



## UNSW Course Outline

# CVEN3304 Concrete Structures - 2024

Published on the 21 May 2024

## General Course Information

**Course Code :** CVEN3304

**Year :** 2024

**Term :** Term 2

**Teaching Period :** T2

**Is a multi-term course? :** No

**Faculty :** Faculty of Engineering

**Academic Unit :** School of Civil and Environmental Engineering

**Delivery Mode :** In Person

**Delivery Format :** Standard

**Delivery Location :** Kensington

**Campus :** Sydney

**Study Level :** Postgraduate, Undergraduate

**Units of Credit :** 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

A course on concrete materials and the design of reinforced concrete structural elements subject to bending, shear and combined bending and axial compression. These include: concrete materials (cements, aggregates and admixtures and hardened concrete properties) concrete

mechanical properties, reinforcement types and properties; durability requirements; behaviour of reinforced concrete cross-sections in bending at both service and ultimate loads; ultimate strength analysis and design of cross-sections in flexure (singly and doubly reinforced, ductility); serviceability analysis and design of beams (cracked section analysis, deflection and crack control); ultimate strength in shear; bond anchorage and curtailment (simple and continuous beams and one-way slabs); short and slender concrete columns (interaction diagrams).

## Course Aims

The aim of this course is to develop the understanding of cementitious materials and structural behaviour by studying new concepts in the context of design of reinforced concrete structures.

This course will also provide students with opportunities to develop the following **graduate attributes**:

- the capacity for analytical and independent critical thinking; and
- skills related to lifelong learning, such as self-reflection (ability to apply theory to practice in familiar and unfamiliar situations);

# Course Learning Outcomes

Course Learning Outcomes
CLO1 : Describe the properties and behaviour of concrete materials
CLO2 : Apply the fundamentals in concrete materials to real engineering problems in large scale concrete
CLO3 : Use concepts of reinforced concrete (RC) to simplify reinforced concrete structure, including idealized structural members, and to identify the related load paths.
CLO4 : Explain the design principles and concepts for ultimate strength design, and serviceability design
CLO5 : Conduct structural analysis to understand the behaviour of structural members
CLO6 : Design structural members for given conditions (bending moment, shear force, and axial force) in compliance with Australian Standards.

Course Learning Outcomes	Assessment Item
CLO1 : Describe the properties and behaviour of concrete materials	<ul style="list-style-type: none"><li>• 6 Online Assignments</li><li>• Final exam</li></ul>
CLO2 : Apply the fundamentals in concrete materials to real engineering problems in large scale concrete	<ul style="list-style-type: none"><li>• 6 Online Assignments</li><li>• Final exam</li></ul>
CLO3 : Use concepts of reinforced concrete (RC) to simplify reinforced concrete structure, including idealized structural members, and to identify the related load paths.	<ul style="list-style-type: none"><li>• 6 Online Assignments</li><li>• Final exam</li></ul>
CLO4 : Explain the design principles and concepts for ultimate strength design, and serviceability design	<ul style="list-style-type: none"><li>• 6 Online Assignments</li><li>• Final exam</li></ul>
CLO5 : Conduct structural analysis to understand the behaviour of structural members	<ul style="list-style-type: none"><li>• 6 Online Assignments</li><li>• Final exam</li></ul>
CLO6 : Design structural members for given conditions (bending moment, shear force, and axial force) in compliance with Australian Standards.	<ul style="list-style-type: none"><li>• 6 Online Assignments</li><li>• Final exam</li></ul>

## Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Echo 360

## Additional Course Information

A background in Mechanics of Solids 1 (ENGG2400) and Structural Analysis (CVEN2303) is assumed. This course is an application of solid mechanics and structural analysis to structural components of reinforced concrete.

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
6 Online Assignments Assessment Format: Individual	40%	
Final exam Assessment Format: Individual	60%	

## Assessment Details

### 6 Online Assignments

#### Assessment Overview

Six weekly online assignments on reinforced concrete.

