ENAC12002 *Steel and Concrete Design*

Term 1 - 2024

Profile information current as at 10/05/2024 10:44 am

All details in this unit profile for ENAC12002 have been officially approved by CQUniversity 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 - 2024

- 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: 40%
2. **Written Assessment**
Weighting: 30%
3. **Written Assessment**
Weighting: 30%

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 Student communication

Feedback
Learning materials need improvements.

Recommendation
Additional resources (short videos and updated study materials) should be provided in 2023.

Feedback from Student communication

Feedback
Assessments can be linked with unit learning outcomes in more detail.

Recommendation
All assessments should be revised and peer-reviewed before the 2023 offer.

Feedback from Student communication

Feedback
This unit content is directly linked to real-world applications and is relevant to the industry.

Recommendation
Continue linking the unit materials with real-world applications.

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

Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes			
	1	2	3	4
1 - Online Quiz(zes) - 40%		•	•	
2 - Written Assessment - 30%	•	•	•	•
3 - Written Assessment - 30%	•	•	•	•

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
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Supplementary

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
HB71-2011 is Pending Revision for the recent update of AS3600 in 2018.

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

Schedule

Week 1 - 04 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Structural Design, Limit State Design, Estimation of Loads on the Structure	Study Resources will be provided on Moodle	

Week 2 - 11 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic

Reinforced Concrete Design: Beam Design I	Study Resources will be provided on Moodle	

Week 3 - 18 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Reinforced Concrete Design: Beam Design II	Study Resources will be provided on Moodle	**Progressive Assessment (Quiz 1)** opens on Monday at 09:00 AM Topic: RC Beam Design Due on Monday Week 4 at 09:00 AM

Week 4 - 25 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Reinforced Concrete Design: One way Slab Design	Study Resources will be provided on Moodle	

Week 5 - 01 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Reinforced Concrete Design: Two-way Slab Design	Study Resources will be provided on Moodle	**Progressive Assessment (Quiz 2)** opens on Wednesday at 09:00 AM Topic: RC Slab Design Due on Wednesday Week 6 at 09:00 AM

Vacation Week - 08 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Vacation week		

Week 6 - 15 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Reinforced Concrete Design: Column Design	Study Resources will be provided on Moodle	

Week 7 - 22 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Steel Design: Introduction to the Steel Design		**Assignment 1: Reinforced Concrete Design** Due: Week 7 Tuesday (23 Apr 2024) 5:00 pm AEST

Week 8 - 29 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Steel Design: Design of Tension Members	Study Resources will be provided on Moodle	

Week 9 - 06 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Steel Design: Design of Compression Members	Study Resources will be provided on Moodle	**Progressive Assessment (Quiz 3)** opens on Wednesday at 09:00 AM Topic: Steel Tension and Compression Members Due on Wednesday Week 10 at 09:00 AM

Week 10 - 13 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Steel Design: Design of Bending Members	Study Resources will be provided on Moodle	

Week 11 - 20 May 2024

Module/Topic	Chapter	Events and Submissions/Topic

Steel Design: Design of Webs in Shear and Bearing	Study Resources will be provided on Moodle	**Progressive Assessment (Quiz 4)** opens on Wednesday at 09:00 AM Topic: Steel Bending Members & Connections Due on Wednesday Week 12 at 09:00 AM
Week 12 - 27 May 2024		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Steel Design: Design of connections	Study Resources will be provided on Moodle	
Review/Exam Week - 03 Jun 2024		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Application of Software in Structural Analysis and Design		**Assignment 2: Steel Design** Due: Review/Exam Week Wednesday (5 June 2024) 5:00 pm AEST
Exam Week - 10 Jun 2024		
Module/Topic	**Chapter**	**Events and Submissions/Topic**

Term Specific Information

All lecture materials and recorded videos will be available on Moodle on Monday morning each week and tutorial discussions will run on that evening at 06:00 PM. Students are encouraged to review the course materials before the tutorial class.

Assessment Tasks

1 Progressive Assessments

Assessment Type
Online Quiz(zes)

Task Description
This assessment task consists of **four** 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-minute time may have lapsed and you will be scored - zero for that attempt.
- You can attempt the quiz up to two times within the given time frame (generally one week) specified in the Schedule. Questions shall be different for each attempt and each student.
- The test will be automatically closed after the given time frame ends.
- The final mark will be the **Highest** of all the attempts.
- Tests cannot be deferred.

Number of Quizzes
4

Frequency of Quizzes
Other

Assessment Due Date

See the Schedule

Return Date to Students

Immediately after the submission

Weighting
40%

Minimum mark or grade
30% (total of 12 marks out of 40 marks)

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 Assignment 1: Reinforced Concrete Design

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 Tuesday (23 Apr 2024) 5:00 pm AEST

Return Date to Students
Week 9 Tuesday (7 May 2024)

Weighting
30%

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
- 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 work 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 correctly 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.

3 Assignment 2: Steel Design

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 the Moodle unit website at the beginning of Week 7.

Assessment Due Date
Review/Exam Week Wednesday (5 June 2024) 5:00 pm AEST

Return Date to Students
Exam Week Friday (14 June 2024)

Weighting
30%

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
- 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 work 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 correctly 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