AINV12005 *Forensic Engineering*
Term 2 - 2019

Profile information current as at 12/10/2024 04:18 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 you with an understanding of the role and effect of engineering on the causation, prevention and investigation of accidents. You 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. You will examine the principles of forensic engineering, forensic engineering investigation methods and the application of contemporary investigation technologies. In addition, this unit will provide you 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 - 2019

- 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).

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 and informal feedback

Feedback

Some students suggested that the residential school should start later on the first day and finish earlier on the last day to allow for travel time.

Recommendation

Review residential school timing and investigate how travel time can be built in.

Feedback from Have your say and informal feedback

Feedback

Students really enjoyed the residential school, and the practical activities associated with it.

Recommendation

Continue with the current residential school activities.

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 multidisiplinary 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

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
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Schedule

Week 1 - 15 Jul 2019

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

Week 2 - 22 Jul 2019

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

Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: The design process & opportunities for failure. Crashworthiness		Discussion 1 Due Friday 11.55pm

Week 4 - 05 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Key engineering concepts influencing accident causation and understanding of failure. Topic A - Fundamental concepts of Mathematics and Physics		Discussion 2 Due Friday 11.55pm

Week 5 - 12 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Key engineering concepts influencing accident causation and understanding of failure Topic B - Stress vs Strength • Failure Modes • Materials Testing		Online Zoom tutorial - helping you apply the maths Discussion 3 due Friday 11.55pm

Vacation Week - 19 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 26 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Key engineering concepts influencing accident causation and understanding of failure Topic C • Motion and Vectors • Vibration and Fatigue of equipment		

Week 7 - 02 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Residential School		Residential School Bundaberg Starts 1pm 2nd September Finishes 12pm 5th September

Week 8 - 09 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Key engineering concepts influencing accident causation and understanding of failure Topic D - Kinematics and Gravity		

Week 9 - 16 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Key engineering concepts influencing accident causation and understanding of failure Topic E - Force, Equilibrium & Momentum		**Practicum Report** Due: Week 9 Monday (16 Sept 2019) 9:00 am AEST

Week 10 - 23 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Key engineering concepts influencing accident causation and understanding of failure Topic F - Applying energy & conservation of energy concepts to motor vehicle accidents		

Week 11 - 30 Sep 2019

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

Week 12 - 07 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
Review engineering concepts		Discussion 4 due Friday 11.55pm

Review/Exam Week - 14 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
		Forensic Analysis Due: Review/Exam Week Thursday (17 Oct 2019) 9:00 am AEST

Exam Week - 21 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic

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.

assessmentOutcome

- 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 multidisiplinary teams
- Examine key forensic investigation disciplines including fire and meteorological investigations.

assessmentGradAttribute

- Communication
- 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 your 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. You are required to submit your visual supporting materials into Moodle.

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
- Assess the impact of design desicions on crashworthiness
- 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 (16 Sept 2019) 9:00 am 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
- Depth of discussion of the results of practical activities
- Quality of development of survey map
- Depth of reflection of learnings from the visit by experts
- Depth of reflection on learnings from the site visit
- Depth of reflection with examples on where the knowledge gained at the residential school may be applied by accident investigators.
- Depth of 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

assessmentOutcome

- 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 multidisiplinary teams
- Examine the methods of engineering failure analysis, failures in design, forensic investigation and related technologies, and their contribution to accident forensics

assessmentGradAttribute

- 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 unit 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 Thursday (17 Oct 2019) 9:00 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 investigatons
- 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

assessmentOutcome

- 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.

assessmentGradAttribute

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

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