



UNSW Course Outline

MECH4100 Mechanical Design 2 - 2024

Published on the 17 May 2024

General Course Information

Course Code : MECH4100

Year : 2024

Term : Term 2

Teaching Period : T2

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Mechanical and Manufacturing Engineering

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Postgraduate, Undergraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

From theory to prototype, how does it happen? Have you ever wondered how Mechanical Design Engineers come up with innovative solutions to make the world a better place?

In your degree, you have learned many theoretical designs and concepts. In this course, you will learn how to apply your knowledge and how to think critically to transform the theory into working prototypes. Most importantly, you will learn how to tackle open-ended problems and take ownership of your learning. These skills are essential in your future life as engineer.

The course has been designed to replicate all the phases of a mechanical design project in industry from design to manufacturing and prototype testing. A project-based learning approach has been implemented with a hands-on experience. You will build your prototype in the workshop and test it!

In this course, you will undertake a major design project as a team, enabling them to develop conceptual and detailed solutions for an engineering project, utilizing and extending their knowledge and skills acquired throughout the degree programme. This includes project-based design process, project management, design for manufacturing, reliability, affordability, and sustainability.

Finally, you will get the opportunity to work within a team and strengthen your technical communication skills from the design phase using CAD tools to the testing phase with the support of academics and technical staff. Industrial partners will be invited to give you an insight into their professional experiences.

Course Aims

This is the final undergraduate course (or Masters course) in Mechanical Engineering Design. Here students will be expected to apply the knowledge and skills acquired in the preceding courses to a real design problem. To facilitate this students will be working on a team project.

Students will engage in written work, verbal communication activities. This will involve researching information, planning and meeting specified requirements. The demonstration of team work and collaborative skills are essential for satisfactory completion. The quality of your reporting will be evaluated to the standards expected of professional consulting engineers.

Students are expected to formulate the technical specifications for their projects and to complete the designs with a high level of engineering expertise. Students are responsible for organizing, managing the project and coordinating the workload within their team.

This course will conclude on testing and performance evaluation of the built prototype.

Relationship to Other Courses

The following assumed knowledge is expected for postgraduate students undertaking this course: MECH3110 and MMAN1130.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Implement the basic elements of managing a design project, plan and schedule work activities in accordance with standard practice
CLO2 : Apply an effective problem-solving approach. Justify and defend the selection
CLO3 : Design, build and test a prototype
CLO4 : Provide constructive feedback to your team members and benchmark your performance against appropriate standards
CLO5 : Produce effective oral and written presentations to a technical audience

Course Learning Outcomes	Assessment Item
CLO1 : Implement the basic elements of managing a design project, plan and schedule work activities in accordance with standard practice	<ul style="list-style-type: none">• Preliminary Design Review (PDR)• Final deliverables
CLO2 : Apply an effective problem-solving approach. Justify and defend the selection	<ul style="list-style-type: none">• Critical Design Review (CDR)• Preliminary Design Review (PDR)• Final deliverables
CLO3 : Design, build and test a prototype	<ul style="list-style-type: none">• Critical Design Review (CDR)• Preliminary Design Review (PDR)
CLO4 : Provide constructive feedback to your team members and benchmark your performance against appropriate standards	<ul style="list-style-type: none">• Final deliverables
CLO5 : Produce effective oral and written presentations to a technical audience	<ul style="list-style-type: none">• Final deliverables

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Preliminary Design Review (PDR) Assessment Format: Group	10%	Due Date: 12/06/2024 11:59 PM
Critical Design Review (CDR) Assessment Format: Group	40%	Due Date: 29/06/2024 11:59 PM
Final deliverables Assessment Format: Group	40%	Due Date: 02/08/2024 11:59 PM
Prototype Testing Assessment Format: Group	10%	Due Date: Exam Period

Assessment Details

Preliminary Design Review (PDR)

Assessment Overview

Assessment length: PowerPoint presentation

The purpose of this assignment is to clearly establish your baseline and ensure that your design meets the requirements (client's expectations, manufacturing capabilities, minimum cost and schedule). This phase is critical as it will allow you to identify potential issues in the initial stage.

Several aspects will be assessed:

- Team organisation, RACI
- Planning
- Quality governance
- Presentation of viable concepts

Assessment criteria

The preliminary design review will be assessed based on the quality of the PDR presentation. This technical presentation must provide assurance that the concept being developed will meet specified requirements.

