

ENGG1300

Engineering Mechanics

Term 3, 2021



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
David Kellermann	d.kellermann@unsw.edu.au	Teams chat	Ainsworth 208j	

Demonstrators

Name	Email	Availability	Location	Phone
Michael Ling	m.z.ling@unsw.edu.au	Teams	Ainsworth 208	
Harrison Low	h.low@unsw.edu.au	Teams	Ainsworth	

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](#)

Course Details

Units of Credit 6

Summary of the Course

This is the foundational mechanics course for students in Aerospace, Civil, Environmental, Manufacturing, Mechanical, Mechatronics and Mining Engineering, with content as follows: Revision of vectors, resultants and components, moments; The free body diagram; Equilibrium of planar rigid objects; Equilibrium of systems of co-planar multi-force members and planar trusses; Frames and Machines; Springs; Friction; Mass centre, centroids, distributed forces; Internal forces in beams; Introduction to 3-dimensional statics; Plane particle kinematics, including curvilinear and relative motion; Plane particle kinetics, including equations of motion, work-energy-power, friction, impulse-momentum, impact; Kinetics of systems of particles; Introduction to plane kinematics of rigid bodies, types of rigid body motion (translation, rotation about a fixed axis); Mass moment of inertia, parallel axis theorem, moment of inertia for various shapes, Introduction to plane kinetics of rigid bodies, rigid body in plane motion, equations of motion, work-energy for a rigid body.

Course Aims

This is a first course in Engineering Mechanics, which is the study of the interaction of matter and forces in engineering contexts. It is evident that all objects in the world around us are composed of matter, and they are all subject to forces. As such, Engineering Mechanics is the foundational tool for engineers, and forms the underlying basis for understanding more advanced fields such as Solid Mechanics, Fluid Dynamics, Rigid Body Dynamics, Aerodynamics, Structures, Control and many aspects of Advanced Design.

This course is a direct pre-cursor to second stage courses such as ENGG2400 Mechanics of Solids 1 and MMAN2300 Engineering Mechanics 2.

The aim of this course can be stated simply: For everyone involved (staff, students, demonstrators) to progress further towards becoming really good engineers.

Our field of endeavour will be the concepts and applications of Introductory Engineering Mechanics. Additionally, we will not measure our progress as the number of equations or facts or theories that we know. Rather, as our degree of transformation into someone who sees, understands, can make relevant and accurate predictions, and communicates about the world around us through the lens of Engineering Mechanics.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Explain, describe and apply principles and components of Engineering Mechanics. Principles and components include: vectors, forces, torques, mass and inertia, particles and rigid	

Learning Outcome	EA Stage 1 Competencies
bodies in two dimensions, equilibrium conditions, linear momentum and impact, kinetic and potential energy and internal forces and bending moments in beams.	
2. Discern the relevant principles that must be applied to describe the equilibrium or motion of engineering systems and discriminate between relevant and irrelevant information in the context.	PE1.1, PE1.2, PE2.1
3. Demonstrate an ability to communicate clearly and precisely about technical matters related to Engineering Mechanics.	PE1.6, PE3.2
4. Accomplish hands on tasks that require the application of knowledge of Engineering Mechanics.	PE2.1, PE2.2
5. Demonstrate professional communication, both written and oral, that includes mathematical, graphical and diagrammatic elements.	PE3.2
6. Produce individual work by leveraging a collaborative environment, helping and and receiving help from peers in a professional and ethical manner.	PE3.1, PE3.5, PE3.6

Teaching Strategies

This course will be delivered both in the classroom and online. Full participation in the class means that you will participate fully in both arenas. That is, you will be held accountable for all content, instructions, information, etc. that is delivered either in class or online. There will also be laboratory or practical exercises that you may have to complete during your self-study time.

Online: The online forum for participation in this class is the Moodle Platform. All official online interactions will take place or be linked clearly and appropriately from this site.

In class: There are three in-class activities in a typical week, which we refer to as the Monday Lecture, Tuesday Lecture and Problem Solving Session based on the timetable above.

Both the online and in-class segments of this course are organised on the following principles:

1. **Learning:** Student learning is the first priority - teaching and assessment are secondary concerns. Learning here is defined as gaining new ways of seeing the world, not as being filled with information. Students will be supported in developing the core skills, qualities and understandings needed for more advanced courses in their program and associated with their role as a future Engineer.
2. **Peer Interaction:** Learning is a social activity, and research shows that you will learn most best when you are actively taught by your peers and, in turn, when you teach them.
3. **Authenticity:** We will have as much authenticity of engineering practice as is possible within the constraints of the course and where it does not restrain your learning.
4. **High standards:** We will have high standards for achievement in the course, and everyone (including staff) will be accountable for putting in the effort to get you to the standard.

