

MECH3110: Mechanical Engineering Design 2

Singapore PSB

Trimester 1 - 2024 (Singapore)



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description	This second course in engineering design applies knowledge gained in earlier mechanics and design courses to advanced aspects of engineering design. A range of topics are covered including the design of mechanical connections, power transmission through gears, bearing design and selection and shaft design.
Academic Progress Requirements	Nil
Assumed Knowledge	MECH2110 Mechanical Engineering Design 1, MECH2430 Mechanics of Solids 1 (previously MECH2420).
Contact Hours	Singapore PSB Lectorial Face to Face On Campus 2 hour(s) per week(s) for 13 week(s) starting Week 1 2 separate sessions. Lectorial Face to Face On Campus 2 hour(s) per week(s) for 13 week(s) starting Week 1 2 separate sessions.
Unit Weighting	10
Workload	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 **Singapore PSB**
Professor Craig Wheeler
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Teaching Staff Dr Goh Eng Yew

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SYLLABUS

Course Content This course covers key topics important in mechanical engineering design. The following topics are covered:

1. Mechanical connections.
2. Design of friction drives, clutches and brakes.
3. Epicyclic gear trains.
4. Gear design and selection to Australian Standards.
5. Shaft design.
6. Bearing selection, journal bearing design and lubrication.
7. Design project.

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

1. Undertake appropriate analyses of key components in a mechanical design;
2. Utilise design standards to size components in a mechanical design;
3. Perform a detailed design on a multi-component mechanical system;
4. Incorporate ethical/professional considerations into design solutions, and
5. Present a written report to professional standards.

Course Materials **Recommended Text:**

- Budynas, R. G. and Nisbett, J. K. "Shigley's Mechanical Engineering Design", 11th Edn in SI units, McGraw Hill.

- Lecture notes, PowerPoint presentations on Canvas

ASSESSMENTS

This course has 5 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Minor Assignment	Week 5	Individual	10%	1, 2, 3, 5
2	Major Assignment Part 1	Week 7	Individual	15%	1, 3, 5
3	Major Assignment Part 2	Week 13	Individual	15%	1, 2, 3, 4, 5
4	Quiz	Week 8	Individual	20%	1, 2, 3
5	Formal Examination	During the formal examination period.	Individual	40%	1, 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 - Minor Assignment

Assessment Type	Written Assignment
Purpose	Written assessments meet the course objectives of knowledge acquisition and demonstrated assimilation of data, upon reflection and analysis, to produce articulate and concise documents which convey evidence-based understanding of the concepts and topics.
Description	Written assignment, answering specific questions.
Weighting	10%
Due Date	Week 5
Submission Method	In Class Submit at the end of the lectorial.
Assessment Criteria	Appropriate analysis and interpretation Application of appropriate theory and concepts Accuracy of work
Return Method	In Class
Feedback Provided	In Class

Assessment 2 - Major Assignment Part 1

Assessment Type	Written Assignment
Purpose	Written assessments meet the course objectives of knowledge acquisition and demonstrated assimilation of data, upon reflection and analysis, to produce articulate and concise documents which convey evidence-based understanding of the concepts and topics.
Description	Written assignment, answering specific questions.
Weighting	15%
Due Date	Week 7
Submission Method	In Class Submit at the end of the lectorial.
Assessment Criteria	Appropriate analysis and interpretation Application of appropriate theory and concepts Accuracy of work
Return Method	In Class
Feedback Provided	In Class

Assessment 3 - Major Assignment Part 2

Assessment Type	Written Assignment
Purpose	Written assessments meet the course objectives of knowledge acquisition and demonstrated assimilation of data, upon reflection and analysis, to produce articulate and concise documents which convey evidence-based understanding of the concepts and topics.
Description	Written assignment, answering specific questions.
Weighting	15%
Due Date	Week 13
Submission Method	In Class

Assessment Criteria	Submit at the end of the lectorial. Appropriate analysis and interpretation Application of appropriate theory and concepts Accuracy of work
Return Method	In Person
Feedback Provided	In Class

Assessment 4 - Quiz

Assessment Type	Quiz
Purpose	The purpose and benefit of the class quiz is to provide the students with feedback on student learning. These tests highlight areas of concern and may stimulate discussion with tutors and lecturers.
Description	Open book quiz.
Weighting	20%
Due Date	Week 8
Submission Method	In Class During the scheduled lectorial.
Assessment Criteria	Appropriate analysis and interpretation Application of appropriate theory and concepts Accuracy of work
Return Method	In Class
Feedback Provided	In Class

Assessment 5 - Formal Examination

Assessment Type	Formal Examination
Purpose	The final formal examination is designed to test the individual student's knowledge of the course material and their ability to describe, analyse and hypothesise from this material.
Description	Formal examination
Weighting	40%
Due Date	During the formal examination period.
Submission Method	Formal Exam
Assessment Criteria	Appropriate analysis and interpretation Application of appropriate theory and concepts Accuracy of work
Return Method	Not Returned
Feedback Provided	In Person - Upon request.

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

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.

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:

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.

This course outline was approved by the Head of School on 28th November, 2023. 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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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.	X	X	X	3
13	3.3. Creative, innovative and pro-active demeanour.				
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.				
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.	X	X	X	3
8	2.2. Fluent application of engineering techniques, tools and resources.	X	X	X	3
9	2.3. Application of systematic engineering synthesis and design processes.	X	X	X	3
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.				
	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.	X	X	X	3
2	1.2. Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.				
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	X	X	X	3
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.				
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.				