



ENEC20001 Concrete Design

Term 1 - 2021

Profile information current as at 05/07/2022 05:14 pm

All details in this unit profile for ENEC20001 have been officially approved by CQU University and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

General Information

Overview

Concrete Design is an advanced civil engineering unit that introduces the analysis and design of complex reinforced and prestressed concrete structures. In this unit, you will develop knowledge of state-of-the-art construction materials and design technologies in the context of structural engineering and environmental sustainability. You will be expected to conceptualise the vertical and horizontal load resisting mechanism of concrete structural systems, interpret and apply the relevant Australian Standards, and ensure the designed structure/structural components also meet the serviceability and stakeholder requirements. The use of commercial computer software is required to analyse and design these structures. In this unit, you will document the processes involved in modelling, analysis, design, and communication, and work and learn, both individually and in teams in a professional manner.

Details

Career Level: *Postgraduate*

Unit Level: *Level 9*

Credit Points: *12*

Student Contribution Band: *8*

Fraction of Full-Time Student Load: *0.25*

Pre-requisites or Co-requisites

There are no requisites for this unit.

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

Offerings For Term 1 - 2021

- Melbourne
- Online
- Perth
- Rockhampton

Attendance Requirements

All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

Class and Assessment Overview

Recommended Student Time Commitment

Each 12-credit Postgraduate unit at CQUniversity requires an overall time commitment of an average of 25 hours of study per week, making a total of 300 hours for the unit.

Class Timetable

[Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

[Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. **Project (applied)**

Weighting: 30%

2. **Project (applied)**

Weighting: 30%

3. **In-class Test(s)**

Weighting: 40%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the [CQUniversity Policy site](#).

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from Moodle

Feedback

Well organised and delivered unit.

Recommendation

This practice will be continued in the future offering as well.

Feedback from Moodle

Feedback

Lecturers are supportive and available for consultation when required.

Recommendation

This practice will be continued in the future offering as well.

Unit Learning Outcomes

On successful completion of this unit, you will be able to:

1. Determine various types of loads acting on a structural system, provide a rationale for load combinations applied, and conceptualise the load resisting concrete structural systems
2. Formulate, plan, manage, and complete projects, individually or in teams, in an ethical and professional manner considering stakeholder requirements and principals of sustainable development
3. Design complex reinforced concrete structural components using appropriate Australian Standards
4. Design prestressed concrete structural components using appropriate Australian Standards
5. Use appropriate software to analyse and/or design the structural components subjected to different load combinations
6. Demonstrate a professional level of communication and leadership.

The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:

Intermediate

- 1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1I 3I 4I)
- 1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 3I 4I)
- 3.1 Ethical conduct and professional accountability. (LO: 2I 6N)
- 3.2 Effective oral and written communication in professional and lay domains. (LO: 2I 6I)
- 3.4 Professional use and management of information. (LO: 1I 2I 3I 4I 6I)
- 3.5 Orderly management of self, and professional conduct. (LO: 2I 6I)

Advanced

- 1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1I 3A 4A)
- 1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1A 3A 4A 5I)
- 1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1A 3A 4A 5I)
- 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 1I 3A 4A 5A)
- 2.1 Application of established engineering methods to complex engineering problem solving. (LO: 1I 2I 3A 4A 5I)
- 2.2 Fluent application of engineering techniques, tools and resources. (LO: 1I 5A)
- 2.3 Application of systematic engineering synthesis and design processes. (LO: 1I 3A 4A 5I)
- 2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 1A 2A 3I 4I 5I)
- 3.6 Effective team membership and team leadership. (LO: 2A 3I 4I 6I)

Note: LO refers to the Learning Outcome number(s) which link to the competency and the levels: N - Introductory, I - Intermediate and A - Advanced.

