School of Civil and Environmental Engineering

CVEN9806 Prestressed Concrete Design – Session 1, 2014

COURSE DETAILS

Units of Credit: 6
Contact hours: 3 hours per week
Class: Wednesday 6.00pm - 9.00pm  CE101
Course Convenor: Associate Professor Mario M. Attard
email: m.attard@unsw.edu.au  Room: 514 ph: 9385 5075

INFORMATION ABOUT THE COURSE

Syllabus:

1. Introduction to Prestressed Concrete:

2. Design for Serviceability:
   2.1 Stress limits. Serviceability criteria. Determination of prestress and eccentricity. Cable profiles.
   2.2 Cracked section analysis. Effect of cracking at service loads. Short-term cracked section analysis.
   2.3 Short-term deflection calculations. Crack control. Losses of prestress.

3. Design for Strength:
   3.2 Transfer Strength.
   3.3 Design For Shear. Effect of Prestress on Shear. Flexure-Shear And Web-Shear Cracking. Stirrup Design.

4. Statically Indeterminate Beams:
   4.1 Introduction to Continuous Prestressed Concrete Beams; Secondary Moments; Method of Equivalent Loads; Load Balancing;
   4.2 Practical Tendon Profiles; Moment Redistribution; Secondary Effects at Ultimate;

6. End Block Design:
   5.1 Bursting and Spalling Forces in Post-Tensioned End-Blocks; Single and Multiple Anchorages; Design and Analysis; Transmission Lengths in Pretensioned Members;
UNIVERSITY HANDBOOK DESCRIPTION


Refer to Online Handbook available at:

OBJECTIVES

Establish the philosophies and principles of the structural design of prestressed concrete. Present techniques for proportioning and detailing simple structural members in prestressed concrete. Develop an insight into the behaviour of prestressed concrete structural members both at service loads and overloads.

TEACHING STRATEGIES

<table>
<thead>
<tr>
<th>Private Study</th>
<th>Lectures</th>
<th>Tutorials</th>
<th>Assessments (multiple choice, tests, examinations, assignments, hand-in tutorials, laboratory reports etc.)</th>
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</thead>
<tbody>
<tr>
<td>• Review lecture material and textbook</td>
<td>• Find out what you must learn</td>
<td>• Be guided by tutors</td>
<td>• Demonstrate your knowledge and skills</td>
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<tr>
<td>• Do set problems and assignments</td>
<td>• See methods that are not in the references</td>
<td>• Practice solving set problems</td>
<td>• Demonstrate higher understanding and problem solving</td>
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<td>• Reflect on class problems and assignments</td>
<td>• Follow worked examples</td>
<td>• Ask questions</td>
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EXPECTED LEARNING OUTCOMES

At the end of this course, if a student has attended the lectures reflective on the presented material and participated in the tutorials, it is expected that they will be able to proportion the dimensions of simple structural prestressed concrete members such as simply supported beams, continuous beams, one-way slabs and two-way slabs. They should be able to proportion reinforcement for flexural and shear strength and be able to check deflections and detail to control cracking.

For each hour of contact it is expected that a student will put in at least 1.5 hours of private study.

ASSESSMENT

The final grade for this course will normally be based on the sum of the scores from each of the assessment tasks. There will be a final examination after week 12. There will also be one major assignment (worth 25%) and hand-in tutorials (worth 15%). The final examination is worth 60% of the Final Mark if class work is included otherwise the final examination is worth 100% if class work is not included. The class work is worth 40% of the Final Mark if included. **An average mark of at least 40% in the final examination is required before the class work is included in the final mark.**

Students who perform poorly in the tutorials are recommended to discuss progress with the lecturer during the semester. There will be hand-in problems. **Note:** The lecturer reserves the right to adjust the final scores by scaling if agreed to by the Head of School.
COURSE PROGRAM
A table of lecture and tutorial or practical class topics for each week, indicating the name of lecturer involved (where multiple lecturers teaching in course), online activities, such as discussion forums, and relevant readings from textbook and other reference material identified for the course.

