



# **AINV12005 Forensic Engineering**

## **Term 2 - 2018**

Profile information current as at 27/04/2024 02:34 am

All details in this unit profile for AINV12005 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 will provide students with an understanding of the role and effect of engineering on the causation, prevention and investigation of accidents. Students will study the concepts, drivers and language of the engineering profession, the engineering domains (eg Civil, mechanical, electrical, chemical) and their contribution to accident forensics, engineering failure analysis methods and failure in the engineering design process (such as solving the wrong problem, wrong user consultation, failure to understand user requirements, the designed system vs operational system), and understanding of engineers' reports. Students will examine the principles of forensic engineering, forensic engineering investigation methods and the application of contemporary investigation technologies. In addition, this unit will provide students with an opportunity to explore the tenets of the key forensic investigation disciplines such as fire and meteorological investigations.

### 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

There are no requisites for this unit.

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

- Adelaide
- Brisbane
- Bundaberg
- Gladstone
- Mackay
- Melbourne
- Mixed Mode
- Perth
- Rockhampton
- Sydney

### 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. **Group Discussion**

Weighting: 20%

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

Weighting: 30%

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

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 Student Feedback

**Feedback**

Students greatly enjoyed the new residential school activities especially those that related to forensic engineering.

**Recommendation**

Continue the new residential school activities.

#### Feedback from Student Feedback

**Feedback**

Students requested that assessments be structured earlier in the term.

**Recommendation**

Change assessment item timing. Bring some assessment items earlier in the term.

#### Feedback from Student feedback

**Feedback**

Some students found responding to discussion items as assessment challenging.

**Recommendation**

Review Discussion forum assessment item.

#### Feedback from Student Feedback

**Feedback**

Students requested that the residential school be scheduled earlier in the term

**Recommendation**

Residential school is already scheduled for earlier in the term. This will also bring the assessment for that residential school earlier in the term.

## Unit Learning Outcomes

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

1. Appraise the role and effect of engineering practice on the causation, prevention and investigation of accidents.
2. Discuss the concepts, drivers, language and practice of the engineering profession.
3. Explain the accident forensics contexts of the engineering disciplines including mechanical, electrical, civil and chemical engineering and their contribution to accident forensics and Multidisciplinary teams.
4. Examine the methods of engineering failure analysis, failures in design, forensic investigation and related technologies, and their contribution to accident forensics.
5. Critique engineering reports in relation to causation, prevention and investigation of accidents.
6. Examine key forensic investigation disciplines including fire and meteorological investigations

N/A

## 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



## Textbooks and Resources

### Textbooks

**There are no required textbooks.**

### 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

**Prue Howard** Unit Coordinator  
[p.howard@cqu.edu.au](mailto:p.howard@cqu.edu.au)

## Schedule

### Week 1 - 09 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to the Unit What is Forensic Engineering? The Engineering Disciplines - Mechanical, Electrical, Civil, Chemical		

### Week 2 - 16 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Overview of the contribution of the engineering disciplines to accident forensics Concepts & language of the Engineering Profession		

### Week 3 - 23 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
The design process & opportunities for failure. Crashworthiness		Discussion 1 Due

### Week 4 - 30 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Key engineering concepts influencing accident causation and understanding of failure Topic A - Fundamental concepts of Mathematics and Physics		Discussion 2 Due

### Week 5 - 06 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Key engineering concepts influencing accident causation and understanding of failure

Topic B - Stress vs Strength

- Failure Modes
- Materials Testing

Online tutorial - helping you apply the maths

Discussion 3 due

### Vacation Week - 13 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
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### Week 6 - 20 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Key engineering concepts influencing accident causation and understanding of failure

Topic C

Motion and Vectors

Vibration and Fatigue of equipment

### Week 7 - 27 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Residential School

Residential School

12-14 September

Bundaberg

### Week 8 - 03 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Key engineering concepts influencing accident causation and understanding of failure

Topic D

Kinematics and Gravity

### Week 9 - 10 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Key engineering concepts influencing accident causation and understanding of failure

Topic E

Force, Equilibrium & Momentum

**Practicum Report** Due: Week 9  
Monday (10 Sept 2018) 11:45 pm  
AEST

### Week 10 - 17 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Key engineering concepts influencing accident causation and understanding of failure

Topic F

Applying energy & conservation of energy concepts to motor vehicle accidents

### Week 11 - 24 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
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How collaboration and teamwork are used in multidisciplinary investigation teams.  
Contribution of engineers and engineering reports in accident investigations.  
Key forensic investigation disciplines (Fire and Meteorology)

#### **Week 12 - 01 Oct 2018**

<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Review engineering concepts		Discussion 4 due

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

<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
		<b>Forensic Analysis</b> Due: Review/Exam Week Wednesday (10 Oct 2018) 11:45 am AEST

#### **Exam Week - 15 Oct 2018**

<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
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## Assessment Tasks

### 1 Group Discussion

#### **Assessment Type**

Group Discussion

#### **Task Description**

During term, 4 discussion topics related to the unit lecture material will be posted in a Forum on Moodle. For each topic (5 marks), you are expected to:

- post in the applicable Forum. Submissions of approximately 300 words are more likely to be successful
- support your post to each question with at least one reference from the relevant literature
- respond constructively to at least two posts of your fellow students with comments that further demonstrate your understanding of the related lecture material

#### **Assessment Due Date**

As per unit schedule

#### **Return Date to Students**

Within three weeks of submission

#### **Weighting**

20%

#### **Assessment Criteria**

Each topic discussion will be assessed as shown below.

