COURSE OUTLINE

CIV451 Concrete Structures and Technology

School: School of Science, Technology and Engineering

2025 | Semester 1

UniSC Sunshine Coast
UniSC Moreton Bay

BLENDED LEARNING — Most of your course is on campus but you may be able to do some components of this course online.

Please go to usc.edu.au for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1. Description

Civil engineers need to design concrete structures and infrastructures that meet regulatory standards. In this course you will learn to design reinforced concrete structures and their members (beams, slabs, etc.) to service and ultimate limit states, and to detail the reinforcement of these structures and members in compliance with Australian Standard AS 3600.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – Asynchronous learning materials	1hr	Week 1	13 times
Tutorial/Workshop 1 – Online workshops	1hr	Week 1	13 times
Tutorial/Workshop 2 – On campus tutorials	2hrs	Week 1	13 times
Laboratory 1 – On campus Labs	1hr	Week 2	3 times

1.3. Course Topics

Introduction to concrete structures and design procedures.
Design of reinforced concrete members such as beams, slabs, columns, etc.
Use and application of design codes in particular AS 3600.
Application of limit state design.
Application of structural analysis and design of structures.

2. What level is this course?

400 Level (Graduate)

Demonstrating coherence and breadth or depth of knowledge and skills. Independent application of knowledge and skills in unfamiliar contexts. Meeting professional requirements and AQF descriptors for the degree. May require pre-requisites where discipline specific introductory or developing knowledge or skills is necessary. Normally undertaken in the third or fourth full-time study year of an undergraduate program.

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES On successful completion of this course, you should be able to...	GRADUATE QUALITIES MAPPING Completing these tasks successfully will contribute to you becoming...	PROFESSIONAL STANDARD MAPPING * Engineers Australia Stage 1 Professional Engineer Competency Standards
1 Use and apply design codes e.g. AS/NZS 1170.0, AS/NZS 1170.1 and AS 3600; determine design loads and load combinations for strength and serviceability and understand their importance in limit state design.	Empowered	1.2, 1.3, 2.2
2 Describe and explain the nature of concrete and steel and how they work as a composite members i.e. reinforced concrete.	Knowledgeable	1.1
3 Analyse structures to determine the internal actions on structural elements resulting from the application of the design loads in compliance with Australian Standards.	Creative and critical thinker	1.3, 2.1
4 Design concrete members and structures for durability to various environments including design for fire.	Empowered	1.1, 1.3
5 Design and size reinforced concrete elements for ultimate and serviceability limit states that conform to Australian Standards.	Empowered	1.3, 1.6, 2.2, 3.1
6 Communicate (in your group or to an audience) your design, ie. procedures, outcomes and recommendations, in a manner acceptable to the engineering profession.	Empowered Ethical	3.2, 3.4
7 Collaborate with others in a team project environment to design concrete structures (concept to optimised solutions), and produce engineering reports.	Ethical Engaged	3.2, 3.5, 3.6

* Competencies by Professional Body

CODE	COMPETENCY
ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS	
1.1	Knowledge and Skill Base: Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
1.2	Knowledge and Skill Base: Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.
1.3	Knowledge and Skill Base: In-depth understanding of specialist bodies of knowledge within the engineering discipline.
1.6	Knowledge and Skill Base: Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline.
2.1	Engineering Application Ability: Application of established engineering methods to complex engineering problem solving.

CODE	COMPETENCY
2.2	Engineering Application Ability: Fluent application of engineering techniques, tools and resources.
3.1	Professional and Personal Attributes: Ethical conduct and professional accountability.
3.2	Professional and Personal Attributes: Effective oral and written communication in professional and lay domains.
3.4	Professional and Personal Attributes: Professional use and management of information.
3.5	Professional and Personal Attributes: Orderly management of self, and professional conduct.
3.6	Professional and Personal Attributes: Effective team membership and team leadership.

5. Am I eligible to enrol in this course?

Refer to the UniSC Glossary of terms for definitions of “pre-requisites, co-requisites and anti-requisites”.

5.1. Pre-requisites

You must be enrolled in Program SC410, SC425, SC411, SC404, SC405

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

ENG451

5.4. Specific assumed prior knowledge and skills (where applicable)

Not applicable

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

6.2. Details of early feedback on progress

Your engagement in weekly formative tutorial exercises will demonstrate your level of proficiency of the course material. You may peer-review the draft of your Tasks during the Tutorials.

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Written Piece	Individual	30%	Four short design reports of max. 250 words. Word limit excludes calculations, diagrams, sketches & Appendices.	Throughout teaching period (refer to Format)	In Class
All	2	Oral and Written Piece	Group	30%	One design report of max. 1000 words and one Project presentation of max 15 minutes.	Refer to Format	In Class
All	3	Examination - Centrally Scheduled	Individual	40%	2 hr	Exam Period	Exam Venue

All - Assessment Task 1: Design of concrete members to limit states

GOAL:	These assignments (take-home tasks) develop your understanding of core theory of concrete design.
PRODUCT:	Written Piece
FORMAT:	Submission: Weeks 2, 4, 6 & 8 You determine the relevant limit state conditions of structural concrete members, design these members to these limit states and provide the detailing of these members, noting your detailing must adhere to industry best practice. Your design solutions shall be the most adapted / optimised / sustainable to meet the design brief. You also explain the key design aspects and discuss the design procedures and/or your designs. Further details will be provided on Canvas and/or in class.
CRITERIA:	**No.** — **Learning Outcome assessed** 1 — Choice of design methods and codes. — 1 2 — Application of design methods and procedures through the use of formulae and codes to analyse and design a concrete member to limit states. — 1 3 — Workings showing sequences of the problem solutions and presentation of design calculations to a professional engineering standard. — 1 4 5 4 — Report format and presentation to a professional engineering standard. — 6 5 — Description and explanation of design aspects and phenomena. — 2
GENERIC SKILLS:	Communication, Problem solving

