



# ENEM28005 Introduction to Engineering Asset and Maintenance Management

## Term 1 - 2024

Profile information current as at 12/05/2024 05:33 pm

All details in this unit profile for ENEM28005 have been officially approved by CQU University 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

Engineers are often required to evaluate the performance of various types of engineering assets. The ability to analyse maintenance data and develop effective maintenance plans are important skills for today's engineers. This unit will introduce you to asset maintenance standards, strategies, philosophies, and procedures, including the basic principles of asset management systems. You will investigate and report on key concepts relating to asset and maintenance management in engineering organisations. You will learn the fundamentals of asset maintenance and management strategies, reliability, and life cycle engineering of assets to maximise and optimise their value. You will gain insight into the governing ISO standards and their application in real-world scenarios. You will learn how to use different diagnostic tools such as failure mode effect and critical analysis, reliability-centred maintenance, and collect and analyse maintenance data in several engineering contexts. These learning objectives will be achieved through successful completions of online quizzes, a group project, and an individual assignment. This knowledge will help to predict the future reliability performance of operating assets, as well as to develop and recommend appropriate maintenance strategies for different engineering assets.

### Details

Career Level: *Postgraduate*

Unit Level: *Level 8*

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 1 - 2024

- Melbourne
- 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 Postgraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

### Class Timetable

#### [Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

#### [Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

### Assessment Overview

#### 1. **Online Test**

Weighting: 30%

#### 2. **Group Work**

Weighting: 40%

#### 3. **Project (applied)**

Weighting: 30%

### 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](#).

## Unit Learning Outcomes

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

1. Apply theoretical principles, standards, frameworks, and strategies underpinning engineering asset and maintenance management through group project and individual assignments
2. Analyse the performance of engineering assets using different fault detection, diagnostic, and life cycle management tools
3. Apply maintenance and reliability methods to predict the useful life of engineering assets
4. Model and predict the performance of engineering assets through data acquisition using analytical and statistical tools
5. Critique contemporary theories of leadership for effective management of assets
6. Work autonomously and as part of a team to deliver high-quality technical reports.

The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability, and 3. Professional and Personal Attributes at the following levels:

### Intermediate

1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 2I 3I)

1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 3I 5I)

2.2 Fluent application of engineering techniques, tools and resources. (LO: 2I 4I)

2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 1I 3I)

3.1 Ethical conduct and professional accountability. (LO: 6I)

3.2 Effective oral and written communication in professional and lay domains. (LO: 5I)

3.4 Professional use and management of information. (LO: 4I)

3.5 Orderly management of self and professional conduct. (LO: 5I)

3.6 Effective team membership and team leadership. (LO: 6I)

### Advanced

1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences that underpin the engineering discipline. (LO: 3A)

1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1A)

*Note: LO refers to the Learning Outcomes number(s) that link to the competency and the levels: N - Introductory, I - Intermediate and A - Advanced.*

Refer to the Engineering Postgraduate Units Moodle site for further information on the Engineers Australia Stage 1 Competency Standard for Professional Engineers and course-level mapping information

<https://moodle.cqu.edu.au/course/view.php?id=11382>

## 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 - Online Test - 30%	•		•		•	
2 - Group Work - 40%			•	•		•
3 - Project (applied) - 30%		•		•		•

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
1 - Knowledge		◦		◦	◦	
2 - Communication			◦		◦	◦
3 - Cognitive, technical and creative skills		◦	◦	◦		
4 - Research		◦		◦		
5 - Self-management						◦
6 - Ethical and Professional Responsibility						◦
7 - Leadership					◦	
8 - Aboriginal and Torres Strait Islander Cultures						

## Textbooks and Resources

### Textbooks

ENEM28005

#### Prescribed

##### Physical Asset Management

Authors: Hastings, Nicholas Anthony John

Springer-Verlag

London , UK

ISBN: ISBN: 978-1-84882-751-6

Binding: eBook

ENEM28005

#### Supplementary

##### Reliability Centered Maintenance - Implementation Made Simple

Authors: Neil Bloom

McGraw-Hill

ISBN: ISBN - 0 - 07 - 1460 69 - 1

Binding: eBook

[View textbooks at the CQUniversity Bookshop](#)

### IT Resources

**You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

## Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Neamul Khandoker** Unit Coordinator

[n.khandoker@cqu.edu.au](mailto:n.khandoker@cqu.edu.au)

## Schedule

### Week 1 - 04 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Unit overview. Importance of asset and maintenance management. Evolution of maintenance practices.	Textbook chapter (Hastings) - 1.	Lecture and Tutorial classes.

