

MECH1750: Engineering Materials 1

Singapore PSB

Trimester 1 - 2024 (Singapore)



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description	Case studies highlighting different aspects of materials science and how it relates to engineering will be used throughout the course to give a fundamental knowledge of materials science in context. By completing this course students will be able to identify engineering materials and their applications. They will be able to investigate engineering design problems and evaluate the range of materials that could be used as part of the solution. A knowledge of manufacturing processes and how these processes can limit or increase the usefulness of selected materials will also be developed.
Academic Progress Requirements	Nil
Requisites	Students who have previously successfully completed MECH2250 Materials Science and Engineering 1 cannot take this course.
Assumed Knowledge	HSC level knowledge of Physics or Chemistry is recommended but not required or assumed.
Contact Hours	Singapore PSB Lecture Online 4 hour(s) per week(s) for 13 week(s) starting Week 1 2 hours x pre-recorded online lectures per week. 2 hours x live and online recap and Q&A per week. Tutorial Face to Face On Campus 2 hour(s) per week(s) for 13 week(s) starting Week 1
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**
Dr Alexander Gregg
Alexander.Gregg@newcastle.edu.au
Consultation: By email

Teaching Staff Other teaching staff will be advised on the course Canvas site.

School Office **School of Engineering (Callaghan)**
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SYLLABUS

Course Content The course is concerned with the engineering properties of materials, how those properties affect design and the supporting science. The following topics are covered:

- Properties of materials (mechanical, thermal, electrical, magnetic and chemical properties).
- Engineering materials (metals and alloys, ceramic materials, polymers and composites).
- Manufacturing processes (for metals and composite materials, and how this affect design choices)
- Context specific case studies (Structural, robotics, biomechanical and aerospace)

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

1. Identify and describe the possible material choices for specific design applications and discuss their limitations.
2. Describe the link between internal structure, processing and properties of materials for engineering applications.
3. Apply the materials selection process to novel engineering problems.
4. Explain how manufacturing processes affect materials selection for engineering components.

Course Materials **Lecture Materials:**

- Pre-recorded lecture videos provided, delivered online.

Required Reading:

- Free textbook/lecture notes provided, delivered online.

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Weekly Quizzes	Weekly	Individual	30%	1, 2, 3, 4
2	Weekly Tutorial Presentations	Weekly	Individual	30%	1, 2, 3, 4
3	Exam	Formal Examination Period	Individual	40%	1, 2, 3, 4

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 - Weekly Quizzes

Assessment Type	Quiz
Purpose	Continuous weekly assessment to help you assess your own understanding and revise as necessary.
Description	12 short weekly quizzes, each worth 3%. Your final grade will be taken as your best 10/12 quiz grades. Late submissions are possible but will be penalised at 10% per day.
Weighting	30%
Length	30 minutes per week on average.
Due Date	Weekly
Submission Method	Online Submitted online via Canvas.
Assessment Criteria	Grades will depend on successfully answering the quiz questions.
Return Method	Online
Feedback Provided	Online. Following Week. Individual grade will be visible online. Course-wide trends will be reviewed in following weeks livestream.

Assessment 2 - Weekly Tutorial Presentations

Assessment Type	Presentation
Purpose	Practice your material design, presentation and feedback skills - EA stage 1 competencies.
Description	12 assessed tutorials, each worth 3%. Your final grade will be taken as your best 10/12 tutorial grades. Late submissions are not possible.
Weighting	30%
Length	2 hrs in-class + 15 mins feedback review per week.
Due Date	Weekly
Submission Method	In Class Presentations provided face-to-face in class. You must review peer-provided feedback each week.
Assessment Criteria	Grades will depend on your presentation, contribution to teamwork, engagement/participation and the quality of the feedback you provide to your peers.
Return Method	In Class
Feedback Provided	Online. Weekly. Peer feedback on your presentations will be collated and provided online for you to review.

Assessment 3 - Exam

Assessment Type	Formal Examination
Purpose	Synthesise the information provided in the lectures and tutorials.
Description	Written examination completed in the examination period.
Weighting	40%
Length	2 hours
Due Date	Formal Examination Period
Submission Method	Formal Exam
Assessment Criteria	
Return Method	Not Returned
Feedback Provided	No Feedback

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:

- 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.
- Face to Face: Communication will be provided via face to face meetings or supervision.

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	<p>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:</p> <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. <p>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</p>
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 that support a safe and respectful environment at the University.

This course outline was approved by the Head of School on 21st 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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Graduate Profile Statement

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	1
13	3.3. Creative, innovative and pro-active demeanour.		X	X	1
14	3.4. Professional use and management of information.				
15	3.5. Orderly management of self, and professional conduct.		X	X	1
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	1
8	2.2. Fluent application of engineering techniques, tools and resources.	X	X	X	1
9	2.3. Application of systematic engineering synthesis and design processes.	X	X	X	1
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	1
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	1
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.	X	X	X	1
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				