Refer to the Engineering Postgraduate Units Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping information

<https://moodle.cqu.edu.au/course/view.php?id=11382>

Alignment of Learning Outcomes, Assessment and Graduate Attributes



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
1 - Project (applied) - 30%	•	•	•		•	•
2 - Project (applied) - 30%	•	•		•	•	•

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
3 - In-class Test(s) - 40%			•	•		

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
1 - Knowledge		○	○	○	○	○
2 - Communication			○			○
3 - Cognitive, technical and creative skills		○	○	○	○	
4 - Research		○	○	○	○	○
5 - Self-management			○	○	○	○
6 - Ethical and Professional Responsibility		○	○	○	○	○
7 - Leadership						○
8 - Aboriginal and Torres Strait Islander Cultures						

Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes							
	1	2	3	4	5	6	7	8
1 - Project (applied) - 30%	○	○	○	○	○	○	○	
2 - Project (applied) - 30%	○	○	○	○	○	○	○	
3 - In-class Test(s) - 40%	○	○	○		○			

Textbooks and Resources

Textbooks

ENEC20001

Prescribed

Reinforced and Prestressed Concrete

3rd Edition (2018)

Authors: Yew-Chaye Loo and Sanaul Huq Chowdhury

Cambridge University Press

Melbourne , VIC , Australia

ISBN: 9781108405645

Binding: Paperback

Additional Textbook Information

This edition has been written based on the Australian Standard for Concrete Structures AS3600-2009. Since then the AS3600 was updated and a new version is released in 2018 as Australian Standard for Concrete Structures AS3600-2018. Therefore, this textbook may not necessarily reflect recent amendments and addenda to AS3600-2018. However, an errata for this book will be provided through the unit website.

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

Referencing Style

No referencing style set.

Teaching Contacts

Kumaran Suntharavadivel Unit Coordinator

t.suntharavadivel@cqu.edu.au

Schedule

Week 1 - 08 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Introduction of RC Design		
Limit State Design and Load Combinations		
Design Properties of Concrete and Reinforcement		
Durability and Fire Resistance		
Structural Analysis		

Week 2 - 15 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Design of Rectangular Beam		
• Ultimate Limit State requirements		
• Serviceability Limit State requirements		

Week 3 - 22 Mar 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Design of T-Beams and irregular shapes		
Week 4 - 29 Mar 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Design of Slab • One-way and two-way slabs • Suspended Slabs		
Week 5 - 05 Apr 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Design of Columns		
Vacation Week - 12 Apr 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Week 6 - 19 Apr 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Introduction to PC Design • Principle of prestressing • Type of prestressing		
Week 7 - 26 Apr 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Analysis and Design of PC (Magnet Diagram)		REINFORCED CONCRETE DESIGN Due: Week 7 Monday (26 Apr 2021) 5:00 pm AEST
Week 8 - 03 May 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Determine the Tendon Details		
Week 9 - 10 May 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Ultimate Moment Checks and Losses		
Week 10 - 17 May 2021		
Module/Topic	Chapter	Events and Submissions/Topic
End-block Design		
Week 11 - 24 May 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Advanced Topics • Design of Walls and Footings • Strut-and-tie Modelling		Prestressed Concrete Beam Design Due: Week 11 Monday (24 May 2021) 5:00 pm AEST
Week 12 - 31 May 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Revision		
Review/Exam Week - 07 Jun 2021		
Module/Topic	Chapter	Events and Submissions/Topic
		Class Test Due: Review/Exam Week Friday (11 June 2021) 5:00 pm AEST
Exam Week - 14 Jun 2021		
Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

Please read **ENEC20001 Important Information** available on the Moodle site.

Assessment Tasks

1 REINFORCED CONCRETE DESIGN

Assessment Type

Project (applied)

Task Description

In this task, you will be asked to design a low-rise RC building as per a client's requirements. The project briefing will be released on Friday, Week 1.

Assessment Due Date

Week 7 Monday (26 Apr 2021) 5:00 pm AEST

Return Date to Students

Week 9 Tuesday (11 May 2021)

Weighting

30%

Minimum mark or grade

40%

Assessment Criteria

Each question will be assessed for the criterion accuracy and correct answers.