### Week 2 - 11 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Role of asset and maintenance management in overall business operations. Strategies for various maintenance types.	Textbook chapters (Hastings) - 2, and 3.	Lecture and Tutorial classes.

**Week 3 - 18 Mar 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Maintenance planning and scheduling.	Textbook chapter (Hastings) - 7.	Lecture and Tutorial classes.

**Week 4 - 25 Mar 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Methods for maintenance plans, and budgets developments.	Textbook chapters (Hastings)- 2, 4, 5, 6, 12, and 29.	Lecture and Tutorial classes.

**Week 5 - 01 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Maintenance engineering management principle - 1.	Textbook chapters (Hastings) - 4, 5, 6, and 8.	Lecture and Tutorial classes. <b>Online quiz #1</b>

**Vacation Week - 08 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
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**Week 6 - 15 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Maintenance engineering management principle - 2	Textbook Chapters (Hastings) - 4, 5, 6, 8, and 16.	Lecture and Tutorial classes. <b>Group project work</b> Due: Week 6 Friday (19 Apr 2024) 11:55 pm AEST

**Week 7 - 22 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Reliability centered maintenance principle - 1.	Textbook Chapter (Hastings) - 21 Textbook Chapter (Bloom) - 2	Lecture and Tutorial classes.

**Week 8 - 29 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Reliability centered maintenance principle - 2.	Textbook Chapters (Bloom) - 4, and 5.	Lecture and Tutorial classes.

**Week 9 - 06 May 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Performance measures in maintenance engineering and management.	Textbook Chapter (Hastings) - 28.	Lecture and Tutorial classes.

**Week 10 - 13 May 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Technologies in maintenance management, and engineering practices.	Textbook Chapter (Hastings) - 13, and 21. Textbook Chapter (Bloom) - 7, and 9.	Lecture and Tutorial classes. <b>Online quiz #2</b>

**Week 11 - 20 May 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Safety issues in maintenance engineering, and managements.	Textbook Chapters (Hastings) - 15, and 22.	Lecture and Tutorial classes.

**Week 12 - 27 May 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Guest lecture, and revision.		Sharing industrial experiences with students. <b>Applied individual project</b> Due: Week 12 Friday (31 May 2024) 11:55 pm AEST

## Review/Exam Week - 03 Jun 2024

Module/Topic	Chapter	Events and Submissions/Topic
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## Exam Week - 10 Jun 2024

Module/Topic	Chapter	Events and Submissions/Topic
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## Assessment Tasks

### 1 Online Quiz(zes)

#### Assessment Type

Online Test

#### Task Description

This assessment item includes two online quizzes which can be accessed via the unit's Moodle site. A set of calculation, drag-and-drop, short answer, and multiple-choice questions will be assigned. Each online quiz will cover the syllabus of previous four weeks and the corresponding week (e.g. Online quiz 1 covers the contents in Weeks 1 to 5, and online quiz 2 covers the contents in Weeks 6 to 10).

Every online quiz will stay open from Wednesday in the testing weeks until midnight Sunday in the following week so that you can take it whenever you are ready and available. You can attempt each quiz twice and the highest mark of the two attempts will be registered in Moodle Gradebook. The time limit for 20 questions will be an hour for each quiz. Once started, it cannot be paused, and it will become unavailable after its closing. There will be no restrictions on the venue and materials you can use. However, you are highly recommended to prepare for the quizzes due to their limited times.

#### Assessment Due Date

Quizzes will be held on teaching week 5, and 10.

#### Return Date to Students

#### Weighting

30%

#### Minimum mark or grade

50%

#### Assessment Criteria

- The total marks of each of two online quizzes will be scaled to out of 30 marks for the unit total.
- Numerical answers must be entered to 3 significant figures.

#### Referencing Style

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

#### Submission

Online

#### Submission Instructions

Students can submit their attempt to check their answers, or it will be submitted by itself on the due date.

#### Learning Outcomes Assessed

- Apply theoretical principles, standards, frameworks, and strategies underpinning engineering asset and maintenance management through group project and individual assignments
- Apply maintenance and reliability methods to predict the useful life of engineering assets
- Critique contemporary theories of leadership for effective management of assets

### 2 Group project work

#### Assessment Type

Group Work

#### Task Description

In this group assessment task, students will form a team of 2 to 3 members to work on an engineering asset and maintenance management project. The project will include investigating failures of relevant engineering components in a facility or failures of a related product. The aim of the undertaken project work is to present a complete solution of the

problem in a cohesive and holistic manner. They will be required to undertake thorough research into the situation, apply relevant theories, and asset and maintenance management frameworks, and evolve and recommend the most appropriate solution.

