case study based assignment (6 pages length)		
Online Examination	70%	
QMP		
~Platforms - AEP,QMP		

Weighting

Study time

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

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](#)

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)