#### Course Learning Outcomes

- CLO1 : Describe the properties and behaviour of concrete materials
- CLO2 : Apply the fundamentals in concrete materials to real engineering problems in large scale concrete
- CLO3 : Use concepts of reinforced concrete (RC) to simplify reinforced concrete structure, including idealized structural members, and to identify the related load paths.
- CLO4 : Explain the design principles and concepts for ultimate strength design, and serviceability design
- CLO5 : Conduct structural analysis to understand the behaviour of structural members
- CLO6 : Design structural members for given conditions (bending moment, shear force, and axial force) in compliance with Australian Standards.

#### Detailed Assessment Description

##### Assessment 1: 6 Online Assignments

- Six Weekly Online Assignments on Reinforced Concrete
- Online Assignment 1: 10% (Assessment and feedback will be released on 19th June 2023)
- Online Assignments 2 to 6: Each 6%
- Due date and submission will be announced in the Moodle.

### Final exam

#### Assessment Overview

Final examination may assess students on all aspects of the course.

#### Course Learning Outcomes

- CLO1 : Describe the properties and behaviour of concrete materials

- CLO2 : Apply the fundamentals in concrete materials to real engineering problems in large scale concrete
- CLO3 : Use concepts of reinforced concrete (RC) to simplify reinforced concrete structure, including idealized structural members, and to identify the related load paths.
- CLO4 : Explain the design principles and concepts for ultimate strength design, and serviceability design
- CLO5 : Conduct structural analysis to understand the behaviour of structural members
- CLO6 : Design structural members for given conditions (bending moment, shear force, and axial force) in compliance with Australian Standards.

#### **Detailed Assessment Description**

Final examination will assess students on all aspects of the course.

#### **Assessment Length**

2 hours

#### **Hurdle rules**

A mark of at least 40% in the final examination is required before the class work is included in the final mark.

## **General Assessment Information**

#### **Grading Basis**

Standard

#### **Requirements to pass course**

A total 50% of the final mark (online assignments and final exam) is required to pass course.

Hurdle Requirement: A mark of at least 40% in the final examination is required before the classwork is included in the final mark.

# Course Schedule

Teaching Week/Module	Activity Type	Content
Week 0 : 20 May - 26 May	Activity	No teaching at Week 0 (UNSW O Week)
Week 1 : 27 May - 2 June	Topic	Lecture: Concrete Materials <ul style="list-style-type: none"><li>• Introduction of Concrete</li><li>• Concrete and Cement Production</li><li>• Cement Hydration</li></ul> Workshop: Concrete Materials <ul style="list-style-type: none"><li>• Concrete and cement production</li></ul>
Week 2 : 3 June - 9 June	Topic	Lecture: Concrete Materials <ul style="list-style-type: none"><li>• Concrete Components</li><li>• Fresh Concrete Properties</li><li>• Hardened Concrete Properties</li></ul> Workshop: Concrete Materials <ul style="list-style-type: none"><li>• Concrete Components</li><li>• Fresh Concrete Properties</li></ul>
Week 3 : 10 June - 16 June	Topic	Lecture: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Introduction</li><li>• Reinforced Concrete Design</li></ul> Workshop: Concrete Materials <ul style="list-style-type: none"><li>• Hardened Concrete Properties</li><li>• Reinforced Concrete Introduction</li></ul>
Week 4 : 17 June - 23 June	Topic	Lecture: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Design</li><li>• Reinforced Concrete Beam - Bending (Flexural Behaviour I)</li></ul> Workshop: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete introduction</li><li>• Reinforced Concrete Design</li></ul>
Week 5 : 24 June - 30 June	Topic	Lecture: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Beam - Bending (Flexural Behaviour II and III)</li><li>• Reinforced Concrete Beam - Flexural Design</li></ul> Workshop: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Beam - Bending (Flexural Behaviour I and II)</li></ul>
Week 6 : 1 July - 7 July	Other	Flexibility Week (Non-teaching)
Week 7 : 8 July - 14 July	Topic	Lecture: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Beam - Shear Behaviour</li><li>• Reinforced Concrete Beam - Shear Design</li></ul> Workshop: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Beam - Bending (Flexural Behaviour III and Flexural Design)</li></ul>
Week 8 : 15 July - 21 July	Topic	Lecture: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Beam - Serviceability</li></ul> Workshop: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Beam - Shear Behaviour and Shear Design</li></ul>
Week 9 : 22 July - 28 July	Topic	Lecture: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Beam - Serviceability</li><li>• Reinforced Concrete One Way Slab</li></ul> Workshop: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Beam - Serviceability</li></ul>
Week 10 : 29 July - 4 August	Topic	Lecture: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete Short Column</li></ul> Workshop: Reinforced Concrete <ul style="list-style-type: none"><li>• Reinforced Concrete One Way Slab</li><li>• Reinforced Concrete Short Column</li></ul>

