ENEC14014 *Structural and Geotechnical Design*
Term 1 - 2017

Profile information current as at 04/05/2024 11:46 am

General Information

Overview

In this unit you will analyse, design and prepare documentation for major civil engineering projects involving a broad range of investigation and design activities. You will establish project requirements and determine design loads and conditions, analyse structures and design components using Australian Standards and/or relevant guidance. You will use commercial computer software to analyse and design the structures with various design actions; conduct site investigations, test and characterise geotechnical materials, design foundations and earth retaining structures, and make assessments of geotechnical stability. In this unit you are expected to document the process of modelling, testing and analysis and communicate, work and learn, both individually and in teams in a professional manner. If you are enrolled in distance mode, you will be required to attend a residential school during the term.

Details

Career Level: *Undergraduate*
Unit Level: *Level 4*
Credit Points: *12*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.25*

Pre-requisites or Co-requisites

Prerequisite: (ENEC12012 Stress Analysis or ENEC13010 Solid Mechanics) AND ENEC12008 Geotechnical Engineering AND (ENEC13015 Steel & Timber Design or ENEC13011 Steel Structures) AND (ENEC13016 Concrete Technology & Design or ENEC14013 Concrete Structures)
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 - 2017

- Bundaberg
- Distance
- Gladstone
- Mackay
- Melbourne
- 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).

Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:
Click here to see your Residential School Timetable.

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 Undergraduate 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. **Portfolio**
Weighting: 40%
2. **Portfolio**
Weighting: 30%
3. **Portfolio**
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 Moodle

Feedback
Overall the course was delivered in more structured way. Assessment tasks are clearly defined and necessary supports/instructions were given by the staff to assist students to successfully complete the assessments .

Recommendation
Continue with current course structure and delivery including clearly defined assessment and student support from teaching staff.

Action
Done.

Feedback from Moodle

Feedback
Assessment policy is clear and easy to understand

Recommendation
Continue with current course structure and delivery including clearly defined assessment and student support from teaching staff.

Action
Done,

Unit Learning Outcomes

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

1. Calculate various types of loads acting on a structural system and provide a rationale for applied load combinations
2. Analyse and design complex structural components using appropriate Australian Standards
3. Describe and demonstrate site investigation and geotechnical testing techniques used to characterise sites and geotechnical materials
4. Analyse, assess and design foundations and earth retaining structures and assess stability of slopes
5. Analyse and/or design structural and geotechnical components using appropriate software
6. Demonstrate a professional level of communication and team work

The Learning Outcomes for this unit are linked with **Engineers Australia's Stage 1 Competency Standard.**

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	5	6
1 - Portfolio - 40%	•	•	•	•	•	•
2 - Portfolio - 30%			•	•	•	•

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
3 - Portfolio - 30%	•	•			•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
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						

Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Portfolio - 40%	•	•	•	•	•	•	•	•		
2 - Portfolio - 30%	•	•	•	•		•	•	•		
3 - Portfolio - 30%	•	•	•	•		•	•	•		

Textbooks and Resources

Textbooks

ENEC14014

Prescribed

Reinforced and Prestressed Concrete
2nd Edition (2013)
Authors: Yew-Chaye Loo, Sanaul H. Chowdhury
Cambridge University Press
Melbourne , VIC , Australia
ISBN: 9781107637863
Binding: Hardcover
ENEC14014

Prescribed

Soil Mechanics and Foundations
3rd Edition (2010)
Authors: Muni Budhu
John Wiley & Sons
USA
ISBN: 978-0-470-55684-9
Binding: Hardcover
ENEC14014

Supplementary

Design of Prestressed Concrete to AS3600-2009
2nd Edition (2015)
Authors: Gilbert, R. I., Mickleborough, N. C., Ranzi, G.
CRC Press
Boca Raton , FL , USA
ISBN: 978-1-4665-7269-0
Binding: Hardcover
ENEC14014

Supplementary

Foundation Design: Principles and Practices
3rd Edition (2015)
Authors: Coduto, D. P., Kitch, W. A., Yeung, M. R.
Pearson
USA
ISBN: 9780133411898
Binding: Hardcover

Additional Textbook Information
Prescribed textbook for Geotechnical Design (Soil Mechanics and Foundations) is the same textbook you used for the prerequisites unit ENEC12008.
In addition to the text book, students **must have access to Australian Standards** and **SA HB 108-2013 Timber Design Handbook** (available through university library website) also required for the unit. Full list of required standards are available on the unit website.
List of recommenced reading books/papers may be available from the unit website, as necessary.

