



# ENAC12002 *Steel and Concrete Design*

## Term 1 - 2022

Profile information current as at 08/05/2024 02:35 pm

All details in this unit profile for ENAC12002 have been officially approved by CQUUniversity 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

This unit introduces you to the basic principles and processes of structural design. You will learn how to design simple structural components made of steel and reinforced concrete under the supervision of a professional engineer. The concept of load action will be introduced and you will build on the structural analysis skills developed in Engineering Statics. Properties of common construction materials and structural sections will be reviewed in the context of sustainability. You will also develop your professional communication, problem-solving and ethical practice skills.

#### Details

Career Level: *Undergraduate*

Unit Level: *Level 2*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

#### Pre-requisites or Co-requisites

Prerequisite: ENEG11006 Engineering Statics and ENEG11008 Materials for Engineers.

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 - 2022

- Online

#### 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 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 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. **Online Quiz(zes)**

Weighting: 20%

#### 2. **Written Assessment**

Weighting: 40%

#### 3. **Written Assessment**

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**

Study materials need more worked examples and updated inlined with lectures.

**Recommendation**

The study materials will be reviewed with all recent updates of Australian Standards and more worked examples will be included for 2022.

#### Feedback from Moodle

**Feedback**

Assessment feedback was received very late.

**Recommendation**

The unit coordinator acknowledges the delay and will ensure the timely return of assessment feedback in 2022.

#### Feedback from Moodle

**Feedback**

Emails are not answered in a timely manner.

**Recommendation**

Students are encouraged to use Moodle forum (Q&A) to ask any unit related queries. This will ensure the teaching staff monitor and answer the queries.

#### Feedback from Moodle

**Feedback**

Assessment feedback can be given in more detail.

**Recommendation**

From 2022, a separate Zoom session will be offered after the return of the assessment items to explain each question and also give the students the opportunity to ask for any clarifications on individual cases.

#### Feedback from Email and Moodle

**Feedback**

After-hours Zoom sessions are helpful.

**Recommendation**

This will be offered again in 2022 as usual.

## Unit Learning Outcomes

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

1. Describe the limit state design process
2. Evaluate basic material and section properties for reinforced concrete and structural steel members in the context of sustainability
3. Design appropriate steel and concrete members using design tables and charts that comply with relevant Australian Standards
4. Demonstrate ethical conduct and a professional level of communication.

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

### **Introductory**

1.5 Knowledge of engineering design practice and contextual factors impacting the practice area. (LO: 3N ) 2.2 Application of technical and practical techniques, tools and resources to well-defined engineering problems. (LO: 3N ) 3.1 Ethical conduct and professional accountability. (LO: 4N ) 3.5 Orderly management of self, and professional conduct. (LO: 4N )

### **Intermediate**

1.2 Procedural-level understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the practice area. (LO: 3I ) 1.4 Discernment of engineering developments within the practice area. (LO: 2N 3I ) 2.1 Application of established technical and practical methods to the solution of well-defined engineering problems. (LO: 3I ) 3.2 Effective oral and written communication in professional and lay domains. (LO: 3I 4I ) 3.4 Professional use and management of information. (LO: 3I 4I )

### **Advanced**

1.1 Descriptive, formula-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the practice area. (LO: 1N 2I 3A ) 1.3 In-depth practical knowledge and skills within specialist sub-disciplines of the practice area. (LO: 1N 2I 3A ) 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 1N 2N 3A ) 2.3 Application of systematic design processes to well-defined engineering problems. (LO: 3A )

**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 Undergraduate Course 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=1511>



## Alignment of Learning Outcomes, Assessment and Graduate Attributes

 N/A Level	 Introductory Level	 Intermediate Level	 Graduate Level	 Professional Level	 Advanced Level
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### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes			
	1	2	3	4
1 - Online Quiz(zes) - 20%		•	•	
2 - Written Assessment - 40%	•	•	•	•
3 - Written Assessment - 40%	•	•	•	•

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes			
	1	2	3	4
1 - Communication	•			•
2 - Problem Solving		•	•	
3 - Critical Thinking		•	•	
4 - Information Literacy	•		•	
5 - Team Work				
6 - Information Technology Competence		•		•
7 - Cross Cultural Competence			•	
8 - Ethical practice			•	•
9 - Social Innovation				
10 - Aboriginal and Torres Strait Islander Cultures				