- Original topic post demonstrates an understanding of the concept being assessed (2.5 marks)
- Original topic post is referenced correctly (0.5 marks)
- Responses to other students extend the conversations (2 marks)

#### **Referencing Style**

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

#### **Submission**

Online



### **Submission Instructions**

Posts and responses will be made in the appropriate Moodle forum discussion thread.

### **Learning Outcomes Assessed**

- Appraise the role and effect of engineering practice on the causation, prevention and investigation of accidents.
- Discuss the concepts, drivers, language and practice of the engineering profession.
- Explain the accident forensics contexts of the engineering disciplines including mechanical, electrical, civil and chemical engineering and their contribution to accident forensics and Multidisciplinary teams.

### **Graduate Attributes**

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

## **2 Practicum Report**

### **Assessment Type**

Practical and Written Assessment

### **Task Description**

You will be required to report on your activities undertaken during their practicum experience at the residential school. The task will require you to complete two components.

#### **Part A: Presentation**

You will be allocated a topic by the end of week 3. Prepare and present an oral presentation, supported by visual media, which you will deliver to the class during the residential school. In this presentation you will investigate the role of engineering within accident investigation through research into a specific piece of engineering equipment or an engineering process.

#### **Part B: Written report**

During the residential school you will visit a site to investigate crashworthiness, and be visited by accident investigators. You will also conduct engineering tests. You will write a report that addresses the following points:

- Assess the forensic engineering methods used in establishing accident causation factors
- Investigate the function and benefit of contemporary accident forensics technologies
- Discuss the results of the practical activities and include the results (including the survey map) in your report.

Further details will be provided to you at the residential school.

### **Assessment Due Date**

Week 9 Monday (10 Sept 2018) 11:45 pm AEST

### **Return Date to Students**

Within three weeks of submission

### **Weighting**

30%

### **Assessment Criteria**

The report will be assessed as shown below.

- Description of the activities undertaken at the residential school.
- Results of the practical activities
- Discussion of the results of practical activities
- Development of survey map
- Reflection of learnings from the visit by experts
- Reflection on learnings from the site visit
- Reflection with examples on where the knowledge gained at the residential school may be applied by accident investigators.
- Discussion of design improvements that could be made to impact crashworthiness - based on site visit.

The presentation will be assessed as shown below.

- Quality of content of presentation

- Quality of presentation skills
- Quality of visual media used

Where necessary, your lecturer may provide additional assessment criteria during the residential school for this unit, or in Moodle.

### Referencing Style

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

### Submission

Online

### Learning Outcomes Assessed

- Appraise the role and effect of engineering practice on the causation, prevention and investigation of accidents.
- Explain the accident forensics contexts of the engineering disciplines including mechanical, electrical, civil and chemical engineering and their contribution to accident forensics and Multidisciplinary teams.
- Examine the methods of engineering failure analysis, failures in design, forensic investigation and related technologies, and their contribution to accident forensics.
- Examine key forensic investigation disciplines including fire and meteorological investigations

### Graduate Attributes

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

## 3 Forensic Analysis

### Assessment Type

Written Assessment

### Task Description

**Part A: Report** (50% of this assessment and 25% of the overall subject grade)

You will be required to access one case study. The choice of the case and the subsequent analysis should allow you to demonstrate your learning and knowledge in assessing the forensic engineering methods used in establishing accident causation factors;

You will identify and explain at least 3 forensic engineering methods. Aim to illustrate the breadth of methods and techniques that were available to the investigators. Draw conclusions about the efficacy/usefulness of the forensic analysis in establishing accident causation.

The format of your assessment will be a report in Word or pdf. It should contain all the relevant figures, tables and diagrams

The report shall not exceed 3000 words.

**Part B: Mathematical Engineering Questions** (50% of this assessment, 25% of the overall unit grade)

You will be required to solve a number of mathematical engineering questions. You should demonstrate the following:

- understanding of the question and the problem being solved;
- all calculation steps are shown clearly;
- diagrams (where required) are drawn clearly;
- answers are presented clearly.

The answers should be scanned and attached as an appendix to your report.

### Assessment Due Date

Review/Exam Week Wednesday (10 Oct 2018) 11:45 am AEST

### Return Date to Students

Within three weeks of submission

### Weighting

50%

## **Assessment Criteria**

### **Part A**

The report will be assessed as shown below.

- Identified and explained at least 3 forensic engineering methods
- quality of the assessment of the forensic engineering methods identified
- breadth of methods and techniques that were available to the investigators
- conclusions about the efficacy/usefulness of the forensic analysis in establishing accident causation
- accuracy and consistency of referencing
- quality of report style, grammar and spelling

### **Part B**

Marks will be for correct answers and working method. Further information will be found on the assessment sheet.

## **Referencing Style**

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

## **Submission**

Online

## **Learning Outcomes Assessed**

- Examine the methods of engineering failure analysis, failures in design, forensic investigation and related technologies, and their contribution to accident forensics.
- Critique engineering reports in relation to causation, prevention and investigation of accidents.
- Examine key forensic investigation disciplines including fire and meteorological investigations

## **Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- 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