View textbooks at the CQUniversity Bookshop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Any FEM and Design Software

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 - 06 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1: Course Introduction & Timber Design I **Lecture 2:** Bearing Capacity of Shallow Foundation I	**Structural Design:** Introduction to Timber Design; Limit state design (AS1720.1) **Geotechnical Design:** Bearing Capacity of Shallow Foundations	

Week 2 - 13 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1: Timber Design II **Lecture 2:** Bearing Capacity of Shallow Foundation II	**Structural Design:** Design of tension, compression and bending members; Combined actions (AS1720.1) **Geotechnical Design:** Bearing Capacity of Shallow Foundations	

Week 3 - 20 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1: Timber Design III **Lecture 2:** Bearing Capacity of Deep Foundation I	**Structural Design:** Design of connections (AS1720.1) **Geotechnical Design:** Pile Foundations	

Week 4 - 27 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1: Structural Tutorials (Timber Design) **Lecture 2:** Bearing Capacity of Deep Foundation II	**Structural Design:** Tutorials **Geotechnical Design:** Pile Foundations	

Week 5 - 03 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1: Reinforced Concrete Design using Strut-and-tie model **Lecture 2:** Geotechnical Tutorials	**Structural Design:** Reinforced Concrete Design **Geotechnical Design:** Tutorials	

Vacation Week - 10 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Mid-term break		

Week 6 - 17 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic

Lecture 1: Prestressed Concrete Design I **Lecture 2:** Retaining Wall I	**Structural Design:** Introduction to prestressed concrete design; Prestress force and tendon profile **Geotechnical Design:** Retaining wall	**Team Portfolio** Due: Week 6 Friday (21 Apr 2017) 5:00 am AEST

Week 7 - 24 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1: Prestressed Concrete Design II **Lecture 2:** Retaining Wall II	**Structural Design:** Losses; Ultimate design checks **Geotechnical Design:** Retaining wall	

Week 8 - 01 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1: Structural Tutorials (Prestressed Concrete Design) **Lecture 2:** Slope Stability	**Structural Design:** Prestressed Concrete Design **Geotechnical Design:** Slope Stability	

Week 9 - 08 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1: Application of FEA in Structural Engineering **Lecture 2:** Site Investigation	**Structural Design:** Use of FEA software in structural engineering analysis and design **Geotechnical Design:** Site Investigation	**Residential School** [08 May - 10 May]

Week 10 - 15 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1: Tutorials (as required) **Lecture 2:** Tutorials (as required)	Tutorials	

Week 11 - 22 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture 1: Tutorials (as required) **Lecture 2:** Tutorials (as required)	Tutorials	

Week 12 - 29 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
No lectures in this week - Both Individual Project Portfolios are due this week [Wednesday]		**Individual Portfolio 1 (Structural Design)** Due: Week 12 Wednesday (31 May 2017) 5:00 pm AEST **Individual Portfolio 2 (Geotechnical Design)** Due: Week 12 Wednesday (31 May 2017) 5:00 pm AEST

Review/Exam Week - 05 Jun 2017

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 12 Jun 2017

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

Please read **ENEC14014: General Information** available in the unit website.
Practical Classes for on-campus students will be scheduled after week 6. Detail of the laboratory timetable will be available in Week 3.Distance students will complete all practicals during the residential school.
Due to multi-campus delivery of the unit, **workshop** timetable will be available from unit website separately.

Assessment Tasks

1 Team Portfolio

Assessment Type
Portfolio

Task Description
Objective:
The aim of this assessment is to allow the students to demonstrate their understanding of various concepts, theories and processes developed in both Structural and Geotechnical Engineering topics covered in the program. This may include, but is not limited to structural analysis, calculation of design actions, concrete design, steel design, timber design, prestressed concrete design, consolidation, slope stability, site investigation, earth retaining wall and foundation design.
Formal assessment is by submission of a portfolio which contains evidence of all the individual work that the student has performed throughout the term. A portfolio is used to allow individuals to choose evidence that demonstrates to the satisfaction of course assessors how the learning outcomes have been met and to what level.
*A **Portfolio Brief*** detailing the requirements for Portfolio, including required pieces of work, will be available on the course Website in Week 1. Students must read and follow the guidance and timeline to complete the project successfully.
This assessment is based on team project and **single portfolio** must be submitted by each team.

Assessment Due Date
Week 6 Friday (21 Apr 2017) 5:00 am AEST

Return Date to Students

Please see the project brief

Weighting
40%

Minimum mark or grade
50% of the total marks for the assignment are required to pass this course

Assessment Criteria
Grades for the assessment will be determined based on the evidence and substantiation of attainment of the Learning Outcomes.
After submission of the portfolio, a short interview (viva) may be scheduled for each student. Students must be prepared to answer any questions raised by the facilitator/lecturer. The questions will be based on their individual achievement/work and the work the team has produced. The interview also used as assessment tool and an unsatisfactory performance during interview may affect the grade.
Omission of any of the required items as specified in the **Portfolio Brief** will automatically result in a Fail grade.
Students will receive feedback after two weeks of the interview.
Individual Student's Grade:
Initially team submission will be assessed and a grade will be given for each team. Then individual grade will be determined based on their contribution **and** performance during the viva. Each student's contribution will be determined by peer assessment. It may be possible individual grade may be higher than team marks, but capped at maximum marks for the assessment.
Example: *Individual contributions of 3 students in* Team A *are given below. This* Team A *received 36 marks (out of 40) for their portfolio.*
M1 - 30%; M2 - 33%; M3 - 37% (Total 100%)
Based on the contribution, Individual marks are given as follow.
M1 = 36 x (30/33.3) = 32.4 (out of 40)
M2 = 36 x (33/33.3) = 35.6 (out of 40)
M3 = 36 x (37/33.3) = 40.0 (out of 40)
If the performance in the viva is not at the satisfactory level, the above individual marks will be multiplied by 0.5 and given as final marks for this assessment item.

