COURSE DETAILS

Units of Credit 6
Contact hours 3 hpw Lectures (Theory) + 2 hpw exercise class/demonstration
Lectures Monday 14:00 - 17:00
Colombo Theatre B (K-B16-LG04)

Demonstration (beginning week 2)
Wednesday 9:00 - 11:00
Mathews 309 (K-F23-309)
John Goodsell LG21 (K-F20-LG21)
Mathews 107 (K-F23-107)

Coordinator/Lecturer: Dr Hamid Valipour
Email: H.Valipour@unsw.edu.au
Rm. 710 Civil and Environmental Engineering Building (H20)
Phone: 9385 6191

Lecturer: Dr Ehab Hamed
Email: E.hamed@unsw.edu.au
Rm. 716 Civil and Environmental Engineering Building (H20)
Phone: 9385 9765

INFORMATION ABOUT THE COURSE

Prerequisites: CVEN3301, CVEN3302

COURSE OVERVIEW

The aim of this elective course is to provide final year students with a more advanced coverage of various topics relating to the design of concrete structures. The course is targeted at students who wish to specialize in Structural Engineering and are planning a career in structural design. The course will build on and reinforce the material covered in the core structural engineering courses. Also, we will engage you in the design process by designing, constructing and testing to failure a structural element.

During this course you will be supported in polishing the core skills, qualities and understandings developed in previous courses and the hone your structural engineering skills associated with your role as a future Civil Engineer.

This course will provide you with opportunities to develop the following graduate attributes:

- the capacity for analytical and independent critical thinking;
- skills related to lifelong learning, such as self-reflection (ability to apply theory to practice in familiar and unfamiliar situations); and
- collaborative and teamwork skills.
How does this course relate to other course offerings in the discipline? This course will continue with and will build on the concepts introduced in Materials and Structures (CVEN2302) and Structural Behaviour and Design (CVEN3302). At the end of this course you will have the ability to design basic reinforced concrete structures in practice.

“It is a great profession. There is the fascination of watching a figment of the imagination emerge through the aid of science to a plan on paper. Then it moves to realization in stone or metal or energy. Then it brings jobs and homes to men. Then it elevates the standards of living and adds to the comforts of life. That is the engineer’s high privilege.”

Herbert Hoover (US President 1929–1933)

**HANDBOOK DESCRIPTION**

A course on the advanced analysis and design of concrete structures for students looking towards a career in Structural Engineering. The course deals with the design and behaviour of the following fundamental aspects for reinforced and prestressed concrete member design: one-way and two-way concrete slabs (including the direct design, equivalent frame and simplified strip methods); retaining walls, strip, pad and pile footings; and determinant prestressed concrete members. Additional topics may be drawn from the following: design for torsion, detailing; ductility; preliminary sizing of members and frames; design with high strength and fibre reinforced concretes.

**OBJECTIVES**

- to reinforce your knowledge of structural engineering
- to further develop and advance skills in structural design
- to reinforce the philosophy of design and link design and analysis

**TEACHING STRATEGIES**

The teaching strategies that will be used include:

- **Lectures** that will focus on theory and on application of generalised problem-solving processes for the analysis and design of structures. Lectures will also emphasise the relationship of the content to the engineering practice and will provide an opportunity for reflection on learning.

- **Exercise classes** that will introduce examples developed from the basic theory presented in lectures. Exercise classes will also allow for student to address question on lecture assignments and lecture materials

**SUGGESTED APPROACHES TO LEARNING IN THE COURSE**

Suggested approaches to learning in this course include:

- Regular participation in lectures and exercise classes. *Review lecture and exercise material. Follow worked examples. Reflect on class problems and quizzes.*

- Weekly reading and recording of your learning.

- Appropriate preparation for exercise class activities.

- Planning your time to achieve all assessment requirements (see assessment).
• We encourage you to work with your peers. A good way to learn the material is in small study groups. Such groups work best if members have attempted the problems individually before meeting as a group. A valued and honest collaboration occurs when, for example, you “get stuck” early on in attacking an exercise and go to your classmate with a relevant question. Your classmate then has the opportunity to learn from your question as well as help you. You then bring something to the collaboration. You can learn too from last year’s problem sets and quizzes if used as a check or corrective when you seem to have hit a dead end.

• Students who perform poorly in the demonstrations/quizzes are strongly encouraged to discuss their progress with the lecturers during the semester. Please do not suffer in silence – seek the help at an early stage! We would like you to make most of this learning process and receive a high grade in the course.

EXPECTED LEARNING OUTCOMES

After completing this course, you will:

• be able to demonstrate an understanding of advanced concepts in structural design
• be able to interpret and understand the requirements of a design brief and identify the potential design problems presented by the objectives of the brief
• have the ability to use computers to solve engineering problems
• have the ability to communicate your design in written and graphical form
• demonstrate collaborative skills by working with other students in groups

SELF-CENTRED AND SELF-DIRECTED LEARNING (expectations of the students)

In addition to the lectures and exercise classes, you are expected to commit 8± hours per week to independent learning and general problem solving.

