



# MECH2003

## Mechanical Design 1

Session 1, In person-scheduled-weekday, North Ryde 2023

*School of Engineering*

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#### **Disclaimer**

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## General Information

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Credit points  
10

Prerequisites  
(MECH1001 or ENGG150) and (MATH1020 or MATH1025 or MATH133 or MATH136)

Corequisites

Co-badged status

Unit description  
In this unit, students will develop skills in computer-aided drawing with a specific focus on part modelling, manufacturing drawings, assembly modelling, CNC programming and surfacing. The unit also covers basic knowledge in the selection of machine elements and principles in the design of engineering systems. Students are expected to demonstrate the ability to analyse rotating systems required to transmit power and consider the most suitable methods for assembling them.

## 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:** Employ computer-aided-drawing proficiently to produce solid models, assemblies, computer-numerical-control codes and manufacturing drawings that meet industrial and Australian standards.

**ULO2:** Analyse and identify the usage of different types of permanent and non-permanent joints.

**ULO3:** Analyse power transmission, losses and angular velocity changes in mechanical engineering systems.

**ULO4:** Discuss the mechanical design process and how the use of engineering principles supports this procedure.

**ULO5:** Apply prerequisite knowledge that will assist with the selection of machine elements and analysis of systems

## General Assessment Information

### Requirements to Pass this Unit

To pass this unit you must:

- Attend weekly SGTA's, and
- Attempt all assessments, and
- Achieve a total mark equal to or greater than 50%

### Late Assessment Submission Penalty

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 a technical concern.

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.

Assessments where Late Submissions will be accepted

- CAD Assignment – YES, Standard Late Penalty applies
- Diagnostic test – NO, unless Special Consideration is Granted
- Mid session test – NO, unless Special Consideration is Granted
- CAD tests – NO, unless Special Consideration is Granted
- Final examination – NO, unless Special Consideration is Granted

## Special Consideration

The [Special Consideration Policy](#) aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through [ask.mq.edu.au](http://ask.mq.edu.au).

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Diagnostic test</a>	5%	No	Must be completed by 11:55pm on Monday of Week 4
<a href="#">Mid session test</a>	10%	No	Week 8 lecture time slot
<a href="#">CAD Assignment</a>	25%	No	Friday 11:55pm of Week 7 for part A and Week 13 for part B
<a href="#">CAD tests</a>	20%	No	Week 5 SGTA for test 1 and Week 9 SGTA for test 2
<a href="#">Final examination</a>	40%	No	Examination period

### Diagnostic test

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 4 hours

Due: **Must be completed by 11:55pm on Monday of Week 4**

Weighting: **5%**

Students will be tested on prerequisite knowledge to allowing them to self assess if they are sufficiently prepared to undertake this unit. The examination will be held during the week 2 lecture.

On successful completion you will be able to:

- Apply prerequisite knowledge that will assist with the selection of machine elements and analysis of systems

## Mid session test

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 12 hours

Due: **Week 8 lecture time slot**

Weighting: **10%**

Students will be tested on materials covered in Lectures 1 – 7. The format of this test will be similar to that of the final examination, but shorter.

On successful completion you will be able to:

- Analyse and identify the usage of different types of permanent and non-permanent joints.
- Analyse power transmission, losses and angular velocity changes in mechanical engineering systems.
- Discuss the mechanical design process and how the use of engineering principles supports this procedure.

## CAD Assignment

Assessment Type <sup>1</sup>: Creative work

Indicative Time on Task <sup>2</sup>: 20 hours

Due: **Friday 11:55pm of Week 7 for part A and Week 13 for part B**

Weighting: **25%**

Students will be required to draw a complex mechanical system that demonstrates all the CAD skills which they have obtained during this unit. One component from the assembly will also have to be manufactured using either 3D printing, laser cutting or CNC machining

On successful completion you will be able to:

- Employ computer-aided-drawing proficiently to produce solid models, assemblies, computer-numerical-control codes and manufacturing drawings that meet industrial and Australian standards.
- Analyse power transmission, losses and angular velocity changes in mechanical engineering systems.