## Textbooks and Resources

### Textbooks

ENAC12002

#### Prescribed

##### **Design Capacity Tables for Structural Steel, Vol. 1: Open Sections**

5th Edition (2016)

Authors: Australian Steel Institute

Australian Steel Institute

Sydney , NSW , Australia

ISBN: 9781921476402

Binding: eBook

ENAC12002

#### Prescribed

##### **HB71-2011: Reinforced Concrete Design in accordance with AS 3600 - 2009**

(2011)

Authors: BD-002 (Concrete Structures)

Cement Concrete & Aggregates Australia and Standards Australia

Sydney , NSW , Australia

ISBN: 9781877023286

Binding: eBook

#### Additional Textbook Information

The prescribed textbook for concrete design (HB71-2011: Reinforced Concrete Design in accordance with AS 3600 - 2009) is based on the AS3600:2009 version. However, a new version of AS3600 was released in 2018. Therefore, please check any updated edition of the prescribed textbook before purchasing for Term 1, 2022.

### IT Resources

#### **You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Microphone and headset

## Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Kumaran Suntharavadivel** Unit Coordinator

[t.suntharavadivel@cqu.edu.au](mailto:t.suntharavadivel@cqu.edu.au)

## Schedule

### **Week 1 - 07 Mar 2022**

#### **Module/Topic**

#### **Chapter**

#### **Events and Submissions/Topic**

Introduction to Structural Design, Limit  
State Design, Estimation of Loads on  
the Structure

### **Week 2 - 14 Mar 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Reinforced Concrete Design: Beam Design I		
<b>Week 3 - 21 Mar 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Reinforced Concrete Design: Beam Design II		
<b>Week 4 - 28 Mar 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Reinforced Concrete Design: One way Slab Design		<b>Progressive Assessment (Quiz) 1</b> opens at 09:00 AM on Monday
<b>Week 5 - 04 Apr 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Reinforced Concrete Design: Two-way Slab Design		<b>Progressive Assessment (Quiz) 1</b> closes at 09:00 AM on Monday
<b>Vacation Week - 11 Apr 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Vacation week		
<b>Week 6 - 18 Apr 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Reinforced Concrete Design: Column Design		
<b>Week 7 - 25 Apr 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Steel Design: Introduction to the Steel Design		<b>Team Project</b> Due: Week 7 Wednesday (27 Apr 2022) 5:00 pm AEST
<b>Week 8 - 02 May 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Steel Design: Design of Tension Members		
<b>Week 9 - 09 May 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Steel Design: Design of Compression Members		
<b>Week 10 - 16 May 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Steel Design: Design of Bending Members		<b>Progressive Assessment (Quiz) 2</b> opens at 09:00 AM on Monday
<b>Week 11 - 23 May 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Steel Design: Design of Webs in Shear and Bearing		<b>Progressive Assessment (Quiz) 2</b> closes at 09:00 AM on Monday
<b>Week 12 - 30 May 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Steel Design: Design of connections		
<b>Review/Exam Week - 06 Jun 2022</b>		
Module/Topic	Chapter	Events and Submissions/Topic

**Exam Week - 13 Jun 2022**

Module/Topic

Chapter

Events and Submissions/Topic

## Assessment Tasks

### 1 Progress Assessments

**Assessment Type**

Online Quiz(zes)

**Task Description**

This assessment task consists of Two Progressive assessments (tests) in the form of online quizzes. Each test consists of a combination of numerical and multiple-choice questions.

Important Notes:

- Each test is set for 60 minutes. You have 60 minutes from when you start your attempt to submit your answers. If you start but leave a test and come back to it later, your 60 min time may have lapsed and you will be scored - zero for that attempt.
- You can attempt the quiz up to 2 times within the given time frame (generally 1 week) as specified in the Schedule. The test will be automatically closed after the end of the given time frame.
- The final mark will be the Highest of all the attempts.
- Tests cannot be deferred.