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<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Assessment</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction to Prestressed Concrete:</td>
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<td>2</td>
<td>Design for Serviceability</td>
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<tr>
<td>3</td>
<td>Design for Serviceability</td>
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<td>4</td>
<td>Statically Indeterminate Beams: Load Balancing</td>
<td>Tutorial Problem 1</td>
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<td>5</td>
<td>Workshop – Design using Rapt</td>
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<td>6</td>
<td>Statically Indeterminate Beams: Practical Tendon Profiles</td>
<td>Tutorial Problem 2</td>
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<td>7</td>
<td>No Classes</td>
<td></td>
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<td>8</td>
<td>Design of Post-Tensioned Slabs</td>
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<td>9</td>
<td>Design for Flexural Strength: Limit State Design</td>
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<td>10</td>
<td>Design for Shear Strength:</td>
<td>Tutorial Problem 3</td>
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<tr>
<td>11</td>
<td>Design for Transfer Strength: Limit State Design</td>
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<tr>
<td>12</td>
<td>End Block Design:</td>
<td>Final Submission of Major Assignment</td>
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<td>13</td>
<td>Revision</td>
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RESOURCES
Reference

Additional Readings
- Standards Australia, *Australian Standard for Concrete Structures, AS3600*
- Warner, Rangan, Hall and Faulkes, *Concrete Structures*.

Software:
MAPLE & RAPT available on the school PC labs.
Moodle

Additional materials provided in Blackboard http://telt.unsw.edu.au/

Websites

- http://www.vsl-intrafor.com, VSL Prestressing (Aust.) Pty Ltd

PLAGIARISM

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.

Plagiarism is the use of another person’s work or ideas as if they were your own. When it is necessary or desirable to use other people’s material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

http://www.lc.unsw.edu.au/onlib/plag.html

COURSE EVALUATION AND DEVELOPMENT

The School of Civil and Environmental Engineering evaluates each course each time it is run through (i) the UNSW Course and Teaching Evaluation and Improvement (CATEI) process, and (ii) Focus Group Meetings.

As part of the CATEI process, your student evaluations on various aspects of the course are graded; the Course Coordinator prepares a summary report for the Head of School. Any problem areas are identified for remedial action, and ideas for making improvements to the course are noted for action the next time that the course is run.

Focus Group Meetings are conducted by the four Year Managers (academic staff) for any students who wish to attend, in each year of the civil and/or environmental engineering programs. Student comments on each course are collected and disseminated to the Lecturers concerned, noting any points which can help improve the course.

COMMON SCHOOL INFORMATION

Common School information may be found at:

http://www.civeng.unsw.edu.au/info-about/our-school/policies-procedures-guidelines/academic-advice

The Common School Information site has information on the following:

1. Dates to Note - important dates relating to enrolling and disenrolling, and a University website (via MyUNSW) with a calendar of other important UNSW dates (semester dates, recess weeks, stuvac dates and exam periods).

   Refer to MyUNSW for Important Dates available at:

   https://my.unsw.edu.au/student/resources/KeyDates.html

2. School Contacts
   i. for enrolment or timetabled difficulties,
   ii. referral chain of contacts for course difficulties:
      - Course Coordinator/Lecturer → Year Coordinators → Grievance Officer
   iii. Advanced Standing, and
   iv. Mentoring.

3. Course Requirements
   i. attendance at lectures, tutorials and laboratory classes,
   ii. participation in tutorials, and
   iii. completion of assessment work.

4. Notes on Assessment
   i. plagiarism (with link to UNSW Learning Centre web site on plagiarism),
   ii. keep a copy of written submissions,
   iii. submitting assignments, and
iv. late submissions (obtaining extensions and special consideration)

5. **Supplementary Exams** – includes link to School website with School policy on supplementary exams.
   i. Special Consideration – includes link to UNSW website (New South Q) for downloading forms, requirements for lodging special consideration forms.

6. **Solutions to Problems – Troubleshooters**
   i. Learning Centre,
   ii. student counsellors, and
   iii. student support services.

7. **CEVSOC** – is the Civil and Environmental Engineering Student Social Committee. For further details contact CEVSOC at cevsoc@gmail.com


http://www.unswengsoc.com/societies/cevsoc/