

CE 207 STRUCTURAL DESIGN

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Lecturers: Professor N.R. Buenfeld (NRB)
Dr. L. Gardner (LG)

Structure: This module is split into two parts, (A) Structural Steel Design and (B)

Links: See below

(A) STRUCTURAL CONCRETE DESIGN – (Professor N.R. Buenfeld)

Module Structure

14 hours of lectures and tutorials in the Autumn term. 4 tutorials are undertaken during the lecture sessions.

Aims

To introduce students to the design of concrete structures such that they are able to design a simple reinforced concrete (RC) structure comprising slab, beams and columns.

Links with other course modules

This module utilises theory introduced in the first year Structural Mechanics module (CE104). The design of concrete structures is taken further in the third year Concrete Structures and Design module (CE306) and in some of the Group Design Projects (CE315).

SYLLABUS

- Introduction to structural design and reinforced concrete
- Behaviour, assessment and analysis of rectangular RC sections in flexure
- Extension of the above to flanged sections
- Behaviour and design of RC elements in shear
- Interaction diagrams for column design and design of short columns
- Bond, anchorage and lapping of reinforcement
- Introduction to RC detailing

Coursework and Submission Dates

There is no coursework included in this module, but the 2-day timetabled Design Project (CE209) puts into practice everything learnt on the module.

Recommended Textbooks/Reading

The lecturer's handouts cover all of the material required.

Learning Outcomes

By the end of this module students are expected to be able to design RC beams/slabs and columns (assessed by design project - CE209).

(B) STRUCTURAL STEEL DESIGN – (Dr. L. Gardner)

Introduction

The module covers the fundamentals of structural steelwork design. Following the introductory lectures, design of steel members and connections to BS 5950 Part 1 is treated with an introduction to the provisions of Eurocode 3.

Assessment

Tutorial sheets will be issued, and the module will culminate in a major design project over two days (see CE 209).

SYLLABUS

- Introduction: design and applications of steel structures, basis of design, design philosophies, loads and load distribution. (2 Lectures)
- Laterally-restrained beams: bending, shear and deflection, local buckling and cross-section classification. (2 Lectures)
- Axially-loaded members: tension members, design for axial tension, end eccentricities, compression members, design for axial compression, column design. (2 Lectures)
- Bolted connections: bolt types, geometric considerations, bolt design, analysis of bolt groups. (2 Lectures)
- Welded connections: weld types, geometric considerations, weld design, analysis of weld groups. (2 Lectures)
- Building design: introduction, loading and layout, industrial buildings, analysis of trusses, design of members, connection design, details and drawings. (4 Lectures)

Recommended Textbooks/Reading

1. Lecturer's handouts
2. Steel Designers' Manual, The Steel Construction Institute, *Blackwell, Oxford*
3. NETHERCOT D.A., VAN NOSTRAND REINHOLD, Limit State Design of Structural Steelwork, *UK*
4. MORRIS L. J. & PLUM D. R Structural Steelwork design to BS 5950, *Longmans, Harlow UK*

Learning Outcomes

- Understand the behaviour and undertake the design of structural steel members to resist bending, shear, tension and compression, and apply the relevant codes of practice.
- Understand the behaviour and undertake the design of connections between elements in simple configurations, and apply the relevant codes of practice.
- Appreciate the process of arranging steel members in a structurally efficient way to transfer design loads.
- Demonstrate the ability to analyse the behaviour of structural steel members at both serviceability and ultimate limit states.
- Produce design calculations and drawings in appropriate professional formats.