ENEC13017 *Advanced Structural Analysis*
Term 2 - 2019

Profile information current as at 12/10/2024 06:07 pm

All details in this unit profile for ENEC13017 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
In this unit, you will analyse determinacy and stability, and the implications this has for structural analysis. You will also determine reactions, internal forces and displacements of structures, and analyse truss and beams with moving loads. You will be introduced to fundamentals of finite element method and use commercially available software to analyse structures.

Details
Career Level: *Undergraduate*
Unit Level: *Level 3*
Credit Points: *6*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites
Prerequisites: ENEG11006 Engineering Statics AND ENEC12012 Stress Analysis
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 2 - 2019

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Online
- 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 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. **Written Assessment**
Weighting: 13%
2. **Written Assessment**
Weighting: 13%
3. **Written Assessment**
Weighting: 12%
4. **Written Assessment**
Weighting: 12%
5. **Examination**
Weighting: 50%

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 Unit evaluation

Feedback

Generally students feedback is very positive, the students thought the unit was very well structured and the concepts well explained.

Recommendation

The standard in this unit will be upheld.

Feedback from Unit evaluation

Feedback

The assessment items were clear and marked very quickly. Being able to run through the assignment solution immediately after submission was very helpful.

Recommendation

The practice of solving the assignments in the tutorial sessions immediately after submission due date will continue.

Feedback from Unit evaluation

Feedback

There was some concern regarding the amount of work and time required for this unit.

Recommendation

The time and work needed for this unit are consistent with a 3rd year engineering unit.

Unit Learning Outcomes

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

1. Conduct structural idealisation, static and kinematic indeterminacy and the duality of flexibility and stiffness for practical structures
2. Analyse statically indeterminate structures to determine support reactions, internal forces and nodal displacements
3. Solve structural analysis problems using software packages by applying finite element method
4. Conduct plastic collapse analysis, lower and upper bound solutions for practical structures
5. Demonstrate a professional level of communication.

The learning outcomes are linked to Engineers Australia Stage 1 Competencies and also discipline capabilities. You can find the mapping for this on the Engineering Undergraduate Course website.

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
1 - Written Assessment - 13%	•				•

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
2 - Written Assessment - 13%		•			
3 - Written Assessment - 12%			•		•
4 - Written Assessment - 12%				•	
5 - Examination - 50%	•	•	•	•	

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
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 - Written Assessment - 13%	•	•	•	•						
2 - Written Assessment - 13%	•	•	•	•						
3 - Written Assessment - 12%	•	•	•	•		•				
4 - Written Assessment - 12%	•	•	•	•						
5 - Examination - 50%	•	•	•	•						

Textbooks and Resources

Textbooks

ENEC13017

Prescribed

Structural Analysis in SI Units
Edition: 10th edn (2019)
Authors: Hibbeler, R
Pearson
Harlow , Essex , UK
ISBN: 9781292247137
Binding: Paperback

Additional Textbook Information
Paper copies can be purchased from the CQUni Bookshop here: http://bookshop.cqu.edu.au (search on the Unit code)
eBook copies can be purchased from the publisher's website here: https://pearson.com.au/9781292247236

View textbooks at the CQUniversity Bookshop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Structural analysis software SpaceGass
- Matlab

Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

Teaching Contacts

Faris Albermani Unit Coordinator
f.albermani@cqu.edu.au

Schedule

Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Introduction, Virtual work, statically indeterminate structures (SIS)	Refer to Lecture Supplement	

Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Method of consistent deformations for analyzing SIS, Flexibility approach	Refer to Lecture Supplement	

Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Computational techniques and structural modelling	Refer to Lecture Supplement	

