



# ENEM13012 *Maintenance Engineering*

## Term 2 - 2019

Profile information current as at 13/05/2024 09:50 am

All details in this unit profile for ENEM13012 have been officially approved by CQUUniversity 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 outlines the importance of effective maintenance management in industry, the costs of maintenance and the benefits of effective maintenance planning and strategies. Emphasis is placed on practical aspects of managing maintenance for plant and equipment. You are introduced to techniques and methods for monitoring the condition of plant and equipment, and to processes used to implement and manage condition monitoring. You will investigate maintenance problems and prepare plans to solve such problems. The unit outlines methods for assessing maintenance effectiveness and improving maintenance systems, and provides a vehicle for developing skills for working and learning autonomously to solve problems, to document approaches used to solve problems and to communicate professionally.

#### Details

Career Level: *Undergraduate*

Unit Level: *Level 3*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

#### Pre-requisites or Co-requisites

Pre-requisites: ENEG12004 Engineering Design & Management Planning OR ENEG12007 Design and Project Management

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

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Online
- 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).

#### 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: 15%

#### 2. **Written Assessment**

Weighting: 25%

#### 3. **Presentation and Written Assessment**

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 email, telephone conversations, 'Have Your Say'

##### **Feedback**

Cohort members were very happy with the range of information, detail and advice provided on theoretical matters relating to maintenance issues.

##### **Recommendation**

Continue to provide a broad range of information, detail and advice regarding theoretical matters relating to maintenance issues.

#### Feedback from email, telephone conversations, 'Have Your Say'

##### **Feedback**

Cohort members believe the focus on an authentic engineering scenario (whether industry based or of their own design) is an important focus in exploring and applying the theoretical aspects relating to identifying, describing and seeking to remedy a maintenance issue.

##### **Recommendation**

Continue to provide an assessment approach which focuses on an authentic engineering scenario (whether industry based or of their own design) to explore and apply theoretical aspects relating to identifying, describing and seeking to remedy a maintenance issue.

#### Feedback from 'Have Your Say'

##### **Feedback**

Identified there is a low rate of response from the cohort though 'Have your Say'.

##### **Recommendation**

Continue to encourage students to give feedback, as previous feedback has been taken up and unit changed accordingly.

## Unit Learning Outcomes

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

1. Explain the impact of maintenance on the business of industrial organisations and the need for maintenance management.
2. Describe processes for establishing maintenance needs of engineering operations, and developing maintenance plans and strategies, and explain costs and benefits of maintenance management.
3. Describe techniques and methods for monitoring the condition of plant and equipment.
4. Describe processes used to implement and manage condition monitoring programs for specific applications of plant and equipment.
5. Investigate and analyse maintenance problems and develop plans to solve these problems.
6. Describe methods for assessing maintenance effectiveness and methods for improving maintenance systems and control of maintenance.
7. Work and learn autonomously to solve problems and record and communicate clearly and professionally the approaches used to solve problems and the rationale for adopting such approaches to problems.

Learning outcomes are linked to Engineers Australia Stage 1 Competencies and 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	5	6	7
1 - Written Assessment - 15%	•	•	•	•			•
2 - Written Assessment - 25%	•	•	•	•	•	•	•
3 - Presentation and Written Assessment - 60%	•	•	•	•	•	•	•

## Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes						
	1	2	3	4	5	6	7
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 - 15%	•	•	•	•				•		
2 - Written Assessment - 25%	•	•	•	•				•		
3 - Presentation and Written Assessment - 60%	•	•	•	•				•		

## 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)
- Access to a digital camera
- Access to a document scanner and pdf converter
- A speaker and mic or a headset

## Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)  
For further information, see the Assessment Tasks.

## Teaching Contacts

**Patrick Keleher** Unit Coordinator  
[p.keleher@cqu.edu.au](mailto:p.keleher@cqu.edu.au)

## Schedule

### Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Module 1: Introduction to Maintenance and Appendix 1: Terminology	Module 1: Study guide (Access on Moodle Site)	Project Topic Verification: <b>prior</b> to Friday of Week 1 Before commencing these assessment items you need to discuss, submit the 'Identification of Maintenance Problem: Proposal Form' and have received <b>written verification, prior</b> to the Friday of Week 1 (although every offering, most students have this task completed by the end of orientation week !), from your lecturer of the appropriateness and viability of your chosen organisation and the identified maintenance problem as a focus for all assessment tasks in this unit.

### Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Module 1: Introduction to Maintenance	Module 1: Study guide (Access on Moodle Site)	

### Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Module 2: Principles of Management	Module 2: Study guide (Access on Moodle Site)	

<b>Week 4 - 05 Aug 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 2: Principles of Management	Module 2: Study guide (Access on Moodle Site)	
<b>Week 5 - 12 Aug 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 2: Principles of Management	Module 2: Study guide (Access on Moodle Site)	<b>Assessment Task 1</b> Due: Week 5 Friday (16 Aug 2019) 10:00 pm AEST
<b>Vacation Week - 19 Aug 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
<b>Week 6 - 26 Aug 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 3: Financial Analysis and Maintenance Management	Module 3: Study guide (Access on Moodle Site)	
<b>Week 7 - 02 Sep 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 3: Financial Analysis and Maintenance Management	Module 3: Study guide (Access on Moodle Site)	
<b>Week 8 - 09 Sep 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 4: Maintenance Management Techniques (1)	Module 4: Study guide (Access on Moodle Site)	
<b>Week 9 - 16 Sep 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 4: Maintenance Management Techniques (1)	Module 4: Study guide (Access on Moodle Site)	<b>Assessment Task 2</b> Due: Week 9 Friday (20 Sept 2019) 10:00 pm AEST
<b>Week 10 - 23 Sep 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Appendix 2: Mathematics Supplement and Appendix 3: Weibull Analysis	Appendix 2 and 3 : Study guide (Access on Moodle Site)	
<b>Week 11 - 30 Sep 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 5: Maintenance Management Techniques (2)	Module 5: Study guide (Access on Moodle Site)	
<b>Week 12 - 07 Oct 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 5: Maintenance Management Techniques (2)	Module 5: Study guide (Access on Moodle Site)	<b>Assessment Task 3</b> Due: Week 12 Friday (11 Oct 2019) 10:00 pm AEST
<b>Review/Exam Week - 14 Oct 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
<b>Exam Week - 21 Oct 2019</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>

## Assessment Tasks

# 1 Assessment Task 1

## Assessment Type

Written Assessment

## Task Description

Refer to the Moodle site for **complete details** of the assessment item. This is only a basic outline of the features relating to the assessment task. You must provide detailed and appropriately referenced descriptions, diagrams, discussions and analysis in order to demonstrate your knowledge and understanding of concepts and processes. Failure to adopt this approach will result in you obtaining a lower grade for your submission as you will not be appropriately demonstrating your knowledge and understanding. **If you are repeating this unit you must define, investigate and remedy a different maintenance problem than what you did previously.** Project Topic Verification: **prior** to Friday of Week 1 (although every offering, most students have this task completed by the end of orientation week !) - Before commencing these assessment items you need to discuss, submit the 'Identification of Maintenance Problem: Proposal Form" and have received **written verification, prior** to the Friday of Week 1, from your lecturer of the appropriateness and viability of your chosen organisation and the identified maintenance problem as a focus for all assessment tasks in this unit. The aim of Assessment Task 1 is to for you to select **one** problem or opportunity within the maintenance function within your organisation or from your previous organisation or an organisation chosen by you or a fictitious organisation that could be solved using one of the techniques presented in Module 4 or 5 of your Study Guide. This is designed to have the student apply learning from this unit to the solution of a problem in their own workplace. You will need to complete an appropriately referenced, written investigative report, including appropriate descriptions, analysis, documentation and photographic support.

## Assessment Due Date

Week 5 Friday (16 Aug 2019) 10:00 pm AEST

Extensions: Feedback and advice regards solutions to this assignment will be made available to students 2 weeks after the due date. Consequently, extension requests greater than 14 days will be denied except under exceptional circumstances.

