



# ENMM20031 Condition Monitoring and Tribology

## Term 1 - 2023

Profile information current as at 05/05/2024 01:08 am

All details in this unit profile for ENMM20031 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 is focused on the tribological principles to understand fundamentals of friction, wear and lubrication aspects of a machine. The knowledge of tribology will help student analysing root cause of failures and also in selecting an appropriate condition monitoring technique to predict failures. The unit will provide adequate knowledge to use condition monitoring as a maintenance strategy. Students will acquire adequate skills to select a suitable condition monitoring technique from a variety of techniques such as; sensory and function inspection; vibration monitoring; infrared thermography; oil analysis; acoustic emission; stress, strain, displacement; non-destructive testing/inspection; electrical equipment performance analysis; and performance monitoring in general.

#### 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

Prerequisites: ENMM20023 & ENMM20025

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 - 2023

- Online

#### 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. **Written Assessment**

Weighting: 20%

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

Weighting: 20%

#### 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 Classroom conversation

**Feedback**

Students reported theory taught in the class is directly applicable at their workplace.

**Recommendation**

The contents will be retained and where possible changes will be made to meet the industry requirements.

#### Feedback from Class conversation and also via phone.

**Feedback**

Class timings are not suitable.

**Recommendation**

Choosing a time that accommodates the entire class can pose challenges. Nevertheless, minor adjustments can be considered with the consensus of the majority. All lectures and tutorials are recorded, and accessible on Moodle for students unable to attend in person.

#### Feedback from Teaching evaluation

**Feedback**

Assessment requirements need to be clearer.

**Recommendation**

Marking rubrics will be revised with clearer requirements.

## Unit Learning Outcomes

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

1. Identify the range of condition monitoring techniques suitable in a plant.
2. Establish tribological principles for deciding condition monitoring techniques.
3. Investigate the standards associated with condition monitoring techniques.
4. Justify the use of condition monitoring in a plant.

n/a

## Alignment of Learning Outcomes, Assessment and Graduate Attributes

 N/A Level	 Introductory Level	 Intermediate Level	 Graduate Level	 Professional Level	 Advanced Level
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### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes			
	1	2	3	4
1 - Written Assessment - 20%	•	•	•	•
2 - Written Assessment - 20%	•	•	•	•
3 - Presentation and Written Assessment - 60%			•	•

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes			
	1	2	3	4
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				

### Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes							
	1	2	3	4	5	6	7	8
1 - Written Assessment - 20%	◦	◦	◦	◦				
2 - Written Assessment - 20%	◦	◦	◦	◦	◦			
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)
- Study Guide electronic copy on the Moodle website
- Online lecture sessions via Zoom
- Web Links of different topics

## Referencing Style

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

## Teaching Contacts

**Subhash Sharma** Unit Coordinator  
[s.sharma2@cqu.edu.au](mailto:s.sharma2@cqu.edu.au)

## Schedule

### Week 1 - 06 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Module 1	Introduction to Condition Monitoring and tribology	Post an introduction about yourself on the discussion forum, including your expectations from this unit. The first lecture will give a general overview of the unit, followed by a general discussion. The lecture and tutorial schedule can be found on the Moodle website for the unit.

### Week 2 - 13 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Module 2 to 3	Topic: Introduction to Tribology and Oil analysis	View power point slides on Principles of Tribology and Oil analysis before coming to class for lecture.

### Week 3 - 20 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Module 2 to 3	<b>Used Oil Analysis techniques and ASTM Lubricant testing standards notes and websites.</b>	Search for ASTM standards website before coming to the lecture. Lecture on: Oil analysis and ASTM standards.