5. **Openness:** As much of the course as possible will be conducted in the open where all participants can be aware of it and comment upon it.
6. **Process:** The focus of the course will be on processes, not outcomes. The right outcomes will be a by-product of following the correct processes.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Weekly Tasks	16%	PSS due weekly prior to next PSS	1, 3
2. Block Tests	24%	6:00pm Weeks 4, 7, 10	1, 3
3. Labs/Assignments	20%	Friday 5pm, Weeks 5 and 9	1, 4, 5, 6, 7
4. Final Examination	40%	End of specified exam time	1, 3, 4, 6

Assessment 1: Weekly Tasks

Due date: PSS due weekly prior to next PSS

Deadline for absolute fail: 2 weeks after due date

Marks returned: 1 week later

Tutorial work and weekly quizzes, marks assigned each week of session to show work has been completed. Correctness is not essential, but attempting each question is required for full marks. Each topic week has 1 mark for the Moodle Quiz and 1 mark for the PSS hand-ins. 8 weeks total.

- Students will get 1 mark in the first 15 minutes of class for each week that they show their demonstrators a complete and reasonable attempt at all hand-in questions
- An incomplete set of solutions, late arrival or unreasonable attempt will score 0.5 marks. Students must be present either in-person or online for the duration of the PSS to attain the full mark.
- If a student comes late, does not attend or join the the PSS or leaves late, their demonstrator will only give them 0.5 for submitted work.
- If the student brings the PSS Hand-in a week late, they will receive a maximum of 0.5 marks
- Zero marks will be awarded for work more than one week late

This is not a Turnitin assignment

Assessment criteria

Complete a genuine attempt.

Assessment 2: Block Tests

Assessment length: 40 minutes

Submission notes: Via Teams

Due date: 6:00pm Weeks 4, 7, 10

Deadline for absolute fail: 5pm to 6:30pm Weeks 4, 7, 10

Marks returned: 2 weeks later

The block tests will have one question on each of the weekly topics preceding that week. Expectations

include mathematical correctness, sufficient description of mathematical and technical process such that the marker can follow the procedure taken. Mid semester, block tests or quizzes.

- Use the basic concepts such as Free-Body Diagrams (FBD) and Equations of Equilibrium (EoE)
- Systematic approach to outline the steps for a problem and use the necessary fundamental concepts covered in the lectures and problem solving sessions
- Correctness of the solution with the aid of necessary diagrams/sketches and the use of appropriate units
- There are no supplementary block tests. If you miss the block test, you must apply for Special Consideration through the University
- All special considerations lodged more than 48 hours after the test date will be rejected without exception
- If Special Consideration is granted, the student will be given a calculated mark that is 80% of the mark calculated based on their performance in the other three block tests. For example, if you score 100% in the three block tests you attend, you would be given 80% for the Block Test you missed

This is not a Turnitin assignment

Assessment criteria

Clarity, correctness and method of mathematical and diagrammatic reasoning.

Assessment 3: Labs/Assignments

Assessment length: Max 10 pages

Submission notes: Via Teams

Due date: Friday 5pm, Weeks 5 and 9

Deadline for absolute fail: 2 mark penalty per day

Marks returned: 2 weeks later

The lab assignments will be assessing students' ability to apply their theoretical knowledge of engineering mechanics to experimental results then document their work in a professional report. Assignment and Lab report. Expectations for marks to be awarded included professional documentation of description, equations, diagrams, figures and referencing. 10% each.

Assignment/Lab 1: Open Week 3, Due Friday 5pm Week 5

Assignment/Lab 2: Open Week 6, Due Friday 5pm Week 9

This is not a Turnitin assignment

Assessment criteria

Professional presentation and communication, technical method, calculation method and correctness.

Additional details

- Interpretation of the experimental results for the required information described in the hand out for each experiment
- Understanding the relationship between the theory covered during the lectures to experimental results in the laboratory
- Presentation of reports in accordance with the MECHENG guidelines
- Attendance and participation during the laboratory experiments
- It is the student's responsibility to ensure the mark in the Gradebook is correct, and must be checked within one week of release

Assessment 4: Final Examination

Assessment length: 2 hours

Submission notes: Via Teams

Due date: End of specified exam time

Deadline for absolute fail: At end of examination time slot

Marks returned: Release of final course results

The final exam is given because the course learning outcomes include a significant level of technical learning that can be effectively assessed in an exam environment and because exams have high reliability. One question directly testing each of the eight weekly topics of the course.

