

# **Engineering Tripos Part IIB, 4D10: Structural Steelwork, 2021-22**

## **Module Leader**

[Dr J Becque](#) [1]

## **Lecturers**

Dr S Selvakumaran, Dr J Becque

## **Lab Leader**

Dr J Becque

## **Timing and Structure**

Michaelmas Term. 12 lectures + 2 examples classes + coursework. Assessment: 75% exam/25% coursework. This course will be delivered in-person in 2021-22.

## **Prerequisites**

3D4 assumed, 3D3 useful.

## **Aims**

The aims of the course are to:

- bridge some of the gap between structural analysis, as taught in Parts I and IIA, and practical steel design as presented in design codes; however, although it will refer to the appropriate codes, it will not be an "introduction to the code" module.

## **Objectives**

As specific objectives, by the end of the course students should be able to:

- show an understanding of the background to the major codes of practice for structural steel work.
- apply these codes thoughtfully to the design of real steel structures.
- differentiate between the functions of compact, rolled sections and more slender, thin-walled plate-girder members.
- appreciate the vital function of joints and connectors, and understand the limitation of various jointing techniques.
- understand the performance of civil engineering composite structures.

## **Content**

A separate handout with numerous worked examples covers each of the sections below.

## **Preliminary Details (1L)**

- Steel properties and grading;
- Types of section;
- Principles of Limit-States design;
- Partial safety factors;
- British and European Standards.

### Compact Member Design (6L)

- Flexural buckling of columns (axial loads) and effect of elastic restraints;
- Lateral torsional buckling of beams (transverse loads);
- Beam-column buckling using Interaction Equations.

### Thin-walled Member Design (3L)

- Local buckling modes for a plate due to compression, bending and shearing;
- Definitions of compactness and effective sections for beams and columns;
- Panel performances in stiffened sections.

### Joints and Composite Construction (3L)

- Connections for simple and continuous construction;
- Bolted joints using bearing bolts and friction bolts;
- Welded joints using butt and fillet welds;
- Fatigue life of welds;
- Classification of weld joints;
- Detailing of joints;
- Composite section types;
- Composite section design using headed shear connectors;
- Composite floor slabs using profiled decking.

## Coursework

Design of a simple steel structure, using methods from the course. Formal report for assessment.

Coursework	Format	Due date & marks
<b>Design project</b>  Complete design of a steel framed building, including columns, wind bracing, composite beams, roof trusses and connections.	Individual project  Report  Anonymously marked	Due on final day of course  25% of course mark
<u>Learning objectives:</u>  <ul style="list-style-type: none"><li>• Apply the knowledge gathered in the lectures to a realistic design scenario.</li><li>• Make well-motivated conceptual design decisions.</li><li>• Carry out a detailed design including all necessary design checks.</li></ul>		

## Booklists

Please refer to the Booklist for Part IIB Courses for references to this module, this can be found on the associated Moodle course.

## Examination Guidelines

Please refer to [Form & conduct of the examinations](#) [2].

Last modified: 20/09/2021 20:31

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### Links

[1] <mailto:jurgen.becque@eng.cam.ac.uk>

[2] <https://teaching24-25.eng.cam.ac.uk/content/form-conduct-examinations>