## Return Date to Students

Week 7 Friday (6 Sept 2019)

Extensions: Feedback and advice regards solutions to this assignment will be made available to students 2 weeks after the due date. Consequently, extension requests greater than 14 days will be denied except under exceptional circumstances.

## Weighting

15%

## Minimum mark or grade

50% of the weighting

## Assessment Criteria

Refer to the Moodle site for complete details of the Assessment Task 1 Assessment Criteria sheet; weightings and focus of assessment criteria vary for each assessment task. This is only a basic outline of the features relating to the assessment task. Each submission will be assessed for presentation and layout, correct procedure, analysis and accuracy and appropriate referencing. The major assessment criteria relate to Analysis & Interpretation, Communication and Information Literacy. Ensure you access and read the details outlined in the Assessment Task 1 Assessment Criteria sheet **before** commencing the assessment item. **As you undertake** the assessment item ensure you address all assessment criteria outlined. Also, at the completion of the assessment item, prior to submission, **undertake an audit** to ensure you have appropriately addressed all assessment criteria.

## Referencing Style

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

## Submission

Online

## Learning Outcomes Assessed

- Explain the impact of maintenance on the business of industrial organisations and the need for maintenance management.
- Describe processes for establishing maintenance needs of engineering operations, and developing maintenance plans and strategies, and explain costs and benefits of maintenance management.
- Describe techniques and methods for monitoring the condition of plant and equipment.
- Describe processes used to implement and manage condition monitoring programs for specific applications of plant and equipment.
- Work and learn autonomously to solve problems and record and communicate clearly and professionally the approaches used to solve problems and the rationale for adopting such approaches to problems.

## Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Ethical practice

## 2 Assessment Task 2

### Assessment Type

Written Assessment

### Task Description

Refer to the Moodle site for **complete details** of the assessment item. This is only a basic outline of the features relating to the assessment task. You must provide detailed and appropriately referenced descriptions, diagrams, discussions and analysis in order to demonstrate your knowledge and understanding of concepts and processes. Failure to adopt this approach will result in you obtaining a lower grade for your submission as you will not be appropriately demonstrating your knowledge and understanding. The aim of Assessment Task 2 is to elaborate upon your chosen maintenance problem, defined in Assessment Task 1, and to provide preliminary insights into the technique you will adopt to address this problem. Your solution needs to focus upon using one of the techniques presented in Module 4 or 5 of your Study Guide. This is designed to have the student apply learning from this unit to the solution of a problem in their own workplace. You will need to complete an appropriately referenced, written investigative report, including appropriate descriptions, analysis, documentation and photographic support.

### Assessment Due Date

Week 9 Friday (20 Sept 2019) 10:00 pm AEST

Extensions: Feedback and advice regards solutions to this assignment will be made available to students 2 weeks after the due date. Consequently, extension requests greater than 14 days will be denied except under exceptional circumstances.

### Return Date to Students

Week 11 Friday (4 Oct 2019)

Extensions: Feedback and advice regards solutions to this assignment will be made available to students 2 weeks after the due date. Consequently, extension requests greater than 14 days will be denied except under exceptional circumstances.

### Weighting

25%

### Minimum mark or grade

50% of the weighting

### Assessment Criteria

Refer to the Moodle site for **complete details** of the Assessment Task 1 Assessment Criteria sheet; weightings and focus of assessment criteria vary for each assessment task. This is only a basic outline of the features relating to the assessment task. Each submission will be assessed for presentation and layout, correct procedure, analysis and accuracy and appropriate referencing. The major assessment criteria relate to Analysis & Interpretation, Communication and Information Literacy. Ensure you access and read the details outlined in the Assessment Task 2 Assessment Criteria sheet **before** commencing the assessment item. **As you undertake** the assessment item ensure you address all assessment criteria outlined. Also, at the completion of the assessment item, prior to submission, **undertake an audit** to ensure you have appropriately addressed all assessment criteria.

### Referencing Style

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

### Submission

Online

### Learning Outcomes Assessed

- Explain the impact of maintenance on the business of industrial organisations and the need for maintenance management.
- Describe processes for establishing maintenance needs of engineering operations, and developing maintenance plans and strategies, and explain costs and benefits of maintenance management.
- Describe techniques and methods for monitoring the condition of plant and equipment.
- Describe processes used to implement and manage condition monitoring programs for specific applications of plant and equipment.



