



UNSW Course Outline

MMAN2300 Engineering Mechanics 2 - 2024

Published on the 21 May 2024

General Course Information

Course Code : MMAN2300

Year : 2024

Term : Term 2

Teaching Period : T2

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Mechanical and Manufacturing Engineering

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Undergraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

This course provides essential knowledge and skills for students to analyse the kinematics and kinetics of rigid bodies and mechanical vibrations. Topics include the following: Plane kinematics and kinetics of rigid bodies; Equations of motion, work and energy; Introduction to

mechanical vibration; Free and forced responses of single degree-of-freedom spring-mass-damper systems, vibration isolation; Harmonic analysis; Linear vibrations of multi-degree-of-freedom systems.

Course Aims

This course aims to develop your understanding of the mechanics of planar rigid bodies, mechanisms, and vibratory systems, which topics are important for analysing and designing mechanical systems and components. It is a fundamental course for mechanical engineering students.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Explain, describe and apply principles and components of Engineering Mechanics using a range of techniques. e.g., using relative velocity or acceleration equations for velocity or acceleration analysis of rigid bodies
CLO2 : Explain and describe principles and components of mechanical vibrations.
CLO3 : Describe the equilibrium or motion of engineering systems and discriminate between relevant and irrelevant information in the context
CLO4 : Demonstrate an ability to communicate clearly and precisely about technical matters related to Engineering Mechanics
CLO5 : Accomplish hands on tasks that require the application of knowledge of Engineering Mechanics to solve a range of problems by completing workshop activities, homework assignments, Moodle practice questions, and two lab activities.

Course Learning Outcomes	Assessment Item
CLO1 : Explain, describe and apply principles and components of Engineering Mechanics using a range of techniques. e.g., using relative velocity or acceleration equations for velocity or acceleration analysis of rigid bodies	<ul style="list-style-type: none">• Weekly Homework Problems• Moodle quizzes• Laboratory Class Assignments• Final Exam
CLO2 : Explain and describe principles and components of mechanical vibrations.	<ul style="list-style-type: none">• Weekly Homework Problems• Moodle quizzes• Laboratory Class Assignments• Final Exam
CLO3 : Describe the equilibrium or motion of engineering systems and discriminate between relevant and irrelevant information in the context	<ul style="list-style-type: none">• Weekly Homework Problems• Moodle quizzes• Laboratory Class Assignments• Final Exam
CLO4 : Demonstrate an ability to communicate clearly and precisely about technical matters related to Engineering Mechanics	<ul style="list-style-type: none">• Laboratory Class Assignments• Final Exam
CLO5 : Accomplish hands on tasks that require the application of knowledge of Engineering Mechanics to solve a range of problems by completing workshop activities, homework assignments, Moodle practice questions, and two lab activities.	<ul style="list-style-type: none">• Weekly Homework Problems• Moodle quizzes• Laboratory Class Assignments• Final Exam

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Weekly Homework Problems Assessment Format: Individual	16%	Due Date: See WHP handouts
Moodle quizzes Assessment Format: Individual	14%	
Laboratory Class Assignments Assessment Format: Individual	30%	Due Date: See the lab handouts
Final Exam Assessment Format: Individual	40%	

Assessment Details

Weekly Homework Problems

Assessment Overview

This is an individual assessment. Students will be given questions to solve and need to submit their handwritten working in PDF. Each homework problem set is worth 2% (2 marks), for a total of 16% of all eight problem sets.

The full mark (2 marks) of each week's homework submission is awarded if all the questions for the week are attempted, a good effort is made to solve the entire problem set, and a good understanding of the correct approach is demonstrated. One (1) mark out of 2 will be given when at least half of the weekly questions are attempted, and a reasonable amount of effort and understanding for their solution is shown. A zero (0) mark is given if less than half of the weekly work is submitted or if the attempts show no or little effort or understanding for solving the problems.

Students must submit handwritten (not typed) working (in PDF) of weekly homework problems. Handwriting in digital-ink is accepted.

Standard late-submission policy applies to this assessment item.

Further details (including changes, if any) on the submission process will be provided during the term.