**Number of Quizzes**

2

**Frequency of Quizzes**

Other

**Assessment Due Date**

See the Schedule

**Return Date to Students**

Immediately after the submission

**Weighting**

20%

**Assessment Criteria**

Due to the nature of the assessment, only the final answer will be considered. Full marks will be given for each correct answer, but there will be no partial marks.

**Referencing Style**

- [Harvard \(author-date\)](#)

**Submission**

Online

**Learning Outcomes Assessed**

- Evaluate basic material and section properties for reinforced concrete and structural steel members in the context of sustainability
- Design appropriate steel and concrete members using design tables and charts that comply with relevant Australian Standards

### 2 Team Project

**Assessment Type**

Written Assessment



### Task Description

This assessment to cover the content from weeks 1 to 6 (Reinforced Concrete Design). Assessment questions include theory, analysis and design of structural elements. Questions will be available on Moodle at the end of Week 1.

### Assessment Due Date

Week 7 Wednesday (27 Apr 2022) 5:00 pm AEST

### Return Date to Students

Week 9 Wednesday (11 May 2022)

### Weighting

40%

### Minimum mark or grade

40%

### Assessment Criteria

**Each question in this assignment will be assessed separately for *accuracy and correct results*.**

- Correct application of mathematics and arithmetic
- Answers clearly identified
- Correct results

**In addition, the assignment as a whole will be assessed against the following criteria:**

#### Evidence of correct procedures

- All necessary steps in the analysis are present in the correct order
- Clear presentation of mathematical and arithmetical working linking given details of the problem to the results obtained
- Evidence of checking results (mathematical, graphical, logic-common sense)

#### Evidence of the understanding of the topic

- Explanation of choices made in the analysis (why is the procedure required, why this particular procedure)
- Interpretation of results, eg limitations, the direction of vectors

#### Professional presentation

- The work (job) is clearly identified (problem, date, analyst)
- A clear statement of each problem and its details and requirements
- The logical layout of the analysis
- Appropriate use of diagrams, clear diagrams
- Correct use of terminology, conventions
- Clear English in the explanation of procedure and interpretation of results.

### Referencing Style

- [Harvard \(author-date\)](#)

### Submission

Online Group

### Learning Outcomes Assessed

- Describe the limit state design process
- Evaluate basic material and section properties for reinforced concrete and structural steel members in the context of sustainability
- Design appropriate steel and concrete members using design tables and charts that comply with relevant Australian Standards
- Demonstrate ethical conduct and a professional level of communication.

## 3 Individual Assignment

### Assessment Type

Written Assessment

### Task Description

This assessment covers the content from weeks 7 to 12 (Steel Design). Assessment questions include theory, analysis and design of structural elements. Questions will be available via Moodle unit website at the beginning of Week 7.

**Assessment Due Date**

Review/Exam Week Wednesday (8 June 2022) 5:00 pm AEST

**Return Date to Students**

Wednesday, 22/06/2022

**Weighting**

40%

**Minimum mark or grade**

40%

**Assessment Criteria**

**Each question in this assignment will be assessed separately for *accuracy and correct results*.**

- Correct application of mathematics and arithmetic
- Answers clearly identified
- Correct results

**In addition, the assignment as a whole will be assessed against the following criteria:**

**Evidence of correct procedures**

- All necessary steps in the analysis are present in the correct order
- Clear presentation of mathematical and arithmetical working linking given details of the problem to the results obtained
- Evidence of checking results (mathematical, graphical, logic-common sense)

**Evidence of the understanding of the topic**

- Explanation of choices made in the analysis (why is the procedure required, why this particular procedure)
- Interpretation of results, eg limitations, the direction of vectors

**Professional presentation**

- The work (job) is clearly identified (problem, date, analyst)
- A clear statement of each problem and its details and requirements
- The logical layout of the analysis
- Appropriate use of diagrams, clear diagrams
- Correct use of terminology, conventions
- Clear English in the explanation of procedure and interpretation of results.

**Referencing Style**

- [Harvard \(author-date\)](#)

**Submission**

Online

**Learning Outcomes Assessed**

- Describe the limit state design process
- Evaluate basic material and section properties for reinforced concrete and structural steel members in the context of sustainability
- Design appropriate steel and concrete members using design tables and charts that comply with relevant Australian Standards
- Demonstrate ethical conduct and a professional level of communication.

## 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