- Correct application of mathematics and arithmetic
- Answers clearly identified and explained
- Correct results/explanation

In addition, the following criteria will be considered:

Evidence of correct procedures

- All necessary steps in the analysis are followed in the correct order
- Clear presentation of mathematical work

Evidence of an understanding of the topic

- Use of correct principles and theories
- Interpretation of results as necessary

Professional presentation

- Appropriate use of diagrams, clear diagrams
- Correct use of terminology, conventions
- Clear English in the explanation of procedure and interpretation of results

Submission

Online Group

Learning Outcomes Assessed

- Determine various types of loads acting on a structural system, provide a rationale for load combinations applied, and conceptualise the load resisting concrete structural systems
- Formulate, plan, manage, and complete projects, individually or in teams, in an ethical and professional manner considering stakeholder requirements and principals of sustainable development
- Design complex reinforced concrete structural components using appropriate Australian Standards
- Use appropriate software to analyse and/or design the structural components subjected to different load combinations
- Demonstrate a professional level of communication and leadership.

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Research
- Self-management
- Ethical and Professional Responsibility
- Leadership

2 Prestressed Concrete Beam Design

Assessment Type

Project (applied)

Task Description

You will be asked to design a PC beam as per a client's requirements. The project briefing will be released on Friday, Week 6.

Assessment Due Date

Week 11 Monday (24 May 2021) 5:00 pm AEST

Return Date to Students

Review/Exam Week Tuesday (8 June 2021)

Weighting

30%

Minimum mark or grade

40%

Assessment Criteria

Each question will be assessed for the criterion accuracy and correct answers.

- Correct application of mathematics and arithmetic
- Answers clearly identified and explained
- Correct results/explanation

In addition, the following criteria will be considered:

Evidence of correct procedures

- All necessary steps in the analysis are followed in the correct order
- Clear presentation of mathematical work

Evidence of an understanding of the topic

- Use of correct principles and theories
- Interpretation of results as necessary

Professional presentation

- Appropriate use of diagrams, clear diagrams
- Correct use of terminology, conventions

Submission

Online

Learning Outcomes Assessed

- Determine various types of loads acting on a structural system, provide a rationale for load combinations applied, and conceptualise the load resisting concrete structural systems
- Formulate, plan, manage, and complete projects, individually or in teams, in an ethical and professional manner considering stakeholder requirements and principals of sustainable development
- Design prestressed concrete structural components using appropriate Australian Standards
- Use appropriate software to analyse and/or design the structural components subjected to different load combinations
- Demonstrate a professional level of communication and leadership.

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills

- Research
- Self-management
- Ethical and Professional Responsibility
- Leadership

3 Class Test

Assessment Type

In-class Test(s)

Task Description

End-of-Term Examination will be conducted in the form of the Class test during the examination week.

Duration of the Test: 3 hours

This class test will be conducted in Melbourne, Perth and Rockhampton campus at the same time. All students must present one of these campuses to complete the test. On request (with a valid reason) this test shall be arranged to one of CQUni campuses.

Assessment Due Date

Review/Exam Week Friday (11 June 2021) 5:00 pm AEST

Return Date to Students

Weighting

40%

Minimum mark or grade

50%

Assessment Criteria

Each question will be assessed for the criterion accuracy and correct answers.

- Correct application of mathematics and arithmetic
- Answers clearly identified and explained
- Correct results/explanation

In addition, the following criteria will be considered:

Evidence of correct procedures

- All necessary steps in the analysis are followed in the correct order
- Clear presentation of mathematical work

Evidence of an understanding of the topic

- Use of correct principles and theories
- Interpretation of results as necessary

Professional presentation

- Appropriate use of diagrams, clear diagrams
- Correct use of terminology, conventions

Submission

Offline

Learning Outcomes Assessed

- Design complex reinforced concrete structural components using appropriate Australian Standards
- Design prestressed concrete structural components using appropriate Australian Standards

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Self-management

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?



Be Honest

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own



Seek Help

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)



Produce Original Work

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem