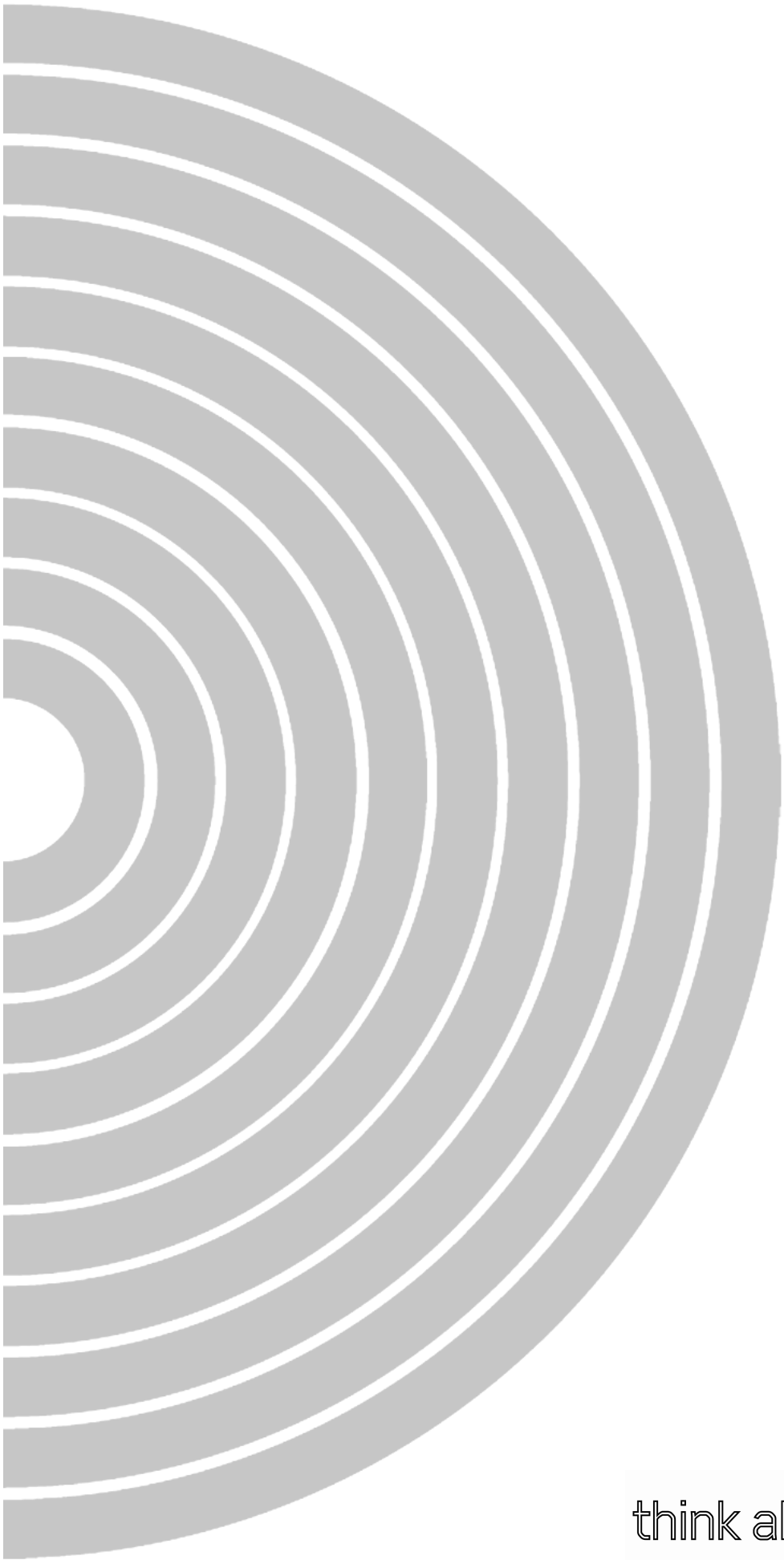


FACULTY OF
ENGINEERING
SCHOOL OF CIVIL
AND

COURSE PROFILE

CVEN4302/9806 Prestressed Concrete Design



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COURSE DETAILS

Units of Credit	6
Contact hours	3 hours per week
Class	Thursday, 5/6.00pm - 9.00pm Room No CLB5
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:

- 1.1 Methods of Prestressing. Forces Imposed By Prestressing (Straight, Draped And Kinked Tendon Profiles). Load Balancing. Introductory Examples. Design Requirements: Strength And Serviceability. Material Properties.

