



# ENEC12012 Stress Analysis

## Term 2 - 2018

Profile information current as at 30/04/2024 12:14 pm

All details in this unit profile for ENEC12012 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 develop skills to analyse the stresses in a structural member subjected to various actions such as axial force, torsion, bending moments and shear force using the principles of mechanics of materials. You will learn how individual structural members resist and transfer the stresses as well as ways in which they can fail. You will document the process of modelling, testing and analysis and communicate, work and learn, both individually and in teams in a professional manner. Students enrolled in distance mode are required to attend a compulsory Residential School.

#### 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

Prerequisites: [ENEG11006 Engineering Statics OR ENEC12007 Analysis of Structures] AND [MATH11219 Engineering Mathematics] AND [ENEG11008 Materials for Engineers OR ENEC12005 Materials Science and Engineering]

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 - 2018

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Mixed Mode
- 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 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: 20%

#### 2. **Practical and Written Assessment**

Weighting: 10%

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

Weighting: 20%

#### 4. **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 Moodle

**Feedback**

Well organised and well delivered unit.

**Recommendation**

This practice will continue in next offer as well.

#### Feedback from Moodle

**Feedback**

Teaching staff is very helpful and available in most of the time as required.

**Recommendation**

This practice will continue in next offer as well.

## Unit Learning Outcomes

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

1. Apply the principles and theories of mechanics of materials to the analysis of structural members
2. Determine sectional properties, stresses and deflections of structural members
3. Analyse structural members subjected to combined axial force, torsion, bending moment and shear force
4. Determine principal stresses and discuss failure criteria for a range of engineering materials
5. Demonstrate a professional level of communication and team work

The learning outcomes are linked to Engineers Australia Stage 1 Competencies and also discipline capabilities.

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
<b>1 - Written Assessment - 20%</b>	•	•	•	•	•
<b>2 - Written Assessment - 20%</b>	•	•	•	•	•
<b>3 - Practical and Written Assessment - 10%</b>	•	•	•		•
<b>4 - Examination - 50%</b>	•	•	•	•	•

### 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 - 20%	•	•	•	•		•				
2 - Written Assessment - 20%	•	•	•	•		•				
3 - Practical and Written Assessment - 10%	•	•		•	•					
4 - Examination - 50%	•	•	•	•						

## Textbooks and Resources

### Textbooks

ENEC12012

#### Prescribed

##### Mechanics of Materials

7th Edition (SI Units) (2015)

Authors: Ferdinand P. Beer, E. Russell Johnston, Jr., John T. DeWolf, David Mazurek

Mc Graw Hill Education

New York , NY , USA

ISBN: 9789814595247

Binding: Hardcover

[View textbooks at the CQUniversity Bookshop](#)

### IT Resources

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

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

## 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 - 09 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Concept of Stress Mechanical Properties of Materials	Chapters 1 and 2	

### Week 2 - 16 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Axial Loading	Chapter 2	

### Week 3 - 23 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Torsion	Chapter 3	

### Week 4 - 30 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Analysis of Beams subjected to Bending (BMD and SFD)	Chapter 5	

### Week 5 - 06 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Pure Bending I: Simple Bending	Sections 4.1 to 4.5	<b>Assignment 1</b> Due: Week 5 Friday (10 Aug 2018) 5:00 pm AEST
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**Vacation Week - 13 Aug 2018**

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

**Week 6 - 20 Aug 2018**

Module/Topic	Chapter	Events and Submissions/Topic
Pure Bending II: Unsymmetric Bending; Plastic Deformation	Sections 4.6 to 4.9	

**Week 7 - 27 Aug 2018**

Module/Topic	Chapter	Events and Submissions/Topic
Shearing Stress and Thin-Walled Members	Chapter 6	<b>Practical Class for on-campus students - Please contact your campus technical staff for timetable</b>

**Week 8 - 03 Sep 2018**

Module/Topic	Chapter	Events and Submissions/Topic
Combined Loading		<b>Residential School for Distance mode students [03rd &amp; 04th September 2018]</b>

**Week 9 - 10 Sep 2018**

Module/Topic	Chapter	Events and Submissions/Topic
Transformation of Stress & Strain Principal Stresses	Chapters 7 & 8	

**Week 10 - 17 Sep 2018**

Module/Topic	Chapter	Events and Submissions/Topic
Deflection of Beams	Chapter 9	<b>Practical Reports</b> Due: Week 10 Wednesday (19 Sept 2018) 5:00 pm AEST

**Week 11 - 24 Sep 2018**

Module/Topic	Chapter	Events and Submissions/Topic
Column Buckling	Chapter 10	<b>Assignment 2</b> Due: Week 11 Wednesday (26 Sept 2018) 5:00 pm AEST

**Week 12 - 01 Oct 2018**

Module/Topic	Chapter	Events and Submissions/Topic
Revision		

**Review/Exam Week - 08 Oct 2018**

Module/Topic	Chapter	Events and Submissions/Topic
		<b>Final Examination</b> - Refer the exam timetable

**Exam Week - 15 Oct 2018**

Module/Topic	Chapter	Events and Submissions/Topic

## Term Specific Information

Read **ENEC12012: General Information** available from the unit website.