Each group assessment will have a peer review component (Team evaluation)

Group project of 7-8 students

Course Learning Outcomes

- CLO1 : Implement the basic elements of managing a design project, plan and schedule work

activities in accordance with standard practice

- CLO2 : Apply an effective problem-solving approach. Justify and defend the selection
- CLO3 : Design, build and test a prototype

Assessment Length

PowerPoint presentation

Submission notes

via Moodle Turnitin box

Assessment information

Please refer to assessment guidelines for further information.

Deadline for absolute fail: 5 days

Marks returned: within 3 days of the due date

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Critical Design Review (CDR)

Assessment Overview

Assessment length: PowerPoint presentation + Engineering Drawings + BOM

The purpose of this assignment is to assess the prototype/s final design and check that it is compliant with the project specifications. All the engineering drawings must be finalised and ready for the manufacturing phase.

Several aspects will be assessed:

- Presentation (Concept definition, compliance with the requirements) - 15%
- Engineering Drawings - 20%
- Bill of materials (BOM) - 5%

Assessment criteria

Critical design review will be assessed based on the quality of the CDR presentation. This technical review must provide assurance that the prototype being developed will meet specified requirements. Engineering drawings must be compliant with Australian standards AS1100.

Each group assessment will have a peer review component (Team evaluation)

Group project of 7-8 students

Course Learning Outcomes

- CLO2 : Apply an effective problem-solving approach. Justify and defend the selection
- CLO3 : Design, build and test a prototype

Assessment Length

PowerPoint presentation + Engineering Drawings + BOM

Submission notes

via Moodle Turnitin box

Assessment information

Please refer to assessment guidelines for further information.

Deadline for absolute fail: 5 days

Marks returned: within 2 weeks of the due date

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Final deliverables

Assessment Overview

Assessment length: Report (20 pages) + video or narrated PowerPoint (10 min)

The purpose of this assignment is to demonstrate to your client that your prototype meets the project specifications. The client expects a 20-page report and a 10-minute presentation.

- Compiled final design report with each section authored individually - 15%
- Powerpoint presentation - 15%
- Risk Management form - 5%
- Weekly reporting and participation - 5%

Assessment criteria

The quality, clarity, detail, structure and content of the report and the presentation will be assessed.

Each group assessment will have a peer review component (Team evaluation)

Group project of 7-8 students

Course Learning Outcomes

- CLO1 : Implement the basic elements of managing a design project, plan and schedule work activities in accordance with standard practice
- CLO2 : Apply an effective problem-solving approach. Justify and defend the selection
- CLO4 : Provide constructive feedback to your team members and benchmark your performance against appropriate standards
- CLO5 : Produce effective oral and written presentations to a technical audience

Assessment Length

Report (20 pages) + video or narrated PowerPoint (10 min)

Submission notes

via Moodle Turnitin box

Assessment information

Please refer to assessment guidelines for further information.

Deadline for absolute fail: 5 days

Marks returned: upon release of final results

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Prototype Testing

Assessment Overview

Assessment length: 1 hour

The purpose of this assignment is to demonstrate the performance of your prototype (cost, weight, number of parts, amount of power produced...). The prototype testing phase will take place in the laboratory in front of your peers.

Prototype testing (performance evaluation)

Assessment criteria

Prototype will be tested against Project Design & Operations requirements. A scorecard will record technical performance.

Each group assessment will have a peer review component (Team evaluation)

Group project of 7-8 students

Assessment Length

1 hour

Submission notes

Physical prototype testing

Assessment information

Please refer to assessment guidelines for further information.

Marks returned: upon release of final results

Assignment submission Turnitin type

This is not a Turnitin assignment

General Assessment Information

For all the assessment tasks, you are permitted to use standard spelling and grammar checking tools. **You must not use AI-based software to generate, paraphrase or translate passages of text, whether based on your own work or not.**

Please note that your submission will be passed through an AI-generated text detection tool. If the marker has concerns that your answer contains passages of AI-generated text you may be asked to explain your work. If you are unable to satisfactorily demonstrate your understanding of your submission, you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties, which may include 00FL, suspension and exclusion.