### Week 4 - 27 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
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Module 3	Module 3 and lecture notes on Oil cleanliness.	<p>Take part in Group and forum discussion. Your assignment is due next week, ask questions in the tutorial or via phone.</p> <p><b>This week Tuesday 28th March is the Census Date, after this day you cannot drop this unit.</b></p>
<b>Week 5 - 03 Apr 2023</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 4	Vibration Monitoring.	<p>The assignment is due on Monday this week.</p> <p>Self-study Vibration Analysis slides and study guide, come prepared with Assignment 2 questions to ask the guest speaker next week.</p> <p><b>WATCH FOR TIME CHANGE-DAYLIGHT SAVING ENDED LAST WEEK</b></p> <p><b>Written Assessment-1</b> Due: Week 5 Monday (3 Apr 2023) 11:59 pm AEST</p>
<b>Vacation Week - 10 Apr 2023</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
<b>NON-TEACHING WEEK</b>		<b>NO LECTURE THIS WEEK</b>
<b>Week 6 - 17 Apr 2023</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 4	Vibration Analysis	<p>GUEST speaker will speak on Vibration Analysis Principles, followed by industrial applications and will discuss Assignment 2.</p>
<b>Week 7 - 24 Apr 2023</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 5	Vibration Monitoring	<p>No Lecture this week, students can self-study Module 5. However, the guest lecturer can be contacted for assignment-related Vibration analysis questions via email/phone. The assignment is due next week.</p>
<b>Week 8 - 01 May 2023</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Module 6	Causes of Vibration	<p>Discussion on Assignment 2 questions in the class. The assignment is due on Friday this week.</p> <p><b>Written Assessment-2</b> Due: Week 8 Friday (5 May 2023) 11:59 pm AEST</p>
<b>Week 9 - 08 May 2023</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>

Module 2

Parameters and symptoms limits. and Non Destructive Testing.  
Guest lecture on Internet of things lecture notes on moodle.

Visit suggested web links for the Non Destructive testing.  
Next week a specialist lecture by a guest lecturer on **Internet of Things (IOT) with possible application to Condition monitoring**. Read lecture notes before coming to the class.

#### Week 10 - 15 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
Advanced Condition Monitoring	Advanced Condition monitoring techniques and current trends.	Discussion on Non-Destructive, testing techniques and questions on Assignment 3.

#### Week 11 - 22 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
Financial Aspects of Condition Motoring	Return on investment- lecture slides and study guide	Discussion on Assignment 3, ask questions on Assignment 3 via phone or pre-booked zoom session.

#### Week 12 - 29 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
Revision	Mini-project queries	<b>Finalize Mini-project, and ask questions in class or over the phone. The assignment is due on Monday next week.</b>

#### Review/Exam Week - 05 Jun 2023

Module/Topic	Chapter	Events and Submissions/Topic
		Submit Assignment 3 Monday this week
Assignment -3	Assignment 3	<b>Presentation and Written Assessment - 3</b> Due: Review/Exam Week Monday (5 June 2023) 11:59 pm AEST

#### Exam Week - 12 Jun 2023

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

### 1 Written Assessment-1

#### Assessment Type

Written Assessment

#### Task Description

The written assessment for this unit will focus on the introduction of condition monitoring principles and the fundamentals of Tribology, including friction, wear, and lubrication, and their application to used oil analysis in a given shop floor scenario. It is important for students to have a strong understanding of ASTM standards for oil testing. The assessment details, including the question sheet, will be available on the Moodle website for this unit. The assignment will require you to gather information from industry reports

or interviews and demonstrate your knowledge of oil analysis practices in industries and your understanding of tribology principles as applied in machines. In addition to the learning guide, you will need to use additional resources such as company reports, information from websites, and library resources to complete the assignment.

**Assessment Due Date**

Week 5 Monday (3 Apr 2023) 11:59 pm AEST

The assessment standards will be clearly defined in a grading guide. Proper citation is essential, and incorporating visual aids such as illustrations, tables, and charts is recommended to exceed the word count limit. It's important to keep in mind that data collected from company sources may have been logically adjusted to maintain confidentiality, and CQU bears no responsibility for this.

**Return Date to Students**

Week 6 Monday (17 Apr 2023)

It is anticipated that the marked assignments will be returned within two weeks of the submission deadline for those submitted on time.

**Weighting**

20%

**Assessment Criteria**

The evaluation criteria for this assignment focus on the clear explanation of the problem and the excellence of the content. The quality of your content will influence your marks. Ensure clear expression throughout by utilizing illustrations and tables, which serve as visual aids to limit the word count. For additional information, including the grading criteria, assignment questions, and the grading method for each question, please refer to the Moodle website for this course.

**Referencing Style**

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

**Submission**

Online

**Submission Instructions**

Submit your assignment electronically in "MSWord" format NOT pdf, Ensure filename is formatted as (example): John Smith\_S000111\_ENMM20031\_Assignment\_1.doc

**Learning Outcomes Assessed**

- Identify the range of condition monitoring techniques suitable in a plant.
- Establish tribological principles for deciding condition monitoring techniques.
- Investigate the standards associated with condition monitoring techniques.
- Justify the use of condition monitoring in a plant.

**Graduate Attributes**

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Research

## 2 Written Assessment-2

**Assessment Type**

Written Assessment

**Task Description**

Assessment deals with the basic principles of vibration monitoring, vibration data collection and its analysis. Assignment questions will be posted on the Moodle Web page of this unit. Question may require theoretical answers or based on the data that you collect from your work place. Students are expected to research resources listed on the Moodle web page, interviews and company reports. Please note that reading will not be limited to the Study Guide only.

**Assessment Due Date**

Week 8 Friday (5 May 2023) 11:59 pm AEST

The evaluation criteria will be clearly outlined in a grading rubric. Accurate referencing is crucial, and incorporating visual aids such as illustrations, tables, and charts should be maximized to surpass the word count requirement. It is important to plan your assessment carefully and ensure that all parts of the question are answered and that it meets the assessment criteria, as the quality of the content will impact your marks. Note that data collected from company sources



may have been adjusted logically to maintain confidentiality, and CQU accepts no responsibility in this matter.

**Return Date to Students**

Week 10 Friday (19 May 2023)

It is expected that marked assessment will be returned within 2 weeks of the due date when submitted on time

**Weighting**

20%

**Assessment Criteria**

The assessment criteria will be explained in the Assignment Question sheet posted on the Moodle web page. Marks will be assigned for each question in the question sheet. Each part of the question must be answered, part answered question will result in lower grade.

**Referencing Style**

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

**Submission**

Online

**Submission Instructions**

Submit your assignment electronically in "MSWord" format NOT pdf, Ensure filename is formatted as (example): John Smith\_S000111\_ENMM20031\_Assignment\_2.doc.

**Learning Outcomes Assessed**

- Identify the range of condition monitoring techniques suitable in a plant.
- Establish tribological principles for deciding condition monitoring techniques.
- Investigate the standards associated with condition monitoring techniques.
- Justify the use of condition monitoring in a plant.

**Graduate Attributes**

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Research
- Self-management

### 3 Presentation and Written Assessment - 3

**Assessment Type**

Presentation and Written Assessment

**Task Description**

This assignment is a mini-project report requires you to develop a condition monitoring plan that can be used to implement a new CM system or upgrade the existing one by incorporating new condition monitoring technologies at your workplace. This may involve collecting data from your company's CMMS, interviewing stakeholders, and gathering information from books and websites. If the data is confidential, you may need to adjust it logically to maintain security, however, CQU takes no responsibility for the confidentiality of the data. To minimize the word count, utilize tables, charts, and diagrams as much as possible. The presentation should consist of no more than 10 PowerPoint slides, focusing on a problem related to advanced non-destructive technologies used in condition monitoring.

**Assessment Due Date**

Review/Exam Week Monday (5 June 2023) 11:59 pm AEST

The assessment standards will be clearly defined in a grading guide. Proper citation is essential, and incorporating visual aids such as illustrations, tables, and charts is recommended to exceed the word count limit. It's important to keep in mind that data collected from company sources may have been logically adjusted to maintain confidentiality, and CQU bears no responsibility for this.

**Return Date to Students**

Exam Week Friday (16 June 2023)

The date for returning the assignment is uncertain as the grades will be finalised a bit later after they have been

approved by the School Committee.

**Weighting**

60%

**Assessment Criteria**

The assessment criteria will be explained in the question sheet available on the Moodle web page. In this assignment a word count limit will apply. A rubric will be provided in the moodle webpage to explain the marking criteria explicitly. Proper referencing is essential. Answers should be short but to the point highlighting your own interpretation to reflect the workplace experience. Plan your assessment before writing so that it meets the assessment criteria and no part of the questions asked is left unanswered. Quality of the contents is important to score high marks.

**Referencing Style**

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

**Submission**

Online

**Submission Instructions**

Submit your assignment electronically in "MSWord" format NOT pdf, Ensure filename is formatted as (example): John Smith\_S000111\_ENMM20031\_Assignment\_3.doc.

**Learning Outcomes Assessed**

- Investigate the standards associated with condition monitoring techniques.
- Justify the use of condition monitoring in a plant.

**Graduate Attributes**

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Research
- Self-management
- Ethical and Professional Responsibility
- Leadership

## 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