- Use the basic concepts such as Free-Body Diagrams (FBD) and Equations of Equilibrium (EoE)
- Systematic approach to outline the steps for a problem and use the necessary fundamental concepts covered in the lectures and problem solving sessions
- Correctness of the solution with the aid of necessary diagrams/sketches and the use of appropriate units
- A pass in this course requires a mark of 40% in the final examination and 50% overall

This is not a Turnitin assignment

Assessment criteria

Correctness, completeness and clarity of mathematical calculation and diagrams/graphs.

Hurdle requirement

This course will include the following hurdle requirements that are closely linked to a set of learning outcomes which demonstrate that you have acquired the required skills and competencies within this discipline:

- Students must demonstrate understanding of the core ENGG1300 syllabus. A minimum mark of 40% must be obtained for the Final exam in order to pass this subject. Failure to achieve this minimum mark will result in an unsatisfactory fail (UF) grade, regardless of the performance in the rest of the course.

Additional details

- Use the basic concepts such as Free-Body Diagrams (FBD) and Equations of Equilibrium (EoE)
- Systematic approach to outline the steps for a problem and use the necessary fundamental concepts covered in the lectures and problem solving sessions
- Correctness of the solution with the aid of necessary diagrams/sketches and the use of appropriate units
- A pass in this course requires a mark of 40% in the final examination and overall

Attendance Requirements

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

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
Week 1: 13 September - 17 September	Topic	FBDs and Equilibrium
Week 2: 20 September - 24 September	Topic	Structures and Trusses
Week 3: 27 September - 1 October	Topic	Frames and Machines
Week 4: 4 October - 8 October	Topic	Distributed Loads, SF and BM
	Assessment	Block Test 1: 9%. Thursday 5pm.
Week 5: 11 October - 15 October	Topic	Particle Kinetics and Kinematics
	Laboratory	Lab 1 due, Friday 5pm
Week 6: 18 October - 22 October	Homework	Flex week, catch up on work!
Week 7: 25 October - 29 October	Topic	Particle Energy and Momentum
	Assessment	Block Test 2: 6%. Thursday 5pm.
Week 8: 1 November - 5 November	Topic	Rigid Body Kinematics and Kinetics
Week 9: 8 November - 12 November	Topic	Rigid Body Energy and Momentum
	Laboratory	Lab 2 due Friday 5pm
Week 10: 15 November - 19 November	Topic	Exam revision
	Assessment	Block Test 3 9%, Thursday 5pm

Resources

Prescribed Resources

All resources on Teams

Recommended Resources

Meriam and Kraige, Engineering Mechanics, Statics and Dynamics

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.

Submission of Assessment Tasks

Assessment submission and marking criteria

Should the course have any non-electronic assessment submission, these should have a standard School cover sheet.

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

Late policy

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of 20 percent (20%) of the maximum mark possible for that assessment item, per calendar day, for a minimum of zero marks.

The late penalty is applied per calendar day (or part thereof), including weekends and public holidays, that the assessment is overdue.

Work submitted after the 'deadline for absolute fail' is not accepted and a mark of zero will be awarded for that assessment item. For example:

- Your course has an assessment task worth a total of **30 marks (Max Possible Mark)**
- You submit the assessment **2 days after the due date**
- The assessment is marked as usual and achieves a score of **20 marks (Awarded Mark)**
- The late policy is applied using **Late Mark = Awarded Mark - (Days*Penalty per Day)*Max Possible Mark**. Your adjusted final score is **8 marks** ($20 - ((2*0.2)*30)$).

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

1. Weekly online tests or laboratory work worth a small proportion of the subject mark, or
2. Online quizzes where answers are released to students on completion, or
3. Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date, or
4. Pass/Fail assessment tasks.

Examinations

You must be available for all quizzes, tests and examinations. For courses that have final examinations, these are held during the University examination periods: February for Summer Term, May for T1, August for T2, and November/December for T3.

Please visit myUNSW for Provisional Examination timetable publish dates. For further information on

exams, please see the [Exams](#) webpage.

Special Consideration

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 submitting an assessment or sitting an exam.

UNSW now has a [Fit to Sit / Submit rule](#), which means that if you attempt an exam or submit a piece of assessment, 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](#).

