



# ENEC12012 Stress Analysis

## Term 3 - 2020

Profile information current as at 01/05/2024 04:45 am

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 mixed 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 3 - 2020

- Mixed Mode

#### 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. **Online Quiz(zes)**

Weighting: 10%

#### 2. **Online Test**

Weighting: 20%

#### 3. **Practical and Written Assessment**

Weighting: 10%

#### 4. **Take Home Exam**

Weighting: 60%

### 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

Assignment feedback could be improved.

##### Recommendation

More structured feedback will be given in the next offering. The workload of the teaching staff was adjusted to ensure the assessment items can be marked and returned within 2 weeks.

#### Feedback from Moodle and email

##### Feedback

This unit is generally well structured and has good study materials. The lecturer is also available to help.

##### Recommendation

This practice will continue in the following offerings as well.

#### Feedback from Moodle

##### Feedback

Handwritten notes of the lectures can be uploaded with the recorded videos.

##### Recommendation

Annotated lecture slides will be uploaded after lectures.

## Unit Learning Outcomes

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

1. Apply the fundamental theories and analytical techniques to solve problems in mechanics of materials
2. Analyse the behaviour of structural members subjected to axial force, torsion, bending moment and shear force
3. Determine principal stresses and discuss failure criteria for a range of engineering materials
4. Demonstrate a professional level of communication and teamwork.

The learning outcomes are linked to Engineers Australia Stage 1 Competencies and also Discipline Capabilities

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



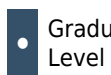
N/A  
Level



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) - 10%	•		•	
2 - Online Test - 20%		•		
3 - Practical and Written Assessment - 10%				•
4 - Take Home Exam - 60%	•	•	•	

## 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				

## Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Online Quiz(zes) - 10%	•	•	•	•		•				
2 - Online Test - 20%	•	•	•	•						
3 - Practical and Written Assessment - 10%	•	•		•		•				
4 - Take Home Exam - 60%	•	•	•	•						

## 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

**Hassan Baji** Unit Coordinator

[h.baji@cqu.edu.au](mailto:h.baji@cqu.edu.au)

## Schedule

### **Week 1 - 09 Nov 2020**

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

### **Week 2 - 16 Nov 2020**

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

### **Week 3 - 23 Nov 2020**

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

### **Week 4 - 30 Nov 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Pure Bending I: Pure Bending - Symmetric Bending	Sections 4.1 to 4.5	

### **Vacation Week - 07 Dec 2020**

Module/Topic	Chapter	Events and Submissions/Topic
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**Week 5 - 14 Dec 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Pure Bending II: Unsymmetric Bending	Sections 4.8, 4.11 and 4.13	Quiz 1 is opened (Questions from materials covered in week 1 to 3)

**Week 6 - 21 Dec 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Shearing Stresses in Beams and Thin-Walled Members I	Chapter 6	Quiz 1 is closed.

**Vacation Week - 28 Dec 2020**

Module/Topic	Chapter	Events and Submissions/Topic
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**Week 7 - 04 Jan 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Shearing Stresses in Beams and Thin-Walled Members II	Chapter 6	

**Week 8 - 11 Jan 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Combined Loading	Sections 4.7 & 4.9 Sections 8.1 & 8.3	Quiz 2 is opened (Questions from materials covered in week 4 to 6)

**Week 9 - 18 Jan 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Transformation of Stress & Strain (Principal Stresses)	Chapters 7 & 8	Quiz 2 is closed. <b>Mid-Term Exam</b> Due: Week 9 Monday (18 Jan 2021) 11:45 pm AEST

**Week 10 - 25 Jan 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Deflection of Beams	Chapter 9	

**Week 11 - 01 Feb 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Column Buckling	Chapter 10	

**Week 12 - 08 Feb 2021**

Module/Topic	Chapter	Events and Submissions/Topic
Review		<b>Practical Report</b> Due: Week 12 Monday (8 Feb 2021) 11:45 pm AEST

**Exam Week - 15 Feb 2021**

Module/Topic	Chapter	Events and Submissions/Topic
		<b>Final Exam</b> Due: Exam Week Monday (15 Feb 2021) 11:45 pm AEST

## Assessment Tasks

### 1 Progressive Tests

**Assessment Type**

Online Quiz(zes)

**Task Description**

This assessment task consists of four Progressive Tests in the form of online quizzes.

