



MTRN4062

Micro Electro Mechanical Systems (MEMS)

Session 2, In person-scheduled-weekday, North Ryde 2026

School of Engineering

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General Information

Unit convenor and teaching staff

Unit Convenor and Lecturer

David Inglis

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Contact via email

9WW-2.134, <https://macquarie.zoom.us/my/david.inglis>

Mondays 4-5pm

Credit points

10

Prerequisites

MTRN3026 OR MECH3005

Corequisites

Co-badged status

Unit description

This unit introduces Microelectromechanical Systems (MEMS) and their application in a wide range of systems including sensors, actuators, biology and microfluidics. MEMS has been identified as one of the most promising technologies and has found vast applications in all aspects of our daily life. Industrial, healthcare, automobile and aerospace designs are increasingly deploying MEMS devices by combining microelectronics with micromachining technology for highly precise control, automation, and positioning applications.

The unit includes hands-on experience in the field of MEMS and aims to familiarise students with the steps of the microfabrication process. Students will spend time within the School of Engineering clean room to perform foundational microfabrication processes. They will learn about the physics and underlying principles behind MEMS devices and will develop understanding of the diversity and significance of the field.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals ([UNSDGs](#)) Good Health and Well Being; Quality Education; Industry, Innovation and Infrastructure;

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

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

ULO1: Describe the working principles of a range of MEMS devices including sensors, actuators, gyroscopes and microfluidics.

ULO2: Execute a successful analysis of a MEMS problem and provide insights into the practical applications of the methods.

ULO3: Perform a simple modelling or computational model for a MEMS problem with sufficient complexity

ULO4: Design and fabricate a MEMS system or component by utilising appropriate facilities and applying the theory learned.

General Assessment Information

Release: Assignment 1 will be released no later than week 4.

Grading and passing requirement for unit

In order to pass this unit a student must obtain a mark of 50 or more for the unit.

Late Assessment Submission Penalty

Online quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide. Should either of these assessments be missed due to illness or misadventure, students should apply for Special Consideration.

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. The submission time for all uploaded assessments is 11:55 pm. A 1-hour grace period will be provided to students who experience technical concerns. For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for [Special Consideration](#). For example, if the assignment is worth 8 marks (of the entire unit) and your submission is late by 19 hours (or 23 hours 59 minutes 59 seconds), 0.4 marks (5% of 8 marks) will be deducted. If your submission is late by 24 hours (or 47 hours 59 minutes 59 seconds), 0.8 marks (10% of 8 marks) will be deducted, and so on.

Resubmissions of work are not allowed.

Supplementary Exam: If you receive [special consideration](#) for the final exam, a supplementary exam will be scheduled by the faculty during a supplementary exam period. This is typically 3 to 4 weeks after the normal exam period. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination

period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
<u>Assignment</u>	30%	No	06/11/2026	Individual	Yes	Open
<u>Skills and knowledge demonstrated during research lab visits</u>	20%	No	Week 3	Individual	No	Observed
<u>Final Exam</u>	50%	No	Exam Period	Individual	No	Observed

Assignment

Assessment Type ¹: Problem-based task

Indicative Time on Task ²: 2 hours

Due: **06/11/2026**

Weighting: **30%**

Groupwork/Individual: Individual

Short extension ³: Yes

AI Approach: Open

One assignment will be used to assess MEMS design and modelling

On successful completion you will be able to:

- Execute a successful analysis of a MEMS problem and provide insights into the practical applications of the methods.
- Perform a simple modelling or computational model for a MEMS problem with sufficient complexity
- Design and fabricate a MEMS system or component by utilising appropriate facilities and applying the theory learned.

Skills and knowledge demonstrated during research lab visits

Assessment Type ¹: Practice-based task

Indicative Time on Task ²: 5 hours

Due: **Week 3**

Weighting: **20%**

Groupwork/Individual: Individual

Short extension ³: No

AI Approach: Observed

Students will be assessed on their demonstration of skills, knowledge and applied learning during visits to research laboratories. This may include replicating a task after having it demonstrated, answering questions about the equipment, facility or process, and behavior in a professional manner.

On successful completion you will be able to:

- Describe the working principles of a range of MEMS devices including sensors, actuators, gyroscopes and microfluidics.
- Design and fabricate a MEMS system or component by utilising appropriate facilities and applying the theory learned.

Final Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 30 hours

Due: **Exam Period**

Weighting: **50%**

Groupwork/Individual: Individual

Short extension ³: No

AI Approach: Observed

You will undertake a final examination during the formal examination period.

On successful completion you will be able to:

- Describe the working principles of a range of MEMS devices including sensors, actuators, gyroscopes and microfluidics.
- Execute a successful analysis of a MEMS problem and provide insights into the practical applications of the methods.

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- [Academic Success](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation.

³ An automatic short extension is available for some assessments. Apply through the [Service Connect Portal](#).

Delivery and Resources

Students are encourage to obtain a copy of "Foundations of MEMS" by Chang Liu. Any edition will be suitable.

"Fundamentals of Microfabrication, The Science of Miniaturization" by Marc J. Madou is also a useful text.

Unit Schedule

Lecture and SGTAs start in week 1. Practical Classess start in week 3.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.smq.edu.au\)](https://policies.smq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit connect.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Academic Success

[Academic Success](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Ask a Study Coach](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via the [Service Connect Portal](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit <https://students.mq.edu.au/support/technology/service-desk>.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Unit information based on version 2026.02 of the [Handbook](#)