School of Civil and Environmental Engineering

Term 2, 2020

CVEN3304 CONCRETE STRUCTURES

COURSE DETAILS

Units of Credit	6	
Contact hours	6 hours per week	
Class	Monday, 15:00 – 17:00	Online
	Tuesday, 10:00 – 12:00	Online
Workshop	Tuesday, 12:00 – 14:00	Online
	Tuesday, 15:00 – 17:00	Online

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INFORMATION ABOUT THE COURSE

This course introduces students to concrete materials (CM) and the design of reinforced concrete (RC) 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).

HANDBOOK DESCRIPTION

See link to virtual handbook *:*

https://www.handbook.unsw.edu.au/undergraduate/courses/2020/CVEN3304

OBJECTIVES

The objectives of this course are to:

- Introduce you to concrete components, basics of hydration reaction occurred in concrete, and

effects of concrete components on characteristics and performance of concrete. This objective contributes to the achievement of learning outcomes 1 and 2.

- Introduce you to the fundamentals of reinforced concrete (RC) design under bending, shear, and compression. This objective contributes to the achievement of learning outcomes 3 to 6.

Link the objectives with the program outcome attributes and the assessment strategies for this course. In other words, how do the assessment strategies assist in achieving these objectives, and how do the objectives contribute to achievement of program outcome attributes?

List of programme attributes:

- An in-depth engagement with the relevant disciplinary knowledge in its inter-disciplinary context
- Capacity for analytical and critical thinking and for creative problem solving
- Ability to engage independent and reflective learning
- Information literacy
- Skills for collaborative and multi-disciplinary work
- A respect for ethical practice and social responsibility
- Skills for effective communication

TEACHING STRATEGIES

Private Study	• Review lecture material and textbook • Do set problems and assignments • Join Moodle discussions of problems • Reflect on class problems and assignments • Download materials from Moodle • Keep up with notices and find out marks via Moodle
Lectures	• Find out what you must learn • See methods that are not in the textbook • Follow worked examples • Hear announcements on course changes
Workshops	• Be guided by Demonstrators • Practice solving set problems • Ask questions
Assessments	• Demonstrate your knowledge and skills • Demonstrate higher understanding and problem solving

EXPECTED LEARNING OUTCOMES

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

Example:

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*

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

COURSE PROGRAM

A table of lectures and workshops 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.

Term 2 2020

Date	Topic	Lecture Content	Demonstration Content
01/06/2020 (Week 1) Dr Kim	Concrete Materials	Introduction of Concrete and Cement Hydration	Concrete and cement production
08/06/2020 (Week 2) Dr Kim	Concrete Materials (no class on 08/06/2020)	Concrete Components Fresh concrete properties	Concrete Components Fresh concrete properties
15/06/2020 (Week 3) Dr Kim	Concrete Materials RC Introduction	Hardened Concrete properties RC Introduction	Hardened Concrete Properties
22/06/2020 (Week 4) Dr Kim	RC Design RC Beam – Bending	RC Design Flexural Behaviour I	RC Introduction RC Design
29/06/2020 (Week 5) Dr Kim	RC Beam – Bending	Flexural Behaviour of Beam II and III Flexural Beam Design	Flexural Behaviour of Beam I and II
06/07/20 (Week 6) Dr Kim		***Flexibility week for all courses (non-teaching)***	
13/07/2020 (Week 7) Dr Eisenträger	RC Beam – Shear	Shear Behaviour of Beam Shear Design of Beam	Flexural Behaviour of Beam III and Flexural Design Shear Behaviour of Beam

20/07/2020 (Week 8) Dr Eisenträger	RC Beam – Serviceability	Shear Design of Beam RC – Serviceability and Detailing	Shear Behaviour of Beam Shear Design of Beam
27/07/2020 (Week 9) Dr Eisenträger	RC Beam – Serviceability	RC – Serviceability and Detailing	RC – Serviceability and Detailing
03/08/2020 (Week 10) Dr Eisenträger	RC One Way Slab and Short Columns	RC One Way Slab and Columns	RC One Way Slab and Columns

ASSESSMENT

The assessment components are six online assignments (40%) and the final exam (60%). The online assignments are designed for students to understand concepts and fundamental theories used in the concrete materials and the reinforced concrete design.

The final exam will assess students all aspects of the course and the type of the final exam will be an open-book and take-home exam.

The final grade for this course will normally be based on the sum of the scores from each of the assessment tasks. The Final Examination is worth 60% of the Final Mark and the class work is worth 40% of the Final Mark. *A mark of at least 40% in the final examination is required before the class work (hand-in quizzes and online tasks) is included in the final mark. The formal exam scripts will not be returned but you are permitted to view the marked script.*

Details of each assessment component, the marks assigned to it, the criteria by which marks will be assigned, and the dates of submission are set out below.

Supplementary Examinations for Term 2 2020 will be held on Monday 7th September – Friday 11th September (inclusive) should you be required to sit one. You are required to be available during these dates. Please do not to make any personal or travel arrangements during this period.

PENALTIES

Late Assignments will incur a penalty of 10% of the maximum mark per calendar day up regardless of the mark awarded. An extension will only be granted by the lecturer under exceptional circumstances.

ASSESSMENT OVERVIEW

Item	**Length**	**Weighting**	**Learning outcomes assessed**	**Assessment Criteria** *(this needs to explicitly describe what students are expected to demonstrate in the task)*	**Due date and submission requirements**	**Deadline for absolute fail**	**Marks returned**
1. Assignments							
Online Assignments	7 to 10 days/each	Total 40 %	1, 2, 3, 4, 5, 6	Six Online Assignments			
2. Final Exam							
Final Exam	Take home exam	60 %	1, 2, 3, 4, 5, 6	Final examination will assess students on all aspects of the course.	Exam Period		TBD

RELEVANT RESOURCES

- There is no prescribed textbook for this course

  Recommended Books

  - S. Midness, J. F. Young, D. Darwin, “Concrete”, 2nd Edition, Prentice Hall, 2002
  - S.J. Foster, A.E. Kilpatrick, R.F. Warner, “Reinforced Concrete Basics 2E, 2010
  - J.K. Wight, Reinforced Concrete Mechanics & Design, 7E, 2015
- Additional materials provided on Moodle.

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;
- Special Considerations: student.unsw.edu.au/special-consideration;
- General and Program-specific questions: The Nucleus: Student Hub
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC/SURVSOC/CEPCA

Refer to Academic Advice on the School website available at:

https://www.engineering.unsw.edu.au/civil-engineering/student-resources/policies-procedures-and-forms/academic-advice

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex 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
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (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