- Investigate and analyse maintenance problems and develop plans to solve these problems.
- Describe methods for assessing maintenance effectiveness and methods for improving maintenance systems and control of maintenance.
- Work and learn autonomously to solve problems and record and communicate clearly and professionally the approaches used to solve problems and the rationale for adopting such approaches to problems.

#### Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Ethical practice

## 3 Assessment Task 3

#### Assessment Type

Presentation and Written Assessment

#### Task Description

Refer to the Moodle site for **complete details** of the assessment item. This is only a basic outline of the features relating to the assessment task. You must provide detailed and appropriately referenced descriptions, diagrams, discussions and analysis in order to demonstrate your knowledge and understanding of concepts and processes. Failure to adopt this approach will result in you obtaining a lower grade for your submission as you will not be appropriately demonstrating your knowledge and understanding. The aim of Assessment Task 3 is to draw everything together in a cohesive and holistic form. In investigating, analysing and finding a remedy to the maintenance problem you have chosen in Assessment Task 1, you need to use any one of the techniques presented in Module 4 or 5 of your study materials (eg. Work Study, Queuing Theory, Statistical Failure Analysis, FMECA, Pareto Analysis, Control Charts, etc.). You will need to submit **two items**, a video presentation, including (separately) an appropriately referenced, set of the Powerpoint slides you presented in the video, with appropriate descriptions, analysis, documentation and photographic support.

Please appreciate that once I have assessed this assessment item - as per CQUniversity assessment processes - I cannot release your mark or provide feedback until after the moderation processes, occurring in the assessment committee meetings, have concluded and grades have been released.

#### Assessment Due Date

Week 12 Friday (11 Oct 2019) 10:00 pm AEST

Extensions: Feedback and advice regards solutions to this assignment will be made available to students 2 weeks after the due date. Consequently, extension requests greater than 14 days will be denied except under exceptional circumstances. Also, assessed submission and assigned mark provided once grades are released - as I am not allowed to release results until after university processes completed.

#### Return Date to Students

Extensions: Feedback and advice regards solutions to this assignment will be made available to students 2 weeks after the due date. Consequently, extension requests greater than 14 days will be denied except under exceptional circumstances. Also, assessed submission and assigned mark provided once grades are released - as I am not allowed to release results until after university processes completed.

#### Weighting

60%

#### Minimum mark or grade

50% of the weighting

#### Assessment Criteria

Refer to the Moodle site for **complete details** of the Assessment Task 1 Assessment Criteria sheet; weightings and focus of assessment criteria vary for each assessment task. This is only a basic outline of the features relating to the assessment task. Each submission will be assessed for presentation and layout, correct procedure, analysis and accuracy and appropriate referencing. The major assessment criteria relate to Analysis & Interpretation, Communication and Information Literacy. Ensure you access and read the details outlined in the Assessment Task 3 Assessment Criteria sheet **before** commencing the assessment item. **As you undertake** the assessment item ensure you address all assessment criteria outlined. Also, at the completion of the assessment item, prior to submission, **undertake an audit** to ensure you have appropriately addressed all assessment criteria.

#### Referencing Style

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

**Submission**

Online

**Learning Outcomes Assessed**

- Explain the impact of maintenance on the business of industrial organisations and the need for maintenance management.
- Describe processes for establishing maintenance needs of engineering operations, and developing maintenance plans and strategies, and explain costs and benefits of maintenance management.
- Describe techniques and methods for monitoring the condition of plant and equipment.
- Describe processes used to implement and manage condition monitoring programs for specific applications of plant and equipment.
- Investigate and analyse maintenance problems and develop plans to solve these problems.
- Describe methods for assessing maintenance effectiveness and methods for improving maintenance systems and control of maintenance.
- Work and learn autonomously to solve problems and record and communicate clearly and professionally the approaches used to solve problems and the rationale for adopting such approaches to problems.

**Graduate Attributes**

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