Thus, in researching, examining, and obtaining an achievable result students will need to use proper analytical and simulation techniques extensively (e.g. Life Cycle Management and Cost Modelling, Work Study, Queuing Theory, Statistical Failure Analysis, Reliability/RAMS Modelling FMECA, Planned Maintenance Optimisation, Pareto Analysis, Control Charts, etc.). The submission will be in the form of a group report.

**Assessment Due Date**

Week 6 Friday (19 Apr 2024) 11:55 pm AEST

**Return Date to Students**

Week 8 Friday (3 May 2024)

**Weighting**

40%

**Minimum mark or grade**

50%

**Assessment Criteria**

A Criteria Referenced Assessment practice will be used to assess this task. The philosophy of this assessment is to gauge the ability of students to work in a small team, use technical tools to analyse and assess information/data, and communication tools to showcase both their problem-solving skills and communication skills.

Although this is a group submission, each member of the group may receive varying grades. In the final report, the group will be asked to specify each members percentage contribution in the project. This percentage contribution will be used to determine the grade of each student. To help with team management the percent contribution should be discussed at the beginning of the project and at the end of the project. Each team member should reference their own contributions in the team report by use of the Harvard author-date system.

The group report will be marked on the main elements of analyzing a problem leading towards possible solution, discussion, and conclusions. The report should also be professionally presented, clearly showing, and explaining the development strategy of the solution including any assumptions or limitations. To maximize time spent on the unit's core aim it is recommended that diagrams are hand-drawn, and any mathematical equations or working be handwritten and scanned into the document. The report should be written and contain enough detail such that an engineer could understand, check and if necessary, repeat the work described. A detailed marking criteria specific to the project elements is available on the Moodle site.

**Referencing Style**

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

**Submission**

Online Group

**Submission Instructions**

Each team shall submit one report as a pdf document.

**Learning Outcomes Assessed**

- Apply maintenance and reliability methods to predict the useful life of engineering assets
- Model and predict the performance of engineering assets through data acquisition using analytical and statistical tools
- Work autonomously and as part of a team to deliver high-quality technical reports.

### 3 Applied individual project

**Assessment Type**

Project (applied)

**Task Description**

Each student will work on an engineering situation where they will have to model and predict the performance of an engineering asset. They will produce a high-quality report of their findings. This assessment will give students an opportunity to showcase their individual brilliance in applying asset management tools for effective decision-making. This will implicitly assess a student's perseverance in the term including conducting background research, retrieving, and processing information, undertaking original engineering data modelling and analysis, interpreting data, and arriving at logical conclusions and recommendations.

The submission will be an individual report containing elements of analyzing a problem leading towards possible solution, discussion, and conclusions. The report should also be professionally presented, clearly showing, and explaining the development strategy of the solution including any assumptions or limitations. To maximize time spent on the unit's core aim it is recommended that diagrams are hand-drawn, and any mathematical equations or working be handwritten



and scanned into the document. The report should be written and contain enough detail such that an engineer could understand, check and if necessary, repeat the work described. A detailed marking criteria specific to the project elements is available on the Moodle site.

**Assessment Due Date**

Week 12 Friday (31 May 2024) 11:55 pm AEST

**Return Date to Students**

Exam Week Friday (14 June 2024)

Students will receive their grades after certification of grades meeting.

**Weighting**

30%

**Minimum mark or grade**

50%

**Assessment Criteria**

The individual report will be used to assess the gain in knowledge, effective self-management, communication, and documentation of technical work. This must be clearly substantiated with evidence of individual work. The submission will be assessed based on how well the material in the report demonstrates student's ability and understanding regarding the unit's material. A detailed marking criteria specific to the project elements is available on the Moodle site.

**Referencing Style**

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

**Submission**

Online

**Submission Instructions**

Submit the report as a pdf file.

**Learning Outcomes Assessed**

- Analyse the performance of engineering assets using different fault detection, diagnostic, and life cycle management tools
- Model and predict the performance of engineering assets through data acquisition using analytical and statistical tools
- Work autonomously and as part of a team to deliver high-quality technical reports.

## 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