## Attendance Requirements

For courses with Workshops and/or Labs, attendance for those classes is a necessary part of the course. You must attend at least 80% of the workshop/lab in which you are enrolled, for the duration of the session.

# General Schedule Information

Lectures: Tuesday 11:00 - 13:00 (K-F13-G09 - Science Theatre)

Wednesday 14:00 - 16:00 (K-D23-201 - Mathews Theatre A)

Demonstration Workshops: Wednesday 16:00 - 18:00 (Face to Face)

Thursday 09:00 - 11:00 (Face to Face)

Thursday 11:00 - 13:00 (Face to Face)

Thursday 13:00 - 15:00 (Face to Face)

Thursday 15:00 - 17:00 (Face to Face)

Friday 09:00 - 11:00 (Face to Face)

Friday 11:00 - 13:00 (Face to Face)

Friday 13:00 - 15:00 (Face to Face)

Friday 15:00 - 17:00 (Face to Face)

# Course Resources

## Prescribed Resources

Moodle

The Moodle LMS, <https://moodle.telt.unsw.edu.au/> will also be used for this course for activities and gradebook management. You will not need to regularly check Moodle.

## Relevant Resources

- Australian Standard: AS 3600-2018
- There is no prescribed textbook for this course
  - Recommended Books
    - S.J. Foster, A.E. Kilpatrick, R.F. Warner, "Reinforced Concrete Basics 3E, 2021
    - K. Wight, Reinforced Concrete Mechanics & Design, 7E, 2015
  - Additional materials provided on Moodle

# Course Evaluation and Development

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Taehwan Kim		Room 718 H20 (Civil Engineering Building)	Teams call		No	Yes
Lecturer	Taehwan Kim		Room 718 H20 (Civil Engineering Building)	Teams call		No	No

## Other Useful Information

### Academic Information

#### I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

#### II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)

- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

### III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

### IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

*Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.*

### Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: [student.unsw.edu.au/plagiarism](http://student.unsw.edu.au/plagiarism). The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

[www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf](http://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)

## Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

## Faculty-specific Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash

requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

## Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

## School-specific Information

### Final Examinations

Final Exams in T2 2024 will be held on campus between the 9th - 22nd August, and Supplementary Exams between the 2nd - 6th September 2024. You are required to be available on these dates. Please do not make any personal or travel arrangements during this period.

### School Contact Information

For assistance with enrolment, class registration, progression checks and other administrative matters, please see [the Nucleus: Student Hub](#). They are located inside the Library – first right as you enter the main library entrance. You can also contact them via <http://unsw.to/webforms> or reserve a place in the face-to-face queue using the UniVerse app.

For course administration matters, please contact the Course Coordinator.

Questions about this course should normally be asked during the scheduled class so that everyone can benefit from the answer and discussion.