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:

- 3.1 Limit State Design. Rectangular Stress Block. Ultimate Moment Capacity. Effect of Non-Prestressed Steel. Ductility.
- 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;

HANDBOOK DESCRIPTION

Introduction to prestressed concrete. Design for serviceability. Design for strength. Statically indeterminate beams. Behaviour and design of two-way slabs. End block design.

Refer to Online Handbook available at:

<http://www.handbook.unsw.edu.au/postgraduate/courses/2009/CVEN4302.html>

<http://www.handbook.unsw.edu.au/postgraduate/courses/2009/CVEN9806.html>

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

Private Study	<ul style="list-style-type: none">• Review lecture material and textbook• Do set problems and assignments• Reflect on class problems and assignments
Lectures	<ul style="list-style-type: none">• Find out what you must learn• See methods that are not in the references• Follow worked examples• Hear announcements on course changes
Tutorials	<ul style="list-style-type: none">• Be guided by tutors• Practice solving set problems• Ask questions
Assessments (multiple choice, tests, examinations, assignments, hand-in tutorials, laboratory reports etc.)	<ul style="list-style-type: none">• Demonstrate your knowledge and skills• Demonstrate higher understanding and problem solving

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 three 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 too 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.

Week	Date	Topic	Assessment
1	12 th March	Introduction to Prestressed Concrete:	
2	19 th March	Design for Serviceability	
3	26 th March	Design for Serviceability	Tutorial Problem 1
4	2 nd April	Workshop on Serviceability Design	
5	9 th April	Design for Flexural Strength: Limit State Design	
	16 th April	Easter Break	
6	23 rd April	Design for Transfer Strength: Limit State Design	Tutorial Problem 2
7	30 th April	Design for Shear Strength:	
8	7 th May	End Block Design:	Tutorial Problem 3
9	14 th May	Statically Indeterminate Beams: Load Balancing	Final Submission of Major Assignment
10	21 st May	Statically Indeterminate Beams: Practical Tendon Profiles	
11	28 th May	Statically Indeterminate Beams: Practical Tendon Profiles	Tutorial Problem 4
12	4 th June	Revision	

RESOURCES

Textbook

Gilbert and Mickleborough, *The Design of Prestressed Concrete*, Unwin Hyman, London, 1990.

Additional Readings

- Standards Australia, *Australian Standard for Concrete Structures, AS3600*
- Warner, RF, Foster, SJ, and Kilpatrick AE, "Reinforced Concrete Basics", Pearson, 2007
- Warner, Rangan, Hall and Faulkes, *Concrete Structures*.
- Warner and Faulkes, *Prestressed Concrete*, Longman, 1989.
- Nilson, A.H., *Design of Prestressed Concrete*, John Wiley and Sons, 1978.
- Lin, T.Y., *Design of Prestressed Concrete Structures*, John Wiley, 1963.
- American Concrete Inst ACI318-89, *Building Code requirements for Reinf. Conc.*
- Cement and Concrete Association of Australia, *Concrete Design Handbook*, 1990. Cement and Concrete Association of Australia, *Concrete Design Workshop Worked Examples*, 1990.

Software:

RAPT available on the school PC labs.

WebCT

Additional materials provided in WebCT

Websites

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

DATES TO NOTE

Refer to MyUNSW for Important Dates in 2009 available at:

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

Tuesday March 31 Census Date for Semester 1

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/currentstudents/index.html>

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).

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

2. **School Contacts**

- i. for enrolment or timetable 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.
<http://www.civeng.unsw.edu.au/currentstudents/ug/supplementary/index.html>
 - 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** – student committee membership and link to (unofficial) student CEVSOC website.
http://www.civeng.unsw.edu.au/currentstudents/ug/common_ug/index.html#c1503