- Each Test consists of a number of numerical 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 Test up to **TWO 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. Even though the tests are open for a few days, it is expected that your first attempt would be on the first day. Tests cannot be deferred.

#### Number of Quizzes

2

#### Frequency of Quizzes

Other

#### Assessment Due Date

Quiz 1 is opened in week 5 and closed in week 6. Quiz 2 is opened in week 8 and closed in week 9 (Please see the unit schedule)

#### Return Date to Students

Immediately after test

#### Weighting

10%

#### Assessment Criteria

Due to the nature of the assessment, only the final answer will be considered.

Full marks will be given for each correct answers, but there will be no partial marks.

#### Referencing Style

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

#### Submission

Online

#### Learning Outcomes Assessed

- Apply the fundamental theories and analytical techniques to solve problems in mechanics of materials
- Determine principal stresses and discuss failure criteria for a range of engineering materials

#### Graduate Attributes

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

## 2 Mid-Term Exam

#### Assessment Type

Online Test

#### Task Description

Sections covered until week 6 (inclusive) will be examined during this assessment.

Duration of the Test: 3 hours

#### Assessment Due Date

Week 9 Monday (18 Jan 2021) 11:45 pm AEST

#### Return Date to Students

Two weeks after the due date

#### Weighting

20%

#### Minimum mark or grade

25%

#### Assessment Criteria

Each question will be assessed for the criterion accuracy and correct answers.

Correct application of mathematics and arithmetic  
Answers clearly identified and explained Correct results/explanation  
In addition, the following criteria also will be considered:

- Evidence of correct procedures
- All necessary steps in the analysis are followed in the correct order
- Clear presentation of mathematical working Evidence of an understanding of the topic
- Use of correct principles and theories Interpretation of results as necessary
- 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

### Learning Outcomes Assessed

- Analyse the behaviour of structural members subjected to axial force, torsion, bending moment and shear force

### Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

## 3 Practical Report

### Assessment Type

Practical and Written Assessment

### Task Description

Practical exercises assist the student to achieve the Learning Outcomes for this unit.

Students required to complete the laboratory report as per instruction given in the **Practical Instruction Video**. The **Practical Instruction Video** and report requirements will be given on the Moodle site.

### Assessment Due Date

Week 12 Monday (8 Feb 2021) 11:45 pm AEST

### Return Date to Students

Feedback for the practical lab will be returned in two weeks after submission due date.

### Weighting

10%

### Minimum mark or grade

50%

### Assessment Criteria

Each report 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 the 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

### Learning Outcomes Assessed

- Demonstrate a professional level of communication and teamwork.

### Graduate Attributes

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

## 4 Final Exam

### Assessment Type

Take Home Exam

### Task Description

All Sections covered until week 11 (inclusive) will be examined during this assessment.

Duration of the Test: 3 hours

Exam date will be posted on Moodle.

### Assessment Due Date

Exam Week Monday (15 Feb 2021) 11:45 pm AEST

### Return Date to Students

Two weeks after final exam.

### Weighting

60%

### Minimum mark or grade

50%

### Assessment Criteria

Each question will be assessed for the criterion accuracy and correct answers.

Correct application of mathematics and arithmetic

Answers clearly identified and explained Correct results/explanation

In addition, the following criteria also will be considered:

- Evidence of correct procedures
- All necessary steps in the analysis are followed in the correct order
- Clear presentation of mathematical working Evidence of an understanding of the topic
- Use of correct principles and theories Interpretation of results as necessary
- 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

### Learning Outcomes Assessed

- Apply the fundamental theories and analytical techniques to solve problems in mechanics of materials
- Analyse the behaviour of structural members subjected to axial force, torsion, bending moment and shear force
- Determine principal stresses and discuss failure criteria for a range of engineering materials

## Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

## 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