Engineering Tripos Part IIB, 4D8: Pre-stressed Concrete (shared with IIA), 2017-18

Module Leader
Prof T Ibell

Lecturer
Prof T Ibell

Lab Leader
Prof T Ibell

Timing and Structure
Lent term. 16 lectures (including examples classes) + coursework. Assessment: 100% exam

Prerequisites
3D3 and 3D4 useful

Aims
The aims of the course are to:

- understand the analysis and design of prestressed concrete.
- understand various issues associated with prestressed concrete which are core to its success.

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

- understand the principles of prestressed concrete, and appreciate why it has important structural advantages.
- be able to design and analyse statically determinate, composite and statically indeterminate prestressed concrete structures.

Content

Basic Principles (7L)
Introduction, prestress applications, definitions, section design, Magnel diagram, statically determinate structures, limits on stress, practical considerations, current problems, new horizons, new materials.

Indeterminate beams (3L)
Secondary moments, line of pressure, concordant profiles, design approaches for continuous beams.

**Strength Calculations (3L)**
Ultimate strength (simple modifications to RC theory), shear failure and prevention.

**Losses and the long term (3L)**
Loss of prestress, creep, composite construction.

**Coursework**
This will consist of carrying out a test on a prestressed concrete beam, plus a write-up.

**Prestressed Concrete Laboratory**

**Learning objectives:**
- To understand how concrete can be prestressed
- To see the effect which such prestress has on a beam
- To observe failure of a prestressed concrete beam

**Practical information:**
- Sessions will take place in the Structures Laboratory on dates yet to be determined.
- This activity doesn't involve preliminary work.

**Booklists**
Please see the [Booklist for Group D Courses](http://teaching.eng.cam.ac.uk) [2] for references for this module.

**Examination Guidelines**
Please refer to [Form & conduct of the examinations](http://teaching.eng.cam.ac.uk) [3].

**UK-SPEC**
The [UK Standard for Professional Engineering Competence (UK-SPEC)](http://teaching.eng.cam.ac.uk) [4] describes the requirements that have to be met in order to become a Chartered Engineer, and gives examples of ways of doing this.

UK-SPEC is published by the Engineering Council on behalf of the UK engineering profession. The standard has been developed, and is regularly updated, by panels representing professional engineering institutions, employers and engineering educators. Of particular relevance here is the [Accreditation of Higher Education Programmes' (AHEP) document](http://teaching.eng.cam.ac.uk) [5] which sets out the standard for degree accreditation.

The [Output Standards Matrices](http://teaching.eng.cam.ac.uk) [6] indicate where each of the Output Criteria as specified in the AHEP 3rd edition document is addressed within the Engineering and Manufacturing Engineering Triposes.