On-time submissions will be marked and returned within 1 week of the corresponding due date.

Course Learning Outcomes

- CLO1 : Explain, describe and apply principles and components of Engineering Mechanics using a range of techniques. e.g., using relative velocity or acceleration equations for velocity

- or acceleration analysis of rigid bodies
- CLO2 : Explain and describe principles and components of mechanical vibrations.
 - CLO3 : Describe the equilibrium or motion of engineering systems and discriminate between relevant and irrelevant information in the context
 - CLO5 : Accomplish hands on tasks that require the application of knowledge of Engineering Mechanics to solve a range of problems by completing workshop activities, homework assignments, Moodle practice questions, and two lab activities.

Detailed Assessment Description

The purpose of this assessment is to give students opportunities to apply the knowledge and methods learned in the course to problem-solving.

Students are required to submit their handwritten working (either in hardcopy or e-copy) by the specified due dates and during the PSS classes. In general, there is one WHP question for each PSS class. Students will solve the WHP question in the class with the support of the demonstrators, who will also mark the question as completed during the same class.

Assessment Length

1 hour/week

Submission notes

Students are required to submit their handwritten working (either in hardcopy or e-copy) by the specified due dates and during the PSS classes.

Assignment submission Turnitin type

Not Applicable

Moodle quizzes

Assessment Overview

This is an individual assessment.Two quizzes (weight: 7% each, total duration including completing the quiz, scanning and uploading: 1 hour each) to be submitted on Moodle. Students will be required to submit both their handwritten working (PDF upload) and their final answers (directly in the Moodle quiz).

No late submission is allowed for this assessment. Zero (0) marks will be awarded for late submissions.

Further details on submission will be provided during the course.

Submissions will be marked and returned within 2 weeks.

Course Learning Outcomes

- CLO1 : Explain, describe and apply principles and components of Engineering Mechanics using a range of techniques. e.g., using relative velocity or acceleration equations for velocity or acceleration analysis of rigid bodies
- CLO2 : Explain and describe principles and components of mechanical vibrations.
- CLO3 : Describe the equilibrium or motion of engineering systems and discriminate between relevant and irrelevant information in the context
- CLO5 : Accomplish hands on tasks that require the application of knowledge of Engineering Mechanics to solve a range of problems by completing workshop activities, homework assignments, Moodle practice questions, and two lab activities.

Detailed Assessment Description

Two quizzes/tests are scheduled in weeks 3 and 8. They will be held in person (on campus). The purposes of this assessment are for students to assess their progress during the term and prepare for the final exam.

Further information, including the topics and duration, will be provided during the term.

Assessment Length

50 - 60 minutes each

Submission notes

Further information will be provided during the term

Laboratory Class Assignments

Assessment Overview

The purpose of these lab activities is to help students have a good understanding of the Coriolis and vibration concept and demonstrate their understanding by completing the tasks and individual reports.

Individual report using the templates provided. Two Laboratory Assignments/Reports (weight 15% each) based on virtual/face-to-face laboratories.

Students repeating the course must redo all activities using the newly assigned values and submit a new report. Re-submitting the assignment/report submitted in a previous term will be treated as self-plagiarism.

On-time submissions will be marked and returned within 2 weeks of the corresponding due date.

Course Learning Outcomes

- CLO1 : Explain, describe and apply principles and components of Engineering Mechanics

using a range of techniques. e.g., using relative velocity or acceleration equations for velocity or acceleration analysis of rigid bodies

- CLO2 : Explain and describe principles and components of mechanical vibrations.
- CLO3 : Describe the equilibrium or motion of engineering systems and discriminate between relevant and irrelevant information in the context
- CLO4 : Demonstrate an ability to communicate clearly and precisely about technical matters related to Engineering Mechanics
- CLO5 : Accomplish hands on tasks that require the application of knowledge of Engineering Mechanics to solve a range of problems by completing workshop activities, homework assignments, Moodle practice questions, and two lab activities.

Detailed Assessment Description

Further information will be provided during the term. Read the information carefully and complete the tasks by the specified deadline for each lab.

Your submissions must be your own work. Please be aware that penalties will apply when unauthorised use of generative AI, such as ChatGPT, is detected to generate the submitted work.

