

## CE401 STEEL STRUCTURES AND DESIGN

**Co-ordinator:** Dr. L.A Louca (Room 438), [l.a.louca@imperial.ac.uk](mailto:l.a.louca@imperial.ac.uk)

**Status:** Elective

<b>Lecturers:</b>	Professor T.A. Wyatt (TAW) (Room 602) Dr. L.A. Louca (LAL)
<b>Structure:</b>	53 hours of lectures, tutorial and associated Coursework, 7 hours project work
<b>Links:</b>	CE301 : Core subject

### Aims

This module aims to teach both the fundamentals of design of elements of structural steelwork and the conceptual design of a range of types of steel structure. This will include approximate and quick design methods and guidance on initial sizing.

### SYLLABUS

The following topics are provisionally intended for inclusion in the module.

1. Introduction to Steel Construction and Design (2 hours)
2. Revision of basic concepts applied to design of restrained beams and Columns
3. including background to Code of Practice (BS 5950) (5 hours)
4. Design of laterally unrestrained beams to BS 5950. (5 hours)
5. Beam-column design to BS 5950 and simple building frame design. (8 hours)
6. Structural form and selection – lattice towers, trusses, bridges, portal frames, tall buildings and floors (2 hours)
7. Design of trusses and tied arches (3 hours)
8. Design of lattice towers (5 hours)
9. Design of single-span portal frames (8 hours)
10. Design of composite beams (5 hours)
11. Design of plate girders (5 hours)
12. Design of bridges (5 hours)

### Coursework and submission dates

Three design projects are set, one in Autumn Term and two in the Spring Term.

The first requires the preliminary design of a 6 storey office building using minimal application of codes of practice to size members and layout of the building.  
*Office Building (week 8)*

The second requires the design of a grandstand roof/stadium structure to cover a seated area of a sports ground. The project requires the student to idealise the structure for simple hand analysis and to investigate the best configuration to cover the desired span. Due to the nature of the structure wind loading considerations need to be accounted for in the design. *Grandstand Roof (week 20)*

The third requires the sizing of the main structural members of an industrial portal frame structure using plastic design methods and to investigate the effects of their underlying assumptions on the design. *Portal Frame (week 24)*

**Assessment**

One 3 hour examination in the summer term (60%) and coursework assignments (40%).

The examination contains two separate sections, one question must be answered from Section A and two questions from Section B.

**Recommended Textbooks/Reading**

Extracts from British Standards for students of Structural Engineering, *B.S.1 (Essential purchase)*.

MARTIN AND PURKISS, Structural Design of Steelwork to BS 5950, *Edward Arnold, 1992.*

Structural steelwork design to BS 5950, Morris and Plum, Longman, 1998.

The behaviour and design of steel structures to BS 5950, D.A. Nethercot, Spon, 2001.

**Learning Outcomes**

At the end of the module the student should be able to:

- Understand the background to the limits given in BS5950 for the design of the main steelwork elements
- Apply the Code to the design of a wide range of structures.
- Use simplified modes of real structures to determine approximate member sizes of a number of common structural forms