“What I hear, I forget; What I see, I remember; What I do, I UNDERSTAND”

T. A. Angelo

COMMON AND GENERAL INFORMATION

Details of common school information including:

• dates of note
• school contacts
• course requirements
• notes on assessment
• supplementary examinations
• special considerations
• solutions to problems - trouble shooters

are given at

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.

TEXTS AND RECOMMENDED READING

Textbooks


Additional Reading

Access to Australian Standards:
Australian Standards may be accessed through the UNSW Library as follows:

2. Under “How do I find” Click on the link to “More…”
3. Click on the link “Standards”
4. Click on the link “Standards Subject Guide”
5. Click on “Australian Standards (SAI Global)” and enter the Standard desired into the search field.

ASSESSMENT

As a final year design intensive subject the focus is on works practiced in industry and the subject assessment is set to match these skills and meet the learning outcomes. This course will be assessed on your demonstrated knowledge on the topics being taught; two-way slabs, footings and retaining walls and prestressed concrete as well as the Laboratory report. The value of each of the assessable tasks is as follows:

- Assignment 1 (Slabs) 25 %
- Assignment 2 (Retaining Walls/footings) 25 %
- Assignment 3 (Laboratory) 10 %
- Assignment 4 (Prestressed Concrete) 40 %

The purpose of assignments is to reinforce the lecture material with practice. It will also provide you with the opportunity to develop self-learning and problem solving skills.
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<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Reading</th>
<th>Major Assignments Dates</th>
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<tbody>
<tr>
<td>1</td>
<td>Slabs &amp; floor systems, introduction, stress resultants, methods of analysis, design requirements, one-way reinforced concrete slabs <em>(EH)</em></td>
<td>RCB Chap 4 Sect 4.1 to 4.5</td>
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<td>2</td>
<td>Two-way edge supported reinforced concrete slabs <em>(EH)</em></td>
<td>RCB Chap 4 Sect 4.6</td>
<td>Assignment 1 Issued</td>
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<td>3</td>
<td>Flat plates and flat slab design: direct design (simplified) method; Punching shear <em>(EH)</em></td>
<td>RCB Chap 4 Sect 4.7 &amp; 4.8</td>
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<tr>
<td>4</td>
<td>Flat plates and flat slab design; equivalent frame method <em>(EH)</em></td>
<td>RCB Chap 4 Sect 4.9</td>
<td>Assignment 2 Issued</td>
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<td>Assignment 1 Due</td>
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<td>5</td>
<td>Footings, pile caps and retaining walls I <em>(EH)</em></td>
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<td>Mid Semester break</td>
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<td>6</td>
<td>Footings, pile caps and retaining walls II <em>(EH)</em></td>
<td>RCB Chap 8, Sect 5.7</td>
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<td>7</td>
<td>Laboratory tests <em>(EH)</em></td>
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<td>Assignment 3 Issued</td>
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<td>8</td>
<td>Introduction to prestressed concrete members; properties of materials; Elastic Stress Analysis due to Prestress; Load Balancing. <em>(HV)</em></td>
<td>PC Chaps 1 &amp; 2</td>
<td>Assignment 2 Due</td>
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<td>9</td>
<td>Behaviour of uncracked prestressed members; Serviceability design of uncracked prestressed concrete statically determinant members <em>(HV)</em></td>
<td>PC Chap 4</td>
<td>Assignment 3 Due</td>
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<td>Flexural strength analysis of prestressed members; <em>(HV)</em></td>
<td>PC Chaps 5 &amp; 6</td>
<td>Assignment 4 Issued</td>
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<td>10</td>
<td>Prestressed Concrete Beams – anchorage; losses <em>(HV)</em></td>
<td>PC Chaps 8 &amp; 9</td>
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<td>11</td>
<td>Prestressed Concrete Beams – Design for shear <em>(HV)</em></td>
<td>PC Chap 7</td>
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<td>12</td>
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<td>Assignment 4 Due</td>
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**Notes** The timetable is indicative only and is subject to changes throughout the semester. Every effort will be made to inform students of variations to the above programme.
DATES TO NOTE

Refer to MyUNSW for Important Dates available at:
https://student.unsw.edu.au/dates

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:
https://student.unsw.edu.au/plagiarism

ACADEMIC ADVICE

For information about:

- Notes on assessments and plagiarism,
- School policy on Supplementary exams,
- Special Considerations,
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC.

Refer to Academic Advice on the School website available at:
http://www.engineering.unsw.edu.au/civil-engineering/resources/academic-advice