CVEN3304

Concrete Structures

Term 2, 2023

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Taehwan Kim	taehwan.kim@unsw.edu.au		Room 718 H20 (Civil Engineering Building)	Teams call

Lecturers

Name	Email	Availability	Location	Phone
Taehwan Kim	taehwan.kim@unsw.edu.au		Room 718 H20 (Civil Engineering Building)	Teams call

School Contact 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).

Course Details

Units of Credit 6

Summary of the Course

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

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Describe the properties and behaviour of concrete materials	PE1.1, PE1.3, PE1.5, PE2.2
2. Apply the fundamentals in concrete materials to real engineering problems in large scale concrete	PE1.1, PE1.3, PE1.5, PE2.2
3. Use concepts of reinforced concrete (RC) to simplify reinforced concrete structure, including idealized structural members, and to identify the related load paths.	PE1.2, PE1.5, PE1.6, PE2.2
4. Explain the design principles and concepts for ultimate strength design, and serviceability design	PE1.2, PE1.5, PE1.6, PE2.2
5. Conduct structural analysis to understand the behaviour of structural members	PE1.2, PE1.3, PE1.6, PE2.1, PE2.2, PE3.4
6. Design structural members for given conditions (bending moment, shear force, and axial force) in compliance with Australian Standards.	PE1.2, PE1.3, PE1.6, PE2.1, PE2.2, PE3.4

Teaching Strategies

Following are our suggested approaches to learning in the course.

Private Study

- Review lecture material and read textbook
- Do set problems and assignments
- Reflect on class problems and assignments

Lectures

- Find out what you must learn â?? read ahead.
- See methods that are not in the textbook
- Follow worked examples
- Listen for announcements on course changes

Tutorials

- Be guided by tutors
- Practice solving set problems
- Ask questions

Assessments (multiple choice, tests, examinations, assignments, hand-in tutorials, laboratory reports etc.)

- Demonstrate your knowledge and skills
- Demonstrate higher understanding and problem solving

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 strcutural analysis to structural components of reinforced concrete.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. 6 Online Assignments	40%	Not Applicable	1, 2, 3, 4, 5, 6
2. Final exam	60%	Not Applicable	1, 2, 3, 4, 5, 6

Assessment 1: 6 Online Assignments

Six Weekly Online Assignments on Reinforced Concrete

Online Assignment 1: 10% (Assessment and feedback will be released on 23rd June 2023)

Online Assignments 2 to 6: Each 6%

Due date and submission will be announced in the Moodle.

Assessment 2: Final exam

Assessment length: 2 hours

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

Hurdle requirement

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

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.

Course Schedule

Lectures: Tuesday 16:00 - 18:00 (K-D23-201 - Mathews Theatre A)

Thursday 09:00 - 11:00 (K-E19-104 - E19 Patricia O'Shane 104, previously CLB 7)

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

Thursday 14:00 - 16:00 (Face to Face)

Thursday 16:00 - 18:00 (Face to Face)

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

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

Friday 14:00 - 16:00 (Face to Face)

View class timetable

Timetable

Date	Type	Content
Week 1: 29 May - 2 June	Lecture	**Concrete Materials** • Introdcution of Concrete • Cement Hydration
	Workshop	**Concrete Materials** • Concrete and cement production
Week 2: 5 June - 9 June	Lecture	**Concrete Materials** • Concrete Components • Fresh Concrete Properties • Hardened Concrete Properties
	Workshop	**Concrete Materials**

		• Concrete Components • Fresh Concrete Properties
Week 3: 12 June - 16 June	Lecture	**Reinforced Concrete** • Reinforced Concrete Introduction • Reinforced Concrete Design • No class on Monday 13th June 2022 (Public Holiday)
	Workshop	**Concrete Materials** • Hardened Concrete Properties
Week 4: 19 June - 23 June	Lecture	**Reinforced Concrete** • Reinforced Concrete Design • Reinforced Concrete Beam - Bending (Flexural Behaviour I)
	Workshop	**Reinforced Concrete** • Reinforced Concrete Introduction • Reinforced Concrete Design
Week 5: 26 June - 30 June	Lecture	**Reinforced Concrete** • Reinforced Concrete Beam - Bending (Flexural Behaviour II and III) • Reinforced Concrete Beam - Flexural Design
	Workshop	**Reinforced Concrete** • Reinforced Concrete Beam - Bending (Flexural Behaviour I and II)
Week 6: 3 July - 7 July	Lecture	**Flexibility Week (Non-teaching)**
Week 7: 10 July - 14 July	Lecture	**Reinforced Concrete** • Reinforced Concrete Beam - Shear Behaviour • Reinforced Concrete Beam - Shear Design
	Workshop	**Reinforced Concrete** • Reinforced Concrete Beam - Bending (Flexural Behaviour III and Flexural

		Design) • Reinforced Concrete Beam - Shear Behaviour
Week 8: 17 July - 21 July	Lecture	**Reinforced Concrete** • Reinforced Concrete Beam - Serviceability
	Workshop	**Reinforced Concrete** • Reinforced Concrete Beam - Shear Behaviour and Shear Design
Week 9: 24 July - 28 July	Lecture	**Reinforced Concrete** • Reinforced Concrete Beam - Serviceability • Reinforced Concrete One Way Slab
	Workshop	**Reinforced Concrete** • Reinforced Concrete Beam - Serviceability
Week 10: 31 July - 4 August	Lecture	**Reinforced Concrete** • Reinforced Concrete Short Column
	Workshop	**Reinforced Concrete** • Reinforced Concrete One Way Slab • Reinforced Concrete Short Column

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.

Submission of Assessment Tasks

Please refer to the Moodle page of the course for further guidance on assessment submission.

UNSW has a standard late submission penalty of:

- 5% per day, for all assessments where a penalty applies, capped at five days (120 hours), after which a student cannot submit an assessment, and no permitted variation.

Academic Honesty and 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 Information

Final Examinations:

Final Exams in T2 2023 will be held on campus between Friday 11th and Thursday 24th August (inclusive), and Supplementary Exams between Monday 4th and Friday 8th September (inclusive). You are required to be available on these dates. Please do not to make any personal or travel arrangements during this period.

For students enrolled in the distance offering of a postgraduate course, and who reside further than 100km from UNSW Kensington campus, will be contacted regarding sitting an external exam. The school's External Exam Policy can be found on the Intranet.

ACADEMIC ADVICE

- Key Staff to Contact for Academic Advice (log in with your zID and password): https://intranet.civeng.unsw.edu.au/key-staff-to-contact-during-your-studies-at-unsw
- Key UNSW Dates - eg. Census Date, exam dates, last day to drop a course without academic/financial liability etc.
- CVEN Student Intranet (log in with your zID and password): https://intranet.civeng.unsw.edu.au/student-intranet
- Student Life at CVEN, including Student Societies: https://www.unsw.edu.au/engineering/civil-and-environmental-engineering/student-life
- Special Consideration: https://student.unsw.edu.au/special-consideration
- General and Program-Specific Questions: The Nucleus: Student Hub
- Book an Academic Advising session: https://unswengacademicadvising.as.me/schedule.php

Disclaimer

This course outline sets out 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 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 (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit

Mike Gal.

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✓
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in professional and lay domains	
PE3.3 Creative, innovative and pro-active demeanour	
PE3.4 Professional use and management of information	✓
PE3.5 Orderly management of self, and professional conduct	
PE3.6 Effective team membership and team leadership	