Week 4 - 05 Aug 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Stiffness approach for structural analysis	Refer to Lecture Supplement	**Assignment 1** Due: Week 4 Monday (5 Aug 2019) 11:45 pm AEST
Week 5 - 12 Aug 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Direct stiffness method: beam structures	Refer to Lecture Supplement	
Vacation Week - 19 Aug 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Week 6 - 26 Aug 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Direct stiffness method: truss structures	Refer to Lecture Supplement	**Assignment 2** Due: Week 6 Monday (26 Aug 2019) 11:45 pm AEST
Week 7 - 02 Sep 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Direct stiffness method: frame structures	Refer to Lecture Supplement	
Week 8 - 09 Sep 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Moment distribution method for beam analysis	Refer to Lecture Supplement	**Assignment 3** Due: Week 8 Monday (9 Sept 2019) 11:45 pm AEST
Week 9 - 16 Sep 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Elastic analysis, Plastic analysis and Nonlinear analysis	Refer to Lecture Supplement	
Week 10 - 23 Sep 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Plastic collapse theorems	Refer to Lecture Supplement	
Week 11 - 30 Sep 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Upper and lower bound solutions	Refer to Lecture Supplement	**Assignment 4** Due: Week 11 Monday (30 Sept 2019) 11:45 pm AEST
Week 12 - 07 Oct 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Limit analysis	Refer to Lecture Supplement	
Review/Exam Week - 14 Oct 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Revision		Final exam as per the University examination timetable
Exam Week - 21 Oct 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
		Final exam as per the University examination timetable

Assessment Tasks

1 Assignment 1

Assessment Type
Written Assessment

Task Description
The assignment will be available for download from the unit Moodle site.

Assessment Due Date
Week 4 Monday (5 Aug 2019) 11:45 pm AEST

Return Date to Students

The assignment will be marked and returned within 2 weeks

Weighting
13%

Assessment Criteria
Submission must be neatly presented and easy to follow. Use clearly annotated diagrams when possible. State all the assumptions and calculations made in your solution.

Referencing Style

- Harvard (author-date)

Submission
Online

assessmentOutcome

- Conduct structural idealisation, static and kinematic indeterminacy and the duality of flexibility and stiffness for practical structures
- Demonstrate a professional level of communication.

assessmentGradAttribute

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

2 Assignment 2

Assessment Type
Written Assessment

Task Description
The assignment will be available for download from the unit Moodle site.

Assessment Due Date
Week 6 Monday (26 Aug 2019) 11:45 pm AEST

Return Date to Students

The assignment will be marked and returned within 2 weeks

Weighting
13%

Assessment Criteria
Submission must be neatly presented and easy to follow. Use clearly annotated diagrams when possible. State all the assumptions and calculations made in your solution.

Referencing Style

- Harvard (author-date)

Submission
Online

assessmentOutcome

- Analyse statically indeterminate structures to determine support reactions, internal forces and nodal displacements

assessmentGradAttribute

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

3 Assignment 3

Assessment Type
Written Assessment

Task Description
The assignment will be available for download from the unit Moodle site.

Assessment Due Date
Week 8 Monday (9 Sept 2019) 11:45 pm AEST

Return Date to Students

The assignment will be marked and returned within 2 weeks

Weighting
12%

Assessment Criteria
Submission must be neatly presented and easy to follow. Use clearly annotated diagrams when possible. State all the assumptions and calculations made in your solution.

Referencing Style

- Harvard (author-date)

Submission
Online

assessmentOutcome

- Solve structural analysis problems using software packages by applying finite element method
- Demonstrate a professional level of communication.

assessmentGradAttribute

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

4 Assignment 4

Assessment Type
Written Assessment

Task Description
The assignment will be available for download from the unit Moodle site.

Assessment Due Date
Week 11 Monday (30 Sept 2019) 11:45 pm AEST

Return Date to Students

The assignment will be marked and returned within 2 weeks

Weighting
12%

Assessment Criteria
Submission must be neatly presented and easy to follow. Use clearly annotated diagrams when possible. State all the assumptions and calculations made in your solution.

Referencing Style

- Harvard (author-date)

Submission
Online

assessmentOutcome

- Conduct plastic collapse analysis, lower and upper bound solutions for practical structures

assessmentGradAttribute

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

Examination

Outline
Complete an invigilated examination.

Date
During the examination period at a CQUniversity examination centre.

Weighting
50%

Length
180 minutes

Minimum mark or grade
Minimum percentage of examination marks required to pass the unit; 50%

Exam Conditions
Closed Book.

Materials
Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).
Calculator - non-programmable, no text retrieval, silent only

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assessmentOutcome

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assessmentGradAttribute

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