MECH4001

Product Design Engineering

Session 1, Weekday attendance, North Ryde 2021

School of Engineering

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Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to timetable viewer. To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff

Convenor
Nicholas Tse
nicholas.tse@mq.edu.au
Contact via via email
50 Waterloo Road
Tue 11-1pm (booking required)

Co-convenor
Shaokoon Cheng
shaokoon.cheng@mq.edu.au
Contact via via email
44 Waterloo Road
Tue 11-1pm (booking required)

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 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.

Late submissions and Resubmissions

For assignments handed in late, the following penalties apply 0-48hrs: -50%, >48hrs: -100%. Extenuating circumstances will be considered upon lodgment of a formal notice of disruption of studies.

Resubmissions of work are generally allowed unless stated prior or otherwise.

Additional information

1. The only invigilated assessment is an in-class test to take place in the week 10 lecture.
2. Hurdle assessments: Attendance of >80% of the workshop tutorials are required. Each workshop is 3hrs long.
3. Rubrics for all assessments are standards-based and will be made available on iLearn by week 1.

Assessment Tasks

Name	Weighting	Hurdle	Due
A1. In-class assignment x4	20%	No	W2, 3, 4 and 6 (see iLearn)

Name	Weighting	Hurdle	Due
A2. In-class online quiz	10%	No	Week 10
A3. Final Shark Tank Presentation	10%	No	Week 13
A4. Final design report	50%	No	Week 13
A5. Professional Engagement and Log Book	10%	No	Week 13

A1. In-class assignment x4

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 8 hours
Due: **W2, 3, 4 and 6 (see iLearn)**
Weighting: **20%**

A total of 4 graded in-tutorial assignments that are designed and scaffolded towards 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 [1]: Quiz/Test
Indicative Time on Task [2]: 1 hours
Due: **Week 10**
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 [1]: Presentation
Indicative Time on Task [2]: 2 hours
Due: **Week 13**
Weighting: **10%**

Final presentation to be held in week 13 that emulates a shark tank pitch. Students are required to present their product/design innovation to industry experts and internal assessors. Student groups are expected to be able to articulate the value preposition 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 [1]: Report
Indicative Time on Task [2]: 5 hours
Due: **Week 13**
Weighting: **50%**

Final design report that illustrates the culmination of the project work conducted in semester

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 [1]: Lab book
Indicative Time on Task [2]: 2 hours
Due: **Week 13**
Weighting: **10%**

A professional and satisfactory participation and engagement to a majority of learning activities. Also the provision of a professional log book documenting consistent work output throughout the semester.

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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[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
- the Writing Centre 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

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 and lecture notes for the unit schedule. The topics to cover will loosely follow the following order:

1. Brainstorming of product/problem ideas
2. assessing idea innovation and creativity
3. derivation of concept variant and design for manufacturing and assembly
4. market analysis, benchmarking and cost analysis
5. FMEA analysis
6. Design and technical analysis
7. Prototyping and detailed FMEA analysis
8. Final "Shark-tank" pitch and presentation

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
- Grade Appeal Policy
- Complaint Management 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 ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- Getting help with your assignment
- Workshops
- StudyWise
- 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

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

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

Changes to the previous offering include:

2021:

- New unit guide information
- More comprehensive assessment criteria.
- Individually assigned subpart for full analysis by the student as a mean to validate students' meet learning outcome.
- Update to www.MQIDEA.com web tool to further the incubation of innovative product ideas.
- Minor update to grading rubrics.

2020:

- New unit guide information
- More comprehensive assessment criteria.
- Inclusion of hurdle requirement for attendance of the workshop tutorial to ensure project progress is made.
- Inclusion of SPARKPLUS peer evaluation grading process for group submissions
- Introduction of individualised oral defence to validate students' meet learning outcome.
- Update to www.MQIDEA.com web tool to further the incubation of innovative product ideas.
- Minor update to grading rubrics.