Assessment Length

Individual report using the templates (approx. 10 pages) provided. See description on Moodle

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Final Exam

Assessment Overview

Formal examination at the end of the term. The exam will include all topics covered in both parts (Dynamics and Vibration) of the course.

Course Learning Outcomes

- CLO1 : Explain, describe and apply principles and components of Engineering Mechanics using a range of techniques. e.g., using relative velocity or acceleration equations for velocity or acceleration analysis of rigid bodies
- CLO2 : Explain and describe principles and components of mechanical vibrations.
- CLO3 : Describe the equilibrium or motion of engineering systems and discriminate between relevant and irrelevant information in the context
- CLO4 : Demonstrate an ability to communicate clearly and precisely about technical matters related to Engineering Mechanics
- CLO5 : Accomplish hands on tasks that require the application of knowledge of Engineering Mechanics to solve a range of problems by completing workshop activities, homework assignments, Moodle practice questions, and two lab activities.

Detailed Assessment Description

This is an individual, in-person assessment.

Refer to Examination timetable in myUNSW.

Further information will be provided before the exam.

Assessment Length

2 hours

Submission notes

Further information will be provided before the exam

General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 0 : 20 May - 26 May	Other	Access the course Teams and Moodle page Read course related information including the course outline and FAQs Review Engineering Mechanics 1 Dynamics
Week 1 : 27 May - 2 June	Lecture	Part A: Velocity analysis of rigid bodies
	Workshop	Part A: Velocity analysis of rigid bodies
Week 2 : 3 June - 9 June	Lecture	Part A: Instant centre method and acceleration analysis (review)
	Workshop	Part A: Instant centre method and acceleration analysis (review) Submit Weekly Homework Problems - Week 1 (WHP01) during the workshops for marking.
Week 3 : 10 June - 16 June	Lecture	Part A: Acceleration analysis of rigid bodies to rotating axes
	Workshop	Part A: Acceleration analysis of rigid bodies to rotating axes Submit WHP02 during the workshops for marking
	Assessment	Quiz 1: Topics covered in weeks 1 & 2
Week 4 : 17 June - 23 June	Lecture	Part A: Kinetics of rigid bodies
	Workshop	Part A: Kinetics of rigid bodies Submit WHP03 during the workshops for marking
Week 5 : 24 June - 30 June	Lecture	Lecture 1: Summary of Part A Lecture 2: Part B - Introduction to Vibration
	Workshop	Workshop 1: Part A summary question Workshop 2: Part B - Vibration introduction question(s) Submit WHP04 during the workshops for marking
	Laboratory	Lab 1: Coriolis laboratory
Week 6 : 1 July - 7 July	Other	Flexibility week
Week 7 : 8 July - 14 July	Lecture	Part B: Free and forced SDOF vibration
	Workshop	Part B: Free and forced SDOF vibration Submit WHP05 during the workshops for marking
	Assessment	Lab 1 report due
Week 8 : 15 July - 21 July	Lecture	Part B: Forced SDOF vibration - Special cases, applications and summary
	Workshop	Part B: Forced SDOF vibration - Special cases, applications and summary Submit WHP06 during the workshops for marking
	Laboratory	Lab 2: Vibration analysis
	Assessment	Quiz 2: Topics covered in weeks 5 and 7 plus any content from the dynamics part (weeks 1-5) relevant to vibration
Week 9 : 22 July - 28 July	Lecture	Part B: 2DOF free and forced vibration
	Workshop	Part B: 2DOF free and forced vibration Submit WHP07 during the workshops for marking
Week 10 : 29 July - 4 August	Lecture	Lecture 1: Summary of 2DOF vibration Lecture 2: Introduction to continuous systems
	Workshop	Vibration recap exercises Submit WHP08 during the workshops for marking
	Assessment	Lab 2 report due

Attendance Requirements

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

Course Resources

Prescribed Resources

Meriam, J.L., Kraige, L.G. and J.N. Bolton, Engineering Mechanics - Dynamics, SI Version, 9th ed., Wiley

Recommended Resources

Rao, S.S. Mechanical Vibