



# ENMM20031 Condition Monitoring and Tribology

## Term 1 - 2024

Profile information current as at 10/05/2024 04:03 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 course is centred around studying tribological principles, which provide a foundation for understanding a machine's friction, wear, and lubrication characteristics. By acquiring knowledge in tribology, you will be equipped to identify the root causes of failures and utilize appropriate condition-monitoring techniques to predict and minimize future failures. The course will provide you with the necessary knowledge and skills to implement condition monitoring as a maintenance strategy. With exposure to a diverse range of techniques, including sensory and functional inspections, vibration monitoring, infrared thermography, oil analysis, stress and strain analysis, non-destructive testing and inspection, electrical equipment, and general performance monitoring, you will be well-equipped to select the most suitable condition monitoring technique for any given scenario.

#### 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 - 2024

- 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: 30%

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

Weighting: 30%

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

Weighting: 40%

### 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. Apply tribological principles for deciding condition monitoring techniques
2. Identify the range of condition monitoring techniques suitable in a plant
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 - 30%	•	•	•	•
2 - Written Assessment - 30%	•	•	•	•
3 - Presentation and Written Assessment - 40%			•	•

### 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				

## 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)
- Zoom online Lecture Sessions
- Weblinks to different resources

## 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 -Introduction to Condition Monitoring - 04 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Condition Monitoring & Tribology	Self-study Articles and Study- guide Module 1	Introduce yourself to the class via a Discussion Forum. Discussion on assessment requirements.

### Week 2 - 11 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Tribology- Friction Wear and Lubrication	Self-study Chapter 2 of Oil Analysis and Condition Monitoring book by David Whitby and Lecture notes by the lecturer.	Tutorial 1: Quiz on Tribology and Condition Monitoring

### Week 3 - 18 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Oil Analysis and ASTM standards	Self-study articles were provided and Chapter 6 of the Oil Analysis and Condition Monitoring book by David Whitby.	Tutorial 2: Discussion on Chevron_ Testing Used Engine Oils

### Week 4- Oil Cleanliness and ASTM standards - 25 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Oil Cleanliness	Self-study Lecturer's notes and Chapter 10 of the Oil Analysis and Condition Monitoring book by David Whitby.	Tutorial 3: Discussion on Video on Oil cleanliness <b>This week Tuesday 26th March is the Census Date, after this day you cannot drop this unit.</b>

**Week 5 - Theory of Vibration - 01 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Theory of Vibration	Self-study Comset Vibration guide	Tutorial 4: Questions related to Vibration measurements Overview of Assessment 2 <b>Daylight saving ends on Monday this week, please check the online lecture time.</b>

**Vacation Week - NO TEACHING - 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
Theory of Vibration	Lecture notes Module 3 of the study guide	Guest Lecture by an industry expert. Tutorial 5: Question-answer session  <b>Written Assessment - Oil analysis and tribology</b> Due: Week 6 Monday (15 Apr 2024) 11:59 pm AEST

**Week 7 - 22 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Vibration Analysis	Self-study Chapter 3 of Study-guide	Tutorial 6: Discussion on a video on vibration analysis

**Week 8- Vibration Standards - 29 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Revision of the vibration Analysis	Module 4 of the study guide	Tutorial 7: Discussion on Assessment 2

**Week 9- Non destructive testing - 06 May 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Parameter Limits	Module 2 of the Study Guide	Tutorial 8: Discussion on Use of Parameters and Warning Limits Discussion on Assessment 3  <b>Written Assessment 2 - Vibration Analysis</b> Due: Week 9 Monday (6 May 2024) 11:59 pm AEST

**Week 10- - 13 May 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Non Destructive Testing	Self-study using Internet	Tutorial 9- discussion on a video on new condition monitoring tools

**Week 11- - 20 May 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Application of the Internet of Things	Lecture notes provided by the guest speaker	Tutorial 10: Discussion on the mini-project assessment Instructions on PowerPoint presentation slides

**Week 12- REVISION - 27 May 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Revision of the unit	All Chapters	Discussion on Mini-project requirements.

**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

## Assessment Tasks

### 1 Written Assessment - Oil analysis and tribology

**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. Students need to have a strong understanding of ASTM standards for used oil testing. The assessment will cover materials from the topics covered in weeks 1-4. 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 assessment.

**Assessment Due Date**

Week 6 Monday (15 Apr 2024) 11:59 pm AEST

**Return Date to Students**

Week 7 Friday (26 Apr 2024)

**Weighting**

30%

**Assessment Criteria**

The evaluation criteria for this assignment focus on providing a clear explanation of the problem and achieving excellence in the content. The quality of your content will influence your marks. Ensure clarity of expression throughout by utilizing illustrations and tables, which are visual aids to limit the word count. Your answers should be contextualised to your workplace practices. The assessment will cover materials from the topics covered in weeks 5-8. For additional information, including the grading criteria, assignment questions, and the grading method for each question, please refer to the marking rubric on the Moodle website for this unit.

**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**

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

### 2 Written Assessment 2 - Vibration Analysis

**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. Questions may require theoretical answers or based on the data that you collect from your workplace. Students are expected to research resources listed on the Moodle web page, interviews, and company reports. In addition to the learning guide, you will need to use additional resources such as company reports/CMMS, information from websites, and library resources to complete the assignment.

### Assessment Due Date

Week 9 Monday (6 May 2024) 11:59 pm AEST

### Return Date to Students

Week 11 Monday (20 May 2024)

### Weighting

30%

### Assessment Criteria

The evaluation criteria for this assessment focus on providing a clear explanation of the problem and achieving excellence in the content. The quality of your content will influence your marks. Ensure clarity of expression throughout by using illustrations and tables as visual aids to limit the word count. For additional information, including the grading criteria, assessment questions, and the grading method for each question, please refer to the marking rubric on the Moodle website for this unit.

### 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

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

## 3 Mini-project and Presentation

### Assessment Type

Presentation and Written Assessment

### Task Description

This assessment is a mini-project report that requires you to develop a condition monitoring plan. The plan can be used to implement a new CM system or upgrade the existing one by incorporating new condition-monitoring technologies in your workplace. This may involve collecting data from your company's CMMS and interviewing stakeholders, consulting journals, websites, etc. If data is confidential, you may need to adjust it logically to maintain the confidentiality of the source; 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 solving problems using advanced condition monitoring tools, including non-destructive technologies. The assignment will cover materials from the entire unit, specifically from weeks 9-10. This assignment is a mini-project report that 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 CMMS, 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 (3 June 2024) 11:59 pm AEST

### Return Date to Students

Exam Week Friday (14 June 2024)

The return date is tentative. Marks will be posted after the moderation process as they may be altered by the



committee.

**Weighting**

40%

**Assessment Criteria**

The evaluation criteria for this assessment focus on providing a clear explanation of the problem and achieving excellence in the content. The quality of your content will influence your marks. Ensure clarity of expression throughout by using illustrations and tables as visual aids to limit the word count. For additional information, including the grading criteria, assessment questions, and the grading method for each question, please refer to the marking rubric on the Moodle website for this unit.

**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.

## 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