

MECH2110: Mechanical Engineering Design 1

Callaghan

Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description	On completion of this course students will have: - A basic familiarity and capacity in workshop methods - An increased skillset in the conceptual design methodology - An ability to conceive and produce a robotic device to solve deterministic problems
Academic Progress Requirements	Nil
Assumed Knowledge	ENGG1003/GENG1003 due to programming involved in the mechatronics labs.MECH1110 Introduction to Mechanical Engineering Design so students have developed skills in interpreting and visualising 3D objects in 2D format and advanced technical sketching skills.
Contact Hours	Callaghan Computer Lab Face to Face On Campus 2 hour(s) per fortnight for 4 fortnight(s) starting Week 2 Lecture Face to Face On Campus 2 hour(s) per week(s) for 8 week(s) Workshop Face to Face On Campus 2 hour(s) per week(s) for 12 week(s) Weeks 1 - 12
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.

COURSE OUTLINE

CONTACTS

Course Coordinator **Callaghan**
Prof Craig Wheeler
Craig.Wheeler@newcastle.edu.au
(02) 4033 9037
Consultation: By email appointment.

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

1. Solving engineering design problems;
2. Important aspects of the assembly of mechanical components - fits and limits, tolerance, surface finish and the like;
3. Group project, i.e. The Warman Design-and-Build national competition;
4. Utilise microcontroller kits to sense and control objects.
5. Basic workshop practice techniques and application of the basic skills to undertake a project.

To comply with Occupational Health and Safety regulations, students are required to have basic Personal Protective Equipment (PPE) from Week 1 which will cost a minimum of \$60. Specific requirements are available on the MECH2110 Canvas site.

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. Apply the fundamentals of mechanical engineering design, including modelling, engineering drawings and conceptual design.
2. Apply concepts including limits and fits, size tolerances, geometric tolerances, conceptual design processes and safety in design.
3. Demonstrate safe working practices in a workshop environment.
4. Work in a group design and build project; ie. Warman Design and Build Competition.

Course Materials

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Contact Hour Requirements:

- Workshop Induction Requirement - Students must attend and pass the induction requirements before attending these sessions.
- Workshop Induction: Induction to the workshop is compulsory in Week 1. Failure to attend the induction session will block entry to the workshop and therefore prevent completion of MECH2110. As a result of this, enrolments into MECH2110 cannot be accepted once the opportunity to complete the induction sessions in Week 1 has passed.
- Students must participate in one workshop session per week to complete MECH2110. When an absence is unavoidable and substantiated, students must liaise with the workshop coordinator to swap their session attendance for that week.

Course Assessment Requirements:

- Assessment 3 - Workshop Competency Portfolio: Minimum Grade / Mark Requirement - Students must obtain a specified minimum grade / mark in this assessment item to pass the course.

Compulsory Placement and WHS Requirements:

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ASSESSMENTS

This course has 6 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Mechatronics Tutorials	Due at the end of each Mechatronics tutorial session.	Individual	25%	1
2	Warman Conceptual Design Report	Week 7	Group	10%	1, 2
3	Workshop Competency Portfolio	Week 7	Individual	10%	3
4	Rapid Prototyping Assignment	Week 2	Individual	5%	1
5	Warman Competition	Week 12	Group	30%	1, 2, 3, 4
6	Warman Final Report	Week 13	Individual	20%	1, 2

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 - Mechatronics Tutorials

Assessment Type	Tutorial / Laboratory Exercises
Purpose	Demonstrate student's knowledge and skills acquisition in relation to programming micro-controllers.
Description	Mechatronics Tutorials
Weighting	25%
Due Date	Due at the end of each Mechatronics tutorial session.
Submission Method	In Class To be submitted in computer lab session.
Assessment Criteria	Programming competency
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Warman Conceptual Design Report

Assessment Type	Report
Purpose	Written assignments demonstrate student's knowledge and skills acquisition.
Description	Warman Conceptual Design Report
Weighting	10%
Length	To be advised
Due Date	Week 7
Submission Method	Online
Assessment Criteria	Demonstration and description of; problem definition and analysis, potential solutions, proposed solution, proposed manufacturing procedure and timeline, a bill of materials and estimated costs.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Workshop Competency Portfolio

Assessment Type	Portfolio
Purpose	Demonstrate student's knowledge and skills acquisition in relation to manufacturing.
Description	The workshop competency portfolio enables students to consolidate manufacturing skills learnt throughout the semester in a safe manner with the production of a range of given tasks.
Weighting	10%
Due Date	Week 7
Submission Method	In Class Specific Location ABEW103
Assessment Criteria	Identification of risks, ways to mitigate these risks and demonstration of safe work practices in a workshop environment.
Return Method	In Class
Feedback Provided	In Class - .
Opportunity to Reattempt	Students WILL be given the opportunity to reattempt this assessment.

Assessment 4 - Rapid Prototyping Assignment

Assessment Type	Written Assignment
Purpose	Demonstrate student's knowledge and skills acquisition to develop suitable rapid prototyping solution.
Description	Rapid Prototyping Assignment
Weighting	5%
Due Date	Week 2
Submission Method	Online
Assessment Criteria	Clarity of drawings and suitability of selected part for rapid prototyping techniques.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 5 - Warman Competition

Assessment Type	Practical Demonstration
Purpose	Demonstrate student's knowledge and skills to undertake a group project and demonstrate problem identification, formulation and solution.
Description	Warman Campus Competition
Weighting	30%
Due Date	Week 12
Submission Method	In Class
Assessment Criteria	Performance, design intent, safety, originality and quality of workmanship of system.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 6 - Warman Final Report

Assessment Type	Report
Purpose	Written assignments demonstrate student's knowledge and skills acquisition.
Description	Warman Final Report
Weighting	20%
Length	To be advised
Due Date	Week 13
Submission Method	Online
Assessment Criteria	Demonstration and description of; problem definition and analysis, potential solutions and final solution, manufacturing procedure, operation risk analysis, commissioning and performance evaluation.
Return Method	Online
Feedback Provided	Online - .
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:

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.

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 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: <ol style="list-style-type: none">1. the assessment item is a major assessment item; or2. 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; or4. 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.				
13	3.3. Creative, innovative and pro-active demeanour.		✓	✓	2
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.		✓	✓	2
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.	✓	✓	✓	2
8	2.2. Fluent application of engineering techniques, tools and resources.	✓	✓	✓	2
9	2.3. Application of systematic engineering synthesis and design processes.	✓	✓	✓	2
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.	✓	✓	✓	2
	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.	✓	✓	✓	3
2	1.2. Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.	✓	✓	✓	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.		✓	✓	2
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.	✓	✓	✓	2

This course outline was approved 12/02/2024 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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