



# **AINV12005 *Forensic Engineering***

## **Term 2 - 2017**

Profile information current as at 07/05/2024 12:45 pm

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 - 2017

- Adelaide
- Brisbane
- Bundaberg
- Distance
- Gladstone
- 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 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 Have your say.

##### Feedback

The res school was well planned. Really got a lot out of it

##### Recommendation

Continue with residential school.

#### Feedback from Have your say.

##### Feedback

Maybe a few more lectures focusing on maths/physics instead of engineering disciplines

##### Recommendation

Dedicate some time each week to work on an area of mathematics/physics, instead of concentrated lectures near the end of 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



### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
1 - Group Discussion - 20%	•	•	•			
2 - Practical and Written Assessment - 30%	•		•	•		•
3 - Written Assessment - 50%				•	•	•

### 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 - Group Discussion - 20%	•	•	•	•		•	•	•		
2 - Practical and Written Assessment - 30%	•	•	•	•	•	•	•	•		
3 - Written Assessment - 50%	•	•	•	•	•	•	•	•		

## 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 - 10 Jul 2017

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

### Week 2 - 17 Jul 2017

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 - 24 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
The Design Process & opportunities for failure. Crash worthiness		

### Week 4 - 31 Jul 2017

Module/Topic	Chapter	Events and Submissions/Topic
Collaboration and teamwork in multidisciplinary investigation teams. Contribution of Engineers and Engineering Reports in accident investigations. Key forensic investigation disciplines (Fire and Meteorology)		

### Week 5 - 07 Aug 2017

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		

### Vacation Week - 14 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

### Week 6 - 21 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
Topic B Stress and Strength Failure Modes Materials Testing		

### Week 7 - 28 Aug 2017

Module/Topic	Chapter	Events and Submissions/Topic
--------------	---------	------------------------------

Topic C  
Motion and vectors  
Vibration and Fatigue

#### Week 8 - 04 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Topic D Kinematics, Gravity & Falls		

#### Week 9 - 11 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Residential school		Residential School 12-14 September Bundaberg  <b>Practicum Report</b> Due: Week 9 Friday (15 Sept 2017) 11:45 pm AEST

#### Week 10 - 18 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Topic E Force, Equilibrium & Momentum		

#### Week 11 - 25 Sep 2017

Module/Topic	Chapter	Events and Submissions/Topic
Topic F Energy & Conservation of Energy		<b>Group Discussion</b> Due: Week 11 Friday (29 Sept 2017) 11:45 pm AEST

#### Week 12 - 02 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic
Tutorial to review Engineering Concepts		

#### Review/Exam Week - 09 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic
		<b>Forensic Analysis</b> Due: Review/Exam Week Friday (13 Oct 2017) 11:45 pm AEST

#### Exam Week - 16 Oct 2017

Module/Topic	Chapter	Events and Submissions/Topic

## Assessment Tasks

### 1 Group Discussion

#### Assessment Type

Group Discussion

#### Task Description

Each fortnight starting from week 2 to week 10, a discussion topic related to the unit lecture material will be posted in a Forum on Moodle.

All students are expected to:

- respond to each question in the applicable Forum
- limit each response to a maximum of 300 words
- support their response to each question with at least one reference from the relevant literature
- respond to two posts of your fellow students with comments that further demonstrate your understanding of the related lecture material

**Assessment Due Date**

Week 11 Friday (29 Sept 2017) 11:45 pm AEST

**Return Date to Students**

Week 12 Friday (6 Oct 2017)

**Weighting**

20%

**Assessment Criteria**

As a general rule, assessment criteria for all assessment items includes

1. (90%) content - includes accuracy, relevance and application of key concepts, analysis, argument, language and grammar used in answering a question. (see marking criteria for individual requirements)
2. (10%) References - includes the provision of a reference list and the application of the Harvard style for referencing information, data, tables or images sourced for the assignment

**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.
- 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**

Students will be required to report on their activities undertaken during their practicum experience at the residential school.

The task will require students to:

- Assess the forensic engineering methods used in establishing accident causation factors
- Investigate the function and benefit of contemporary accident forensics technologies
- Present an oral presentation that investigates the role of engineering design on causation, prevention and investigation of accidents.

**Assessment Due Date**

Week 9 Friday (15 Sept 2017) 11:45 pm AEST

**Return Date to Students**

Week 11 Friday (29 Sept 2017)

**Weighting**

30%

**Assessment Criteria**

As a general rule, assessment criteria for all assessment items includes

(20%) professional conduct - for example, during site visits, engagement in activities and collaboration with fellow students

(70%) content - includes accuracy, relevance and application of key concepts, analysis, argument, language and grammar used in answering a question. (see marking criteria for individual requirements)



(10%) References - includes the provision of a reference list and the application of the Harvard style for referencing information, data, tables or images sourced for the assignment

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

Offline

### 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 1:** (50% of this assessment and 25% of the overall subject grade)

Students will be required to access one case study related to a helicopter or airplane accident (either Australian or international case). The choice of the case and the subsequent analysis should allow you to demonstrate your learning across the following areas:

- assess the forensic engineering methods used in establishing accident causation factors;
- discuss the nature of fires and the principles and techniques of fire investigation;
- examine the impact of meteorology on accident causation and investigation.

You should aim to illustrate the breadth of methods and techniques that were available to the investigations. You should draw some conclusions about the efficacy/usefulness of the forensic analysis in establishing accident causation.

The format of your assessment will be a report and it should contain all the relevant figures, tables and diagrams

The report shall not exceed 3000 words.

**Part 2;** (50% of this assessment, 25% of the overall unit grade)

Students will be required to solve a number of mathematical engineering questions. The students 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. (ie at the end of your helicopter/plane report)

### Assessment Due Date

Review/Exam Week Friday (13 Oct 2017) 11:45 pm AEST

### Return Date to Students

Within 2 weeks of submission

**Weighting**

50%

**Assessment Criteria**

As a general rule, assessment criteria for all assessment items includes

2. (90%) content - includes accuracy, relevance and application of key concepts, analysis, argument, language and grammar used in answering a question. (see marking criteria for individual requirements)
- (10%) References - includes the provision of a reference list and the application of the Harvard style for referencing information, data, tables or images sourced for the assignment

**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