All - Assessment Task 2: Structure Design Assignments

GOAL:	You collaborate with your peers to undertake the detailed engineering design of a concrete structure to limit states in compliance with Australian Standards and produce a design report.
PRODUCT:	Oral and Written Piece
FORMAT:	Submission: Week 12 (Tasks 2a & 2b) Engineers work in project teams! The Design project allows you to advance your skill and competencies, working towards meeting your Engineers Australia competencies. You demonstrate your (structural) design abilities by developing, designing and drawing the structure of a building, and contribute to further developing and/or improving your collaboration skills. Your design solutions shall be the most adapted / optimised / sustainable to meet the design and use requirements of the building. With your Team, you deliver a Design report (2a) to professional engineering standard and a Project presentation (2b). As part of your group work, you are required to actively participate to Peer Assessment, review, feedback and/or debriefing activities. Further details will be provided on Canvas and/or in class.
CRITERIA:	

No.		Learning Outcome assessed
1	Choice of design methods and codes.	1
2	Application of design methods and procedures through the use of formulae and codes to analyse and design concrete structures to limit states.	1
3	Workings showing sequences of the problem solutions to allow a professional review (and sign-off) of the design.	1 3 4 5
4	Presentation of design calculations and drawings to a professional engineering standard.	6
5	Functioning in teams when carrying out the designs and writing up the reports.	7

GENERIC SKILLS:	Communication, Collaboration, Problem solving

All - Assessment Task 3: Final Exam

GOAL:	Demonstrate the competencies and skills to compliantly design concrete structures to design limit states.
PRODUCT:	Examination - Centrally Scheduled
FORMAT:	The final exam assesses the material (learning material, tutorials and assignments) covered in the course and the self-study material. You will analyse structures and design concrete members. With your solutions you will demonstrate your ability to apply methods of structural analysis and compliant design approaches. Further details will be provided on Canvas and/or in class.
CRITERIA:	

No.		Learning Outcome assessed
1	Use of design methods and codes.	1
2	Workings showing sequences of the problem solutions.	1 2
3	Description and explanation of design aspects and phenomena.	2

GENERIC SKILLS:	Problem solving

7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Student workload is calculated at 12.5 learning hours per one unit.

8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Canvas site– Please log in as soon as possible.

8.1. Prescribed text(s) or course reader

Please note that you need to have regular access to the resource(s) listed below. Resources may be required or recommended.

REQUIRED?	AUTHOR	YEAR	TITLE	EDITION	PUBLISHER
Required	Yew-Chaye Loo,Sanaul Huq Chowdhury	2018	Reinforced and Prestressed Concrete	3rd edition	Cambridge University Press

8.2. Specific requirements

Nil

9. How are risks managed in this course?

Health and safety risks for this course have been assessed as low. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the health and safety risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the online induction training for students, and following the instructions of the University staff.

10. What administrative information is relevant to this course?

10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

The final mark is in the percentage range 47% to 49.4%
The course is graded using the Standard Grading scale
You have not failed an assessment task in the course due to academic misconduct

10.3. Assessment: Submission penalties

Late submission of assessment tasks may be penalised at the following maximum rate:
- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.
- 10% (of the assessment task's identified value) for the third day - 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.
- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task. Weekdays and weekends are included in the calculation of days late. To request an extension you must contact your course coordinator to negotiate an outcome.

10.4. SafeUniSC

UniSC is committed to a culture of respect and providing a safe and supportive environment for all members of our community. For immediate assistance on campus contact SafeUniSC by phone: 07 5430 1168 or using the SafeZone app. For general enquires contact the SafeUniSC team by phone 07 5456 3864 or email safe@usc.edu.au.

The SafeUniSC Specialist Service is a Student Wellbeing service that provides free and confidential support to students who may have experienced or observed behaviour that could cause fear, offence or trauma. To contact the service call 07 5430 1226 or email studentwellbeing@usc.edu.au.

10.5. Study help

For help with course-specific advice, for example what information to include in your assessment, you should first contact your tutor, then your course coordinator, if needed.

If you require additional assistance, the Learning Advisers are trained professionals who are ready to help you develop a wide range of academic skills. Visit the Learning Advisers web page for more information, or contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au.

10.6. Wellbeing Services

Student Wellbeing provide free and confidential counselling on a wide range of personal, academic, social and psychological matters, to foster positive mental health and wellbeing for your academic success.

To book a confidential appointment go to Student Hub, email studentwellbeing@usc.edu.au or call 07 5430 1226.

10.7. AccessAbility Services

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, learning disorder mental health issue, injury or illness, or you are a primary carer for someone with a disability or who is considered frail and aged, AccessAbility Services can provide access to appropriate reasonable adjustments and practical advice about the support and facilities available to you throughout the University.

To book a confidential appointment go to Student Hub, email AccessAbility@usc.edu.au or call 07 5430 2890.

10.8. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching

10.9. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The Student Charter sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

10.10. General Enquiries

In person:

- **UniSC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **UniSC Moreton Bay** - Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **UniSC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **UniSC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **UniSC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **UniSC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au