

CE 209 DESIGN PROJECTS

Co-ordinators: see Lecturers

Lecturers: Professor C Swan (Room 328), c.swan@imperial.ac.uk
Dr. L. Gardner (Room 437), leroy.gardner@ic.ac.uk
Professor N.R. Buenfeld (Room 214), n.buenfeld@ic.ac.uk

Structure: This module is split into the following parts: design of a tension leg platform, structural steel design and structural concrete design.

Links: see below

1. DESIGN OF A TENSION LEG PLATFORM

Lecturer: Professor C Swan (CS) and other Fluid Mechanics Section staff.

Module Structure

A two-day project to calculate the design loads acting on a Tension Leg Platform (TLP) and its production riser (Week 18).

Aims

- To consider several important steps in the outline design of a TLP used for oil production in a deep-water location.
- To apply the linear wave theory developed in CE202 to calculate the fluid loads acting on both the TLP and its production riser.
- To develop skills in teamworking.
- To provide experience of organising and presenting ideas in the form of a joint report.
- To develop investigative skills appropriate to a number of wider design issues.

Links to other modules

The design calculations build upon the work undertaken in CE103, CE104 and CE105 and involve the application of methods, tools, and design formula investigated in CE202 during the autumn term. It also gives insight into the work undertaken in future years, namely CE314 and CE406.

SYLLABUS

Basic principles from CE202 with additional design advice given throughout the duration of the project.

Coursework

A joint report from each group. This will include both a significant collaborative element and individual contributions.

Assessment

The total mark awarded will be based upon the sum of the marks awarded for the collaborative effort (distributed uniformly across the group) and an individual mark for work undertaken alone.

Recommended Textbooks/Reading

1. Lecture notes for CE202 Fluid Mechanics
2. Recommended texts from CE202

Learning Outcomes

By the end of the project students should:

- Understand the complexity of a real design problem.
- Appreciate the limitations of simplified design procedures.
- Understand how to apply the theoretical wave model and loading formula developed in CE202.
- Realise that common sense is an essential feature of any design process
- Have exercised critical faculties in assessing the merits of one design over another.

2. STRUCTURAL STEEL DESIGN

Lecturer: Dr. L. Gardner (LG)

Structure: A two-day design project on design of an industrial building including drawing and fabrication details.

Aims

To apply the material learnt in the lectured module on Structural Steel Design (see CE207 part on Structural Steel Design).

Links with Other Course Modules

To CE107 (Materials), CE110 (Drawing), CE113 (Creative Design), CE104 and CE206 (Structural Mechanics), CE315 (Group Design).

SYLLABUS

See CE207

Coursework

Two-day design project

Recommended Textbooks/Readings

See CE207 part on Steel Design

Learning Outcome

- By the end of this project students should be able to design a simple steel structure (also see CE207 part on Steel Design).

3. STRUCTURAL CONCRETE DESIGN

Lecturer Prof. N.R. Buenfeld, (NRB)

Structure

A 2-day design project on the design of a simple reinforced concrete (RC) structure.

Aims

To put into practice the material learnt in the lectured module on Structural Concrete Design (CE207). To demonstrate that designing elements is only one of many activities involved in designing concrete structures.

Links with Other Course Modules

The early part of this project involves taking a broad approach to design, including assessing clients requirements and considering different structural arrangements and construction methods, as fostered in the first year Creative Design module (CE113). Bending moment and shear force diagrams are determined, as learnt in the Structural Mechanics module (CE104) and an understanding of the properties of concrete, as taught in the first year Materials module (CE107) is helpful. Designs are drawn and sketched using the skills and conventions learnt in the Drawing and Sketching module (CE110). Third year modules (Concrete Structures and Design (CE306) and Group Design Project (CE315)) allow the design of concrete structures to be taken to a more advanced level.

SYLLABUS

See CE207.

Coursework

This module comprises a single piece of project work as described above.

Assessment

Project submissions are collected at the end of the 2nd day of the project. They are assessed and returned to students during a feedback session early in the Spring Term.

Recommended Textbooks/Reading

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

Learning Outcomes

- By the end of this project students should be able to design a simple RC structure.