



MECH2001

Engineering Dynamics

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

School of Engineering

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Disclaimer

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General Information

Unit convenor and teaching staff

Unit Convenor and Lecturer

Yuan Wang

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Contact via Email

Room 297, Engineering Innovation Building, 9 Wally's Walk (9WW)

Wednesady 12 PM – 1 PM

Credit points

10

Prerequisites

MECH1001 and (MATH1020 or MATH1025)

Corequisites

Co-badged status

Unit description

The unit examines Newton's laws in the context of engineering dynamics. The unit leads students to an understanding of Newton's laws as applied to the effect of force on solids in engineering. The unit initially examines the issues of work and energy, with a focus on impulse, momentum and impact. The unit assesses the roles of particle kinematics, particle kinetics, rigid body dynamics, plane kinematics and plane kinetics.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals ([UNSDGs](#)) 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: Develop an understanding of Newton's laws applied to the effect of force on solids in engineering applications

ULO2: Apply mathematical skills to solve engineering dynamics problems

ULO3: Build problem-solving skills for a range of real-world engineering dynamics applications

ULO4: Develop effective communication skills through written reports and group work activity

General Assessment Information

Student Responsibilities

Check iLearn regularly. Be familiar with University policy and College procedures and act in accordance with those policies and procedures.

It is the responsibility of the student to retain a copy of any work submitted. Students must produce these documents upon request. Copies should be retained until the end of the grade appeal period each term.

The student is to perform the required due diligence for their assessment grade and rectify as soon as possible upon finding any errors.

Late Assessment Submission Penalty

The late submission policies adopted in this unit are in line with the general faculty's policy on assessment submission deadlines, including late submissions.

Up to 3 calendar days of **Short Extension** can be applied to complete the Laboratory Report assessment and the Field Trip & Report assessment without a penalty. Short Extension can be applied [here](#). This is designed to give you a little more breathing space to complete your work, empower you to manage your study and life commitments and to support your overall wellbeing. Submission time for all written assessments is set at **11:55 pm**. A 1-hour grace period is provided to students who experience a technical concern.

Late submissions after a Short Extension will incur a **5% penalty (of the total possible mark) per day, up until the 7th day (including weekends)**. Submissions received more than 7 days after the assessment deadline will receive a grade of "0", unless a Special Consideration request has been submitted and approved.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for [Special Consideration](#).

Please allow one week for Special Consideration applications to be processed. Processing times may be longer during peak periods.

Notifications

Formal notification of assessment tasks, grading rubrics, and due dates will be posted on iLearn. Although all reasonable measures have been taken to ensure the information is accurate, the University reserves the right to make changes without notice. Each student is responsible for checking iLearn for changes and updates.

Assignment Submissions and Plagiarism Policies

Resubmission of any assessment task is not allowed under any circumstances. All assignments and reports must be submitted electronically through iLearn (in pdf format). Submissions will undergo plagiarism checkers using the Turnitin software and any work deemed to have a **30%** or higher similarity score may incur an academic penalty. For more details on the policies of academic penalties relating to academic honesty, please refer to the policies and procedures section below.

Submissions should be typed and in a logical layout and sequence. The expected workload includes the preparation of final copies and clear diagrams.

Grading and Passing Requirements for Unit

In order to pass this unit, a student must obtain a mark of **50** or more for the unit (i.e., obtain a passing grade P/ CR/ D/ HD). For further details about grading, please refer to the policies and procedures section below.

Assessment Tasks

1. Field Trip Report (35%)

An industry visit will be held likely in Week 5. The visit includes a guided tour on vibration, sound, and strain measurement in real-world engineering systems. After the visit, students will submit an individual written report reflecting on their observations and linking them to key engineering dynamics concepts and real-world applications, following the report requirements and marking rubric provided on iLearn.

2. Lab Report (35%)

Lab report for each laboratory-based activity on Weeks 4, 7, and 12. Attendance of practical classes is **mandatory** before submitting the lab report. Lab reports submitted without attending the practical session will get a grade of '0' even if the assessment is submitted by the due date. A special consideration request must be submitted and approved if any student is unable to attend a practical session to organise alternative arrangements.

3. Final Exam (30%)

Final Examination to be conducted at the end of the semester. For further information, please refer to the Examination Timetable website on www.mq.edu.au.

If you receive a [Special Consideration](#) for the final exam, a supplementary exam will be scheduled by the faculty during a supplementary exam period, typically about 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.

Small Group Teaching Activity (SGTA)

Participation in SGTAs is strongly encouraged. Weekly two-hour SGTAs will run from Weeks 2 to 13, where students can attempt the provided SGTA questions through peer discussion and TA

support to reinforce understanding and practise problem-solving skills.

One Bonus Challenge Question (BCQ) will be provided in selected weeks. Students who correctly solve the BCQ and explain their working to the TA **during an SGTA session in the same week that the question is released** will receive 1 bonus mark added to the final mark.