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 27 May - 2 June	Lecture	Wednesday 2pm-4pm
	Project	Weekly group meeting with mentor
Week 2 : 3 June - 9 June	Lecture	Wednesday 2pm-4pm
	Project	Weekly group meeting with mentor
	Workshop	Workshop and Lab Tour - Book a 30-minute slot
Week 3 : 10 June - 16 June	Lecture	Wednesday 2pm-4pm
	Project	Weekly group meeting with mentor
	Assessment	Preliminary Design Review (PDR)
Week 4 : 17 June - 23 June	Lecture	Wednesday 2pm-4pm
	Project	Weekly meeting with mentor
	Workshop	Technical consultation session for design / manufacturing feedback
Week 5 : 24 June - 30 June	Lecture	Wednesday 2pm-4pm
	Project	Weekly meeting with mentor
	Workshop	Technical consultation session for design / manufacturing feedback
	Assessment	Critical Design Review (CDR)
Week 7 : 8 July - 14 July	Lecture	Guest industry seminar - Wednesday 2pm-4pm
	Project	Weekly group meeting with mentor
Week 8 : 15 July - 21 July	Lecture	Guest industry seminar - Wednesday 2pm-4pm
	Project	Weekly group meeting with mentor
	Workshop	Assembly session (2 hours)
Week 9 : 22 July - 28 July	Project	Weekly group meeting with mentor
	Workshop	Assembly session (2 hours)
Week 10 : 29 July - 4 August	Project	Weekly group meeting with mentor
	Workshop	Assembly session (2 hours)
	Assessment	Final deliverables

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Resources

Recommended Resources

Suggested reading (a starting point only)

Excellent advice, descriptions and guidelines, based on practical experience are given in *Making Stirling Engines* by Andy Ross, which can be obtained as a free download from the following page: <http://www.stirlingbuilder.com/>.

Walker, G. (1973) *Stirling Cycle Machines*, Clarendon Press Oxford

R.G. Budynas & K.J. Nisbett, *Shigley's Mechanical Engineering Design (SI Units)*, 11th Ed,

Print:

<https://www.bookshop.unsw.edu.au/details.cgi?ITEMNO=9789813158986>

Digital:

<https://unswbookshop.vitalsource.com/products/-v9789814923156>

UNSW Library Website: <https://www.library.unsw.edu.au/>

Course Evaluation and Development

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

This year, the course has been redesigned to include hands-on experience. Students will have the opportunity to go through all the phases of a mechanical design project from design to manufacturing and testing. They will implement specific tools of project management and complete a set of project deliverables such as Preliminary Design Review, Critical Design Review, Prototype Testing, formal report and presentation.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Irene Renaud -Assemat		Ainsworth Building J17, Room 208C		9am-5pm, Mon-Fri	No	Yes

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or

within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the

University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way

through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School-specific Information

Short Extensions

Short extensions are not currently applicable to Mechanical and Manufacturing Engineering Courses.

Review of Results

The purpose of a review of results is if there was a marking error. Review of results is for when you have cause to believe that there is a marking error. Review of Results cannot be used to get feedback. If you would like feedback for assessments prior to the final exam, you are welcome to contact the course convenor directly. No feedback will be provided on final exams.

Use of AI

The use of AI is prohibited unless explicitly permitted by the course convenor. Please respect this and be aware that penalties will apply when unauthorised use is detected, such as through Turnitin. If the use of generative AI, such as ChatGPT, is allowed in a specific assessment, they must be properly credited, and your submissions must be substantially your own work.

School Contact Information

Location

UNSW Mechanical and Manufacturing Engineering

Ainsworth building J17, Level 1

Above Coffee on Campus

Hours

9:00–5:00pm, Monday–Friday*

*Closed on public holidays, School scheduled events and University Shutdown

Web

[School of Mechanical and Manufacturing Engineering](#)

[Engineering Student Support Services](#)

[Engineering Industrial Training](#)

UNSW Study Abroad and Exchange (for inbound students)

UNSW Future Students

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

(+61 2) 9385 4097 – School Office**

**Please note that the School Office will not know when/if your course convenor is on campus or available

Email

Engineering Student Support Services – current student enquiries

- e.g. enrolment, progression, clash requests, course issues or program-related queries

Engineering Industrial Training – Industrial training questions

UNSW Study Abroad – study abroad student enquiries (for inbound students)

UNSW Exchange – student exchange enquiries (for inbound students)

UNSW Future Students – potential student enquiries

- e.g. admissions, fees, programs, credit transfer

School Office – School general office administration enquiries

- NB: the relevant teams listed above must be contacted for all student enquiries. The School will only be able to refer students on to the relevant team if contacted

Important Links

- [Student Wellbeing](#)
- [Urgent Mental Health & Support](#)
- [Equitable Learning Services](#)

- [Faculty Transitional Arrangements for COVID-19](#)
- [Moodle](#)
- [Lab Access](#)
- [Computing Facilities](#)
- [Student Resources](#)
- [Course Outlines](#)
- [Makerspace](#)
- [UNSW Timetable](#)
- [UNSW Handbook](#)