Please note that students will **not** be required to provide **any** documentary evidence to support absences from any classes missed **because of COVID-19 public health measures such as isolation**. UNSW will **not** be insisting on medical certificates from anyone deemed to be a positive case, or when they have recovered. Such certificates are difficult to obtain and put an unnecessary strain on students and medical staff.

Applications for special consideration **will** be required for assessment and participation absences – but no documentary evidence **for COVID-19 illness or isolation** will be required.

Special Consideration Outcomes

Assessments have default Special Consideration outcomes. The default outcome for the assessment will be advised when you apply for Special Consideration. Below is the list of possible outcomes:

Outcome	Explanation	Example
Time extension	Student provided more time to submit the assessment	e.g. 1 more week of time granted to submit a report
Supplementary assessment	Student provided an alternate assessment at a later date/time	e.g. a supplementary exam is scheduled during the supplementary exam period of the term
Substitute item	The mark for the missed assessment is substituted with the mark of another assessment	e.g. mark for Quiz 1 applied also applied as mark for Quiz 2, meaning if a student achieved a mark of 20/30 for Quiz 1 and was granted Special Consideration for Quiz 2, a mark of 20/30 would be applied for Quiz 2, etc
Exemption	All course marks are recalculated excluding this assessment and its weighting	e.g. The course has an assessment structure of: - Assignments 30%, - Lab report 30%, - Final Exam 40%. If the Lab report is missed and student is granted Special Consideration, then the assessment structure may be reweighted as follows: - Assignments 50% - Final Exam 50% as though the Lab report did not exist
Non-standard	Course Coordinator is contacted for the outcome when special consideration is granted as the outcome differs on a case-by-case basis	e.g. typical for group assessments where time extension supplementary assessment could be granted to the group member, time extension could be granted to the whole group, etc. Clarify with your Course Convenor for

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.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

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) even suspension from the university. The Student Misconduct Procedures are available here:

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

Academic Information

Credit points

Course credit is calculated in Units-Of-Credit (UOC). The normal workload expectation for one UOC is approximately 25 hours per term. This includes class contact hours, private study, other learning activities, preparation and time spent on all assessable work.

Most coursework courses at UNSW are 6 UOC and involve an estimated 150 hours to complete, for both regular and intensive terms. Each course includes a prescribed number of hours per week (h/w) of scheduled face-to-face and/or online contact. Any additional time beyond the prescribed contact hours should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

On-campus class attendance

****T3-2021 UPDATE****

Classes will be entirely ONLINE until at least Week 6, after which we will receive further advice from UNSW about the return of face-to-face classes. Students who are enrolled in face-to-face classes will have access to the course's online content but NO classes will be changed to reflect online delivery until Week 6 due to uncertainty regarding delivery mode for the rest of the term. Please go to your course's Moodle modules and MS Teams sites for further information about accessing course resources and content.

Public distancing conditions must be followed for all face-to-face classes. To ensure this, only students enrolled in those classes will be allowed in the room. No over-enrolment is allowed in face-to-face classes. Students enrolled in online classes can swap their enrolment from online to a **limited** number of on-campus classes by Sunday, Week 1. Please refer to your course's Microsoft Teams and Moodle sites for more information about class attendance for in-person and online class sections/activities.

Your health and the health of those in your class is critically important. You must stay at home if you are sick or have been advised to self-isolate by [NSW health](#) or government authorities. Current alerts and a list of hotspots can be found [here](#). **You will not be penalised for missing a face-to-face activity due to illness or a requirement to self-isolate.** We will work with you to ensure continuity of learning during your isolation and have plans in place for you to catch up on any content or learning activities you may miss. Where this might not be possible, an application for fee remission may be discussed. Further information is available on any course Moodle or Teams site.

In certain classroom and laboratory situations where physical distancing cannot be maintained or there is a high risk that it cannot be maintained, face masks will be considered **mandatory PPE** for students and staff.

For more information, please refer to the
FAQs: <https://www.covid-19.unsw.edu.au/safe-return-campus-faqs>

Guidelines

All students are expected to read and be familiar with UNSW guidelines and policies. In particular,

students should be familiar with the following:

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

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	✓
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	✓
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	✓
PE2.3 Application of systematic engineering synthesis and design processes	
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	✓
PE3.2 Effective oral and written communication in professional and lay domains	✓
PE3.3 Creative, innovative and pro-active demeanour	
PE3.4 Professional use and management of information	
PE3.5 Orderly management of self, and professional conduct	✓
PE3.6 Effective team membership and team leadership	✓