SGTA and BCQ solutions will be posted on iLearn in the following week.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Field trip & Report	35%	No	11/09/2026	Individual	Yes	Open
Laboratory report	35%	No	06/11/2026	Individual	Yes	Open
Final Exam	30%	No	TBA	Individual	No	Observed

Field trip & Report

Assessment Type ¹: Written Submission

Indicative Time on Task ²: 35 hours

Due: **11/09/2026**

Weighting: **35%**

Groupwork/Individual: Individual

Short extension ³: Yes

AI Approach: Open

A report based on an industry field trip that connects key insights from the site visit to real-world applications of engineering dynamics and learning outcomes.

On successful completion you will be able to:

- Develop an understanding of Newton's laws applied to the effect of force on solids in engineering applications
- Apply mathematical skills to solve engineering dynamics problems
- Build problem-solving skills for a range of real-world engineering dynamics applications

Laboratory report

Assessment Type ¹: Written Submission

Indicative Time on Task ²: 21 hours

Due: **06/11/2026**

Weighting: **35%**

Groupwork/Individual: Individual

Short extension ³: Yes

AI Approach: Open

A curated lab report containing work completed across the semester. Submitted as one single assignment in the final laboratory class.

On successful completion you will be able to:

- Build problem-solving skills for a range of real-world engineering dynamics applications
- Develop effective communication skills through written reports and group work activity

Final Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 35 hours

Due: **TBA**

Weighting: **30%**

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:

- Develop an understanding of Newton's laws applied to the effect of force on solids in engineering applications
- Apply mathematical skills to solve engineering dynamics problems
- Build problem-solving skills for a range of real-world engineering dynamics applications

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

Primary Text: Vector Mechanics for Engineers: Dynamics - 10th Edition in SI Units by Beer, Johnston, and Cornwell.

Supporting Text: Mechanics for Engineers: Dynamics - 13th Edition by R. C. Hibbeler and K. B. Yap

The technology used and required: All course-related materials, lecture slides, SGTA problems, and assignments will be posted on iLearn. Students are required to check iLearn regularly.

Unit Schedule

Week	Lecture Topic	Key topics to be covered
1	Kinetics of Particles: Newton's Second Law	Concepts of Kinetics, Linear Momentum, Free Body Diagrams
2	Kinetics of Particles: Energy and Momentum Methods	Principle of Work and Energy, Conservation of Energy, Principle of Impulse and Momentum, Impact
3	Systems of Particles	Moment, Angular Momentum, Newton's law applied to Systems of particles, Work - Energy and Impulse - Momentum principles applied to Systems of Particles
4	Kinematics of Rigid Bodies - Part 1	Rigid bodies, Types of motion in Rigid bodies, General Plane Motion, Calculating velocities in Rigid bodies
5	Kinematics of Rigid Bodies - Part 1	Rigid bodies, Types of motion in Rigid bodies, General Plane Motion, Calculating velocities in Rigid bodies
6	Kinetics of Rigid Bodies - Part 1	Equations defining the rotation of a rigid body, General Plane motion, Absolute and Relative velocity in Plane motion
7	Kinetics of Rigid Bodies - Part 2	Equations defining the rotation of a rigid body, General Plane motion, Absolute and Relative velocity in Plane motion
8	Kinetics in 3D	Impulse and Momentum of Rigid body in Three Dimensions, Kinetic Energy of Rigid Body in Three Dimensions, Motion of a Gyroscope
9	Mechanical Vibrations - Part 1	Introduction to Vibration, Free vibrations of particles, Simple harmonic motion, Simple Pendulum
10	Mechanical Vibrations - Part 2	Damped Vibrations, Forced Vibrations
11	Mechanical Vibrations - Part 3	Degree of Freedom, Linear and Non-linear Springs, Vibration of Continuous System
12	Mechanical Vibrations - Part 4	Case Studies and Practice Problems, Coulomb Damping, Hysteretic Damping
13	Review of the Unit Contents	Review of the unit

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.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.

Engineer Australia Competency

Engineers Australia Competency Standard		Unit Learning Outcomes
Knowledge and Skill Base	1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline.	1, 2, 3
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	1, 2, 3
	1.3 In-depth understanding of specialist bodies of knowledge.	1, 3
	1.4 Discernment of knowledge development and research directions.	3

Engineers Australia Competency Standard		Unit Learning Outcomes
	1.5 Knowledge of engineering design practice.	3
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	1, 3
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving.	1, 2, 3
	2.2 Fluent application of engineering techniques, tools and resources.	2, 3
	2.3 Application of systematic engineering synthesis and design processes.	3
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	3, 4
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	4
	3.2 Effective oral and written communication in professional and lay domains.	4
	3.3 Creative, innovative and pro-active demeanour.	3, 4
	3.4 Professional use and management of information.	4
	3.5 Orderly management of self, and professional conduct.	4
	3.6 Effective team membership and team leadership.	4

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