## CAD tests

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 18 hours

Due: **Week 5 SGTA for test 1 and Week 9 SGTA for test 2**

Weighting: **20%**

There will be two tests (10% each) on computer-aided drawing (CAD) using the CREO software. Students are required to demonstrate skills in using the tool to draw solid models, produce manufacturing drawings, create an assembly and generate CNC code.

On successful completion you will be able to:

- Employ computer-aided-drawing proficiently to produce solid models, assemblies, computer-numerical-control codes and manufacturing drawings that meet industrial and Australian standards.

## Final examination

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 34 hours

Due: **Examination period**

Weighting: **40%**

The exam includes multiple choice questions and specific design tasks where accurate solutions of the design analysis are expected. Students will be tested on the entire sessions material. This assessment will be invigilated.

On successful completion you will be able to:

- Analyse and identify the usage of different types of permanent and non-permanent joints.
- Analyse power transmission, losses and angular velocity changes in mechanical engineering systems.
- Discuss the mechanical design process and how the use of engineering principles supports this procedure.
- Apply prerequisite knowledge that will assist with the selection of machine elements and analysis of systems

<sup>1</sup> 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
- the [Writing Centre](#) for academic skills support.

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

## **Delivery and Resources**

### **SGTA's**

There will be no SGTA's conducted in week 1. All SGTA's begin as of week 2 in the semester. Students are required to attend the SGTA that they have enrolled in through eStudent to ensure that there are sufficient computing resources for all who attend. Attendance at the SGTA will be recorded and some activities undertaken there will be graded.

### **Mid-semester and CAD tests availability**

Students must be available to undertake the mid-session test during the relevant weekly lecture time slot and the two CAD tests during their respective SGTA's. Not being available at these times will require an approved special consideration for these assessments to be rescheduled.

### **Methods of Communication**

We will communicate with you via your university email or through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to MECH2003@mq.edu.au from your university email address.

### **Covid Information**

For the latest information on the University's response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: <https://www.mq.edu.au/about/coronavirus-faqs>

Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

### **Technology used.**

This unit requires students to learn how to use the CAD software CREO 9.0. No other software will be accepted for any assessments that require the use of CAD. This software is only available on windows operating system. A reduced capability version of this software is available for

students to download for free from the PTC web site. More information is available in the first week lecture slides.

### **Recommended and/or Required texts**

The following text are recommended for this unit:

- Richard G Budynas, "Shigley's Mechanical Engineering Design." McGraw Hill, 11th SI edition.
- AW Boundy, "Engineering Drawing." McGraw Hill, 8th edition.

## **Unit Schedule**

Refer to iLearn and lecture notes for the unit schedule.

## **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 [ask.mq.edu.au](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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/>

### The Writing Centre

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

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [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 [AskMQ](#), or contact [Service Connect](#).

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

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.

## Changes from Previous Offering

In the 2023 offering of the unit, the participation during SGTA's will not contribute to the final grade of students but attendance will still be monitored.

## Engineers Australia Competency Mapping

EA Competency Standard		Unit Learning Outcomes
Knowledge and Skill Base	1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline.	ULO3
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	ULO5
	1.3 In-depth understanding of specialist bodies of knowledge	ULO1, ULO2, ULO3, ULO4, ULO5
	1.4 Discernment of knowledge development and research directions	
	1.5 Knowledge of engineering design practice	ULO1, ULO2, ULO3, ULO4
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	ULO1, ULO2, ULO3, ULO4
	2.2 Fluent application of engineering techniques, tools and resources.	ULO1, ULO2, ULO3, ULO4
	2.3 Application of systematic engineering synthesis and design processes.	ULO1, ULO3, ULO4
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	ULO3, ULO4

Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	
	3.2 Effective oral and written communication in professional and lay domains.	
	3.3 Creative, innovative and pro-active demeanour.	
	3.4 Professional use and management of information.	
	3.5 Orderly management of self, and professional conduct.	
	3.6 Effective team membership and team leadership	