

MECH6110: Mechanical Design Project

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description This is an advanced mechanical design course where students bring together prior fundamental knowledge from fluid and solid mechanics, dynamics, thermodynamics, and heat transfer with numerical tools including finite element analysis and computational fluid dynamics to solve a mechanical engineering design problem.

Academic Progress Requirements Nil

Requisites This course is only available to students enrolled in one of the following programs:

Bachelor of Engineering (Honours) (Mechanical) [12300]
B Engineering (Hons) (Mechanical) / B Engineering (Hons) (Mechatronics)[12302]
Bachelor of Engineering (Honours) (Mechatronics) [12304]
Bachelor of Engineering (Honours) (Mechanical) [40061]
Bachelor of Engineering (Honours) (Mechatronics) [40064]
B Eng (Hons) (Mechatronics)/B Eng (Hons) (Electrical & Electronic) [40075]
B Engineering (Honours) (Mechatronics)/Bachelor of Science [40076]
Bachelor of Engineering (Honours)(Mechatronics)/Bachelor of Mathematics [40081]
B Engineering (Honours) (Mechanical)/Bachelor of Science [40091]
Bachelor Engineering (Honours) (Mechanical)/Bachelor of Mathematics [40092]
B Engineering (Hons)(Mechanical)/Bachelor of Eng (Hons)(Mechatronics) [40094]
Master of Professional Engineering (Mechanical) [40185]
Bachelor of Mechatronics Engineering (Honours)/Bachelor of Electrical an [40346]
Bachelor of Mechanical Engineering (Honours)/Bachelor of Mechatronics En [40363]
Bachelor of Mechanical Engineering (Honours)/Bachelor of Mathematics [40365]
Bachelor of Mechatronics Engineering (Honours) [40367]
Bachelor of Mechatronics Engineering (Honours)/Bachelor of Mathematics [40368]
Bachelor of Mechanical Engineering (Honours) [40376]

COURSE OUTLINE

Assumed Knowledge	MECH3110 Mechanical Engineering Design 2.
Contact Hours	Callaghan Lecture Face to Face On Campus 2 hour(s) per week(s) for 6 week(s) Individual supervision by academic staff members
Unit Weighting Workload	10 Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

CONTACTS

Course Coordinator	Callaghan Prof Craig Wheeler Craig.Wheeler@newcastle.edu.au (02) 4033 9037 Consultation: By email appointment
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Teaching Staff Other teaching staff will be advised on the course Canvas site.

School Office **School of Engineering**
EAG03
EA Building
Callaghan
SENG-Admin@newcastle.edu.au
9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

SYLLABUS

Course Content The course revolves around significant design projects focusing on solving a number of real engineering problems. Each student focuses on an individual problem. These design problems are largely developed through consultation with local engineering firms. The scope and background of each problem is provided by industry representatives through a series of guest lectures.

Course Learning Outcomes **On successful completion of this course, students will be able to:**

1. Undertake a multi-faceted mechanical engineering design on an open-ended project drawing on knowledge and skills learnt in undergraduate courses
2. Incorporate the use of high-end computational design tools in a design problem and explore the strengths and limitations of these tools
3. Communicate design solutions
4. Develop an appreciation for economic and institutional factors affecting mechanical engineering design and the role of sustainability in design.

Course Materials

ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Project Scope Proposal	Week 3	Group	5%	1
2	Conceptual Design Proposal	Week 6	Individual	15%	1, 2, 3, 4
3	Final Report	Week 11	Combination	70%	1, 2, 3, 4
4	Seminar	Week 12	Individual	10%	2, 3

Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Project Scope Proposal

Assessment Type	Report
Purpose	Written Report: demonstrate students' knowledge and skills acquisition in relation to developing and presenting a project scope
Description	Project Scope Proposal
Weighting	5%
Due Date	Week 3
Submission Method	In Class
Assessment Criteria	Clarity and accuracy of problem statement
Return Method	In Class
Feedback Provided	Returned Work - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Conceptual Design Proposal

Assessment Type	Report
Purpose	Written Report: demonstrate students' knowledge and skills acquisition in relation to developing and presenting a conceptual design
Description	Conceptual Design Proposal
Weighting	15%
Due Date	Week 6
Submission Method	Online
Assessment Criteria	Demonstration and description of; problem definition and analysis, potential solutions, proposed final solution, conceptual sketches, proposed manufacturing procedure, and estimated costs.
Return Method	In Class
Feedback Provided	Returned Work - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Final Report

Assessment Type	Report
Purpose	Written Report: demonstrate students' knowledge and skills acquisition in relation to developing and presenting a mechanical design.
Description	Final Report
Weighting	70%
Due Date	Week 11
Submission Method	Online
Assessment Criteria	Demonstration and description of; problem definition and analysis, potential solutions and final solution, detailed calculations and analysis, detailed drawings, manufacturing procedure, cost breakdown, operational risk analysis, and performance evaluation.

Return Method	In Person
Feedback Provided	Returned Work - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 4 - Seminar

Assessment Type	Presentation
Purpose	Oral Presentation: demonstrate students ability to communicate their design solutions effectively
Description	Presentation
Weighting	10%
Due Date	Week 12
Submission Method	In Class
Assessment Criteria	Clarity of presentation and slides Suitability of content Clarity of responses to questions
Return Method	Online
Feedback Provided	In Person - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods	Communication methods used in this course include:
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Course Evaluation	Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.
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Oral Interviews (Vivas)	As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the
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material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the [Oral Examination \(viva\) Procedure](#). In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the [Student Conduct Rule](#).

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to <https://policies.newcastle.edu.au/document/view-current.php?id=35>.

Adverse Circumstances

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:

<https://policies.newcastle.edu.au/document/view-current.php?id=236>

Important Policy Information

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at <https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures> that support a safe and respectful environment at the University.

Graduate Profile Statements

This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements (based on 2011 Engineers Australia revised Stage 1 Competency Standards for Professional Engineers):

UON Att.	University of Newcastle Bachelor of Engineering Graduate Profile Statements/ Engineers Australia Stage 1 competency statements	Taught	Practised	Assessed	Skill Level (1-4)
	Professional Attributes				
11	3.1. Ethical conduct and professional accountability				
12	3.2. Effective oral and written communication in professional and lay domains.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
13	3.3. Creative, innovative and pro-active demeanour.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
14	3.4. Professional use and management of information.				
15	3.5. Orderly management of self, and professional conduct.				
16	3.6. Effective team membership and team leadership.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
8	2.2. Fluent application of engineering techniques, tools and resources.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
9	2.3. Application of systematic engineering synthesis and design processes.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	4
	Knowledge Base				
1	1.1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
2	1.2. Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.				
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3
5	1.5. Knowledge of contextual factors impacting the engineering discipline.				
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				

This course outline was approved 2/02/2024 by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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