Referencing Style

- Harvard (author-date)

Submission
Online Group

Submission Instructions
It is not expected that students will type up workbook/calculations. Students should scan hand calculations for online submission.

Learning Outcomes Assessed

- Calculate various types of loads acting on a structural system and provide a rationale for applied load combinations
- Analyse and design complex structural components using appropriate Australian Standards
- Describe and demonstrate site investigation and geotechnical testing techniques used to characterise sites and geotechnical materials
- Analyse, assess and design foundations and earth retaining structures and assess stability of slopes
- Analyse and/or design structural and geotechnical components using appropriate software
- Demonstrate a professional level of communication and team work

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

2 Individual Portfolio 1 (Structural Design)

Assessment Type
Portfolio

Task Description
Objective:
The aim of this assessment is to allow the students to demonstrate their understanding of various concepts, theories and processes developed in Structural Engineering topics covered in the program. This may include, but is not limited to structural analysis, calculation of design actions, concrete design, steel design, timber design and prestressed concrete design.
Formal assessment is by submission of a portfolio which contains evidence of all the individual work that the student has performed throughout the term. A portfolio is used to allow individuals to choose evidence that demonstrates to the satisfaction of course assessors how the learning outcomes have been met and to what level.
*A **Portfolio Brief*** detailing the requirements for Portfolio, including required pieces of work, will be available on the course Website in Week 6. Students must read and follow the guidance and timeline to complete the project successfully.

Assessment Due Date
Week 12 Wednesday (31 May 2017) 5:00 pm AEST

Return Date to Students

2 weeks after the interview

Weighting
30%

Minimum mark or grade
50% of the total marks for the assignment are required to pass this course

Assessment Criteria
Grades for the assessment will be determined based on the evidence and substantiation of attainment of the Learning Outcomes.
After submission of the portfolio, a short interview (viva) will be scheduled for each student. Students must be prepared to answer any questions raised by the facilitator/lecturer. The questions will be based on their individual achievement/work and the work they produced. The interview also used as assessment tool and an unsatisfactory performance during interview may affect the grade*.
Omission of any of the required items as specified in the **Portfolio Brief** will automatically result in a Fail grade.
* *If the performance in the viva is not at the satisfactory level, the marks obtained from the submission will be multiplied by 0.5 and awarded as final marks for this assessment.*

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
One Report for team

Learning Outcomes Assessed

- Describe and demonstrate site investigation and geotechnical testing techniques used to characterise sites and geotechnical materials
- Analyse, assess and design foundations and earth retaining structures and assess stability of slopes
- Analyse and/or design structural and geotechnical components using appropriate software
- Demonstrate a professional level of communication and team work

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

3 Individual Portfolio 2 (Geotechnical Design)

Assessment Type
Portfolio

Task Description
Objective:
The aim of this assessment is to allow the students to demonstrate their understanding of various concepts, theories and processes developed in Geotechnical Engineering topics covered in the program. This may include, but is not limited to consolidation, slope stability, site investigation, earth retaining wall and foundation design.
Formal assessment is by submission of a portfolio which contains evidence of all the individual work that the student has performed throughout the term. A portfolio is used to allow individuals to choose evidence that demonstrates to the satisfaction of course assessors how the learning outcomes have been met and to what level.
*A **Portfolio Brief*** detailing the requirements for Portfolio, including required pieces of work, will be available on the course Website in Week 6. Students must read and follow the guidance and timeline to complete the project successfully.

Assessment Due Date
Week 12 Wednesday (31 May 2017) 5:00 pm AEST

Return Date to Students

After the final grade released

Weighting
30%

Minimum mark or grade
50% of the total marks for the assignment are required to pass this course

Assessment Criteria
Grades for the assessment will be determined based on the evidence and substantiation of attainment of the Learning Outcomes.
After submission of the portfolio, a short interview (viva) will be scheduled for each student. Students must be prepared to answer any questions raised by the facilitator/lecturer. The questions will be based on their individual achievement/work and the work they produced. The interview also used as assessment tool and an unsatisfactory performance during interview may affect the grade*.
Omission of any of the required items as specified in the **Portfolio Brief** will automatically result in a Fail grade.
* *If the performance in the viva is not at the satisfactory level, the marks obtained from the submission will be multiplied by 0.5 and awarded as final marks for this assessment.*

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Calculate various types of loads acting on a structural system and provide a rationale for applied load combinations
- Analyse and design complex structural components using appropriate Australian Standards
- Analyse and/or design structural and geotechnical components using appropriate software
- Demonstrate a professional level of communication and team work

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence
- Cross Cultural Competence
- Ethical practice

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