



# MECH4001

## Product Design Engineering

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

*School of Engineering*

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## General Information

Unit convenor and teaching staff

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Wednesday 12pm - 2 pm

Credit points

10

Prerequisites

((MECH3003 or MECH303) and (MECH3001 or MECH301) and (MECH3004 or MECH304) and (MECH3002 or MECH302)) or Admission to MEngMechEng

Corequisites

Co-badged status

Unit description

This is a capstone unit. This unit examines the entire product design cycle from conceptualization of ideas to design, manufacturing and marketing. Students are expected to effectively apply knowledge in the field of mechanical engineering to produce innovative products with sound value proposition. Students are expected to apply state-of-the-art design and manufacturing techniques, advanced composites (including biomaterials) or other creative and innovative approaches in their product innovations.

## 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:** Apply acquired analytical and theoretical techniques to the design and development of an innovative product.

**ULO2:** Create an innovative product based on evidence of market opportunities leading to a commercially viable product.

**ULO3:** Assess and evaluate the critical aspects of product design and development in a mechanical engineering context.

**ULO4:** Demonstrate team-building abilities and communication skills in the design and development of a product.

**ULO5:** Demonstrate professionalism in engaging with industry experts and companies through practical learning activity.

## 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.

Refer to iLearn for information regarding the attendance of SGTA starting from week1.

#### Late submission policies and guidelines

Resubmission of assessment tasks are not allowed.

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

All online quizzes, in-class activities, or scheduled tests and exams must be undertaken at the time indicated in the unit guide. Students may apply for Special Consideration if these activities are missed due to illness or misadventure.

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

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.

#### Special consideration for final exam

There is no final exam for this unit. The final major assessment is the final report. Please refer to

the above section on late submission policies and guidelines.

### Additional information

All lectures are online and face to face engagement with students is achieved during the SGTAs. Attending the SGTAs is compulsory, and the teaching staff will keep a record of students participation in class.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>A1. In-class assignment x4</u>	10%	No	Week 3,4, 5 and 8, Monday, 5 pm
<u>A2. In-class online quiz</u>	10%	No	Week 8
<u>A3. Final Shark Tank Presentation</u>	25%	No	Week 13
<u>A4. Final design report</u>	35%	No	Week 14, Monday, 5 pm
<u>A5. Professional Engagement and Log Book</u>	20%	No	Week 14, Monday, 5pm

### A1. In-class assignment x4

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 8 hours

Due: **Week 3,4, 5 and 8, Monday, 5 pm**

Weighting: **10%**

A total of 4 graded in-tutorial assignments, designed to scaffold the development of the final group project outcome.

On successful completion you will be able to:

- Apply acquired analytical and theoretical techniques to the design and development of an innovative product.
- Create an innovative product based on evidence of market opportunities leading to a commercially viable product.
- Demonstrate team-building abilities and communication skills in the design and development of a product.

## A2. In-class online quiz

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 1 hours

Due: **Week 8**

Weighting: **10%**

In class online quiz on lecture materials delivered in the unit.

On successful completion you will be able to:

- Assess and evaluate the critical aspects of product design and development in a mechanical engineering context.

## A3. Final Shark Tank Presentation

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

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

Due: **Week 13**

Weighting: **25%**

The final presentation is to be held in week 13 that emulates a shark tank pitch. Students are required to present their product/design innovations to industry experts and internal assessors. Student groups are expected to be able to articulate the value proposition of their work.

On successful completion you will be able to:

- Apply acquired analytical and theoretical techniques to the design and development of an innovative product.
- Create an innovative product based on evidence of market opportunities leading to a commercially viable product.
- Demonstrate team-building abilities and communication skills in the design and development of a product.
- Demonstrate professionalism in engaging with industry experts and companies through practical learning activity.

## A4. Final design report

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

Indicative Time on Task <sup>2</sup>: 5 hours

Due: **Week 14, Monday, 5 pm**

Weighting: **35%**

A final report that showcases the work that has been conducted in the project work over the semester. This is an individualised submission that demonstrates the technical competency of the individual.

On successful completion you will be able to:

- Apply acquired analytical and theoretical techniques to the design and development of an innovative product.
- Create an innovative product based on evidence of market opportunities leading to a commercially viable product.
- Demonstrate team-building abilities and communication skills in the design and development of a product.
- Demonstrate professionalism in engaging with industry experts and companies through practical learning activity.

## A5. Professional Engagement and Log Book

Assessment Type <sup>1</sup>: Log book

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

Due: **Week 14, Monday, 5pm**

Weighting: **20%**

A professional and satisfactory participation and engagement to a majority of learning activities. A physical log book that professionally documents the consistent work output throughout the semester. This will need to reflect the final presented work in terms of design, idea evolution and calculations.

On successful completion you will be able to:

- Demonstrate professionalism in engaging with industry experts and companies through practical learning activity.

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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

The following texts are recommended for this unit:

1. "Product Design and Development" by Ulrich and Eppinger
2. "Product Design for Engineers" by Devdas Shetty

Technology include:

1. Web learning tool; website link on iLearn.
2. In class computers and CREO CAD software will be provided.

## Unit Schedule

Refer to iLearn for a detail description of the 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](mailto: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

Changes from the 2021 offering.

- Emphasis on the need for a physical log book.
- Update of "MECH4001 assessments – expectations, rationale and guidelines"
- Changes on products and project scope.

## Engineers Australia Competency Mapping

All key learning outcomes of this unit (see learning outcomes section; ULO1 – ULO5) are designed to meet the requirements of the Engineers Australia competency standard. The table below shows how the learning outcomes are mapped to the requirements.

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.	ULO1
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	ULO1, ULO3
	1.3 In-depth understanding of specialist bodies of knowledge	ULO1, ULO2, ULO3
	1.4 Discernment of knowledge development and research directions	ULO2
	1.5 Knowledge of engineering design practice	ULO1, ULO2, ULO3
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	ULO1, ULO2, ULO3

Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	ULO1, ULO3
	2.2 Fluent application of engineering techniques, tools and resources.	ULO1, ULO3
	2.3 Application of systematic engineering synthesis and design processes.	ULO3
	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.	ULO4, ULO5
	3.2 Effective oral and written communication in professional and lay domains.	ULO4
	3.3 Creative, innovative and pro-active demeanour.	ULO2, ULO4, ULO5
	3.4 Professional use and management of information.	ULO2, ULO4, ULO5
	3.5 Orderly management of self, and professional conduct.	ULO5
	3.6 Effective team membership and team leadership	ULO4