## Assessment Tasks

### 1 Assignment 1

#### Assessment Type

Written Assessment

#### Task Description

##### Objective.

The aim of this assignment is to allow the students to demonstrate their understanding of various concepts, theories and processes studied/developed in the topics covered until week 5 from the Study Schedule.

Assignment 1 will be available by start of Week 1 through unit website.

#### Assessment Due Date

Week 5 Friday (10 Aug 2018) 5:00 pm AEST

#### Return Date to Students

Week 7 Friday (31 Aug 2018)

#### Weighting

20%

#### Assessment Criteria

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

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

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

Evidence of correct procedures

- All necessary steps in analysis are present in 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 understanding of the topic

- Explanation of choices made in the analysis (why is procedure required, why this particular procedure)
- Interpretation of results as necessary (such as limitations)

Professional presentation

- The task is clearly identified (problem, date, analyst)
- Clear statement of each problem and its details and requirements
- Logical layout of 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

#### Submission Instructions

All solutions should be submitted as single PDF file

#### Learning Outcomes Assessed

- Apply the principles and theories of mechanics of materials to the analysis of structural members
- Determine sectional properties, stresses and deflections of structural members
- Analyse structural members subjected to combined axial force, torsion, bending moment and shear force
- Determine principal stresses and discuss failure criteria for a range of engineering materials
- Demonstrate a professional level of communication and team work

## Graduate Attributes

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

## 2 Practical Reports

### Assessment Type

Practical and Written Assessment

### Task Description

#### Objective:

Practical exercises assist the student to achieve the Learning Outcomes for this unit. Students required to complete the laboratory activities as per instruction given in the **Practical Instruction Sheets**. The Practical Instruction Sheets and report requirements will be given on the unit website.

### Assessment Due Date

Week 10 Wednesday (19 Sept 2018) 5:00 pm AEST

### Return Date to Students

Week 12 Wednesday (3 Oct 2018)

### Weighting

10%

### Minimum mark or grade

50% of the total marks for the reports are required to pass this unit

### Assessment Criteria

**Each reports will be assessed separately for the criterion accuracy and correct procedure as required in the Instruction.**

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

### In addition, the report as a whole will be assessed against the following criteria:

Evidence of correct procedures

- All necessary steps in experiment and reporting are followed in correct order
- Clear presentation of results obtained
- Evidence of checking results (mathematical, graphical, logic-common sense)

Evidence of understanding of the topic

- Explanation of possible error in the experiment
- Interpretation of results

Professional presentation

- 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

### Submission Instructions

All Reports should be submitted as single PDF file

### Learning Outcomes Assessed

- Apply the principles and theories of mechanics of materials to the analysis of structural members
- Determine sectional properties, stresses and deflections of structural members
- Analyse structural members subjected to combined axial force, torsion, bending moment and shear force



- Demonstrate a professional level of communication and team work

### **Graduate Attributes**

- Communication
- Problem Solving
- Information Literacy
- Team Work

## **3 Assignment 2**

### **Assessment Type**

Written Assessment

### **Task Description**

#### **Objective:**

The aim of this assignment is to allow the students to demonstrate their understanding of various concepts, theories and processes studied/developed in the topics covered from week 6 to week 11 from the Study Schedule.

Assignment 2 will be available by end of week 6 through unit website.

### **Assessment Due Date**

Week 11 Wednesday (26 Sept 2018) 5:00 pm AEST

### **Return Date to Students**

Review/Exam Week Wednesday (10 Oct 2018)

### **Weighting**

20%

### **Assessment Criteria**

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

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

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

Evidence of correct procedures

- All necessary steps in analysis are present in 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 understanding of the topic

- Explanation of choices made in the analysis (why is procedure required, why this particular procedure)
- Interpretation of results as necessary (such as limitations)

Professional presentation

- The task is clearly identified (problem, date, analyst)
- Clear statement of each problem and its details and requirements
- Logical layout of 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

### **Submission Instructions**

All solutions should be submitted as single PDF file

### **Learning Outcomes Assessed**

- Apply the principles and theories of mechanics of materials to the analysis of structural members
- Determine sectional properties, stresses and deflections of structural members

- Analyse structural members subjected to combined axial force, torsion, bending moment and shear force
- Determine principal stresses and discuss failure criteria for a range of engineering materials
- Demonstrate a professional level of communication and team work

### **Graduate Attributes**

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

## **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**

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

## 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