MECH2003

Mechanical Design 1

Session 1, In person-scheduled-weekday, North Ryde 2025

School of Engineering

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General Information

Unit convenor and teaching staff
Unit Convener
Sammy Diasinos
sammy.diasinos@mq.edu.au
Contact via 9850 9146
Rm120, 44 Waterloo Rd Macquarie Park
Monday 11am to 1pm (by appointment)

Credit points
10

Prerequisites
MECH1001 and (MATH1020 or MATH1025)

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.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals (UNSDGs) Industry, Innovation and Infrastructure; Responsible Consumption and Production

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 requirements for this unit

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). Please refer below to the policies and procedures section for further details about grading.

Late assessment submission penalties

The late submission policies adopted in this unit are in line with the general faculty's policy on assessment submission deadlines, including late submissions. 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, for a written report or presentation assessment that 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 11:59 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, CAD tests, Mid session test and Final exam - NO, unless Special Consideration is Granted

Special consideration for the final exam

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 declare yourself available for a resit during the supplementary examination period, and you 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 their supplementary

examination's exact date and time. For the in session tests, the convenor will move the weighting of the missed assessmnet to an alternative assessment at the convener's discretion.

Assessment tasks

Students are expected to receive the grades for their assessment submission between 2 to 4 weeks after the submission deadline.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Diagnostic test	5%	No	Lecture of week 2		No	
CAD tests	20%	No	SGTAs of Week 5 & 9		No	
Mid session test	10%	No	Lecture of week 7		No	
CAD Assignment	25%	No	Week 13		No	
Final examination	40%	No	TBD		No	

Diagnostic test

Assessment Type [1]: Examination
Indicative Time on Task [2]: 4 hours
Due: **Lecture of week 2**
Weighting: **5%**
Groupwork/Individual:
Short extension [3]: No
AI Approach:

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 tests

Assessment Type [1]: Examination
Indicative Time on Task [2]: 18 hours
Due: **SGTAs of Week 5 & 9**
Weighting: **20%**
Groupwork/Individual:
Short extension [3]: No
AI Approach:

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.

Mid session test

Assessment Type [1]: Examination
Indicative Time on Task [2]: 12 hours
Due: **Lecture of week 7**
Weighting: **10%**
Groupwork/Individual:
Short extension [3]: No
AI Approach:

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 [1]: Creative work
Indicative Time on Task [2]: 20 hours
Due: **Week 13**
Weighting: **25%**
Groupwork/Individual:
Short extension [3]: No
AI Approach:

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.

Final examination

Assessment Type [1]: Examination
Indicative Time on Task [2]: 34 hours
Due: **TBD**
Weighting: **40%**
Groupwork/Individual:
Short extension [3]: No
AI Approach:

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

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[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

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.

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.

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.” McGrawll Hill, 11th SI edition.
- AW Boundy, "Egineering Drawing." McGrawll 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). 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). 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) 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.

- 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 the Service Connect Portal, 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/.

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

We value student feedback to be able to continually improve the way we offer our units. As such we encourage students to provide constructive feedback via student surveys, to the teaching staff directly, or via the FSE Student Experience & Feedback link in the iLearn page.

Student feedback from the previous offering of this unit was very positive overall, with students pleased with the clarity around assessment requirements and the level of support from teaching staff. As such, no change to the delivery of the unit is planned, however we will continue to strive to improve the level of support and the level of student engagement.

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	

Unit information based on version 2025.02 of the Handbook