



# MECH2003

## Mechanical Design 1

Session 1, In person-scheduled-weekday, North Ryde 2022

*School of Engineering*

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## General Information

Unit convenor and teaching staff

Unit Convener and Lecturer

Sammy Diasinos

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Contact via email

44 Waterloo Rd, Room 120

Tuesday 9am to 11pm, via zoom or in office

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

### 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 (i.e. obtain a passing grade P/ CR/ D/ HD). For further details about grading, please refer below in the policies and procedures section.

### Final and supplementary examinations

If you receive 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.

### General Faculty Policy on assessment submission deadlines and late submissions

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

All other assessments must be submitted by 5:00 pm (Sydney Time) on their due date.

Should these assessments be missed due to illness or misadventure, students should apply for Special Consideration.

Assessments not submitted by the due date will receive a mark in accordance with the late submission policy as follows:

A 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20% is due 5 pm on 1 January. Student A submits the assessment at 1 pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15, resulting in the loss of three (3) marks. Student A is then awarded a final mark of 12/20.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Participation</u>	5%	No	Week 2 to 13
<u>Mid session test</u>	10%	No	Week 8 lecture time slot
<u>Final examination</u>	40%	No	TBA
<u>CAD tests</u>	20%	No	Week 4 & 8 tutorial time slot
<u>Diagnostic test</u>	5%	No	Week 2 lecture time slot
<u>CAD Assignment</u>	20%	No	Friday Week 13

### Participation

Assessment Type <sup>1</sup>: Participatory task

Indicative Time on Task <sup>2</sup>: 0 hours

Due: **Week 2 to 13**

Weighting: **5%**

This assessment includes students participation in SGTAs and other activities embedded in other learning activities described in the unit.

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 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.

### 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.

## Final examination

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

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

Due: **TBA**

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

## CAD tests

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

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

Due: **Week 4 & 8 tutorial time slot**

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.

## Diagnostic test

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

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

Due: **Week 2 lecture time slot**

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

## CAD Assignment

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

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

Due: **Friday Week 13**

Weighting: **20%**

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.

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<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

SGTA's begin as of week 2 in the semester. Students are required to attend the SGTA that they have enrolled in through eStudent. Attendance at the SGTA will be recorded and activities undertaken their will be graded.

### Recommended and/or Required texts

The following text are recommended for this unit:

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

### Technology used/required.

This unit requires all students to become competent with the CAD software CREO 6.0. All assessment tasks related to demonstrating competency with CAD must be undertaken with this version of the software. Please note that CREO is not available on Mac OS, therefore this must

be installed using windows OS. Any student who attempts to complete this unit remotely must have access to the CAD software and zoom on their personal computers. A scientific calculator is also required for all assessment tasks.

## 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 \(https://policies.s.mq.edu.au\)](https://policies.s.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](https://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 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

The weighting of the assessment tasks has been altered to now accommodate an additional task which grades students participation in SGTA's.

## 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.	
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	
	1.3 In-depth understanding of specialist bodies of knowledge	ULO1, ULO2, ULO3, ULO5
	1.4 Discernment of knowledge development and research directions	
	1.5 Knowledge of engineering design practice	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	ULO2, ULO3
	2.2 Fluent application of engineering techniques, tools and resources.	ULO1
	2.3 Application of systematic engineering synthesis and design processes.	ULO4
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	
	3.2 Effective oral and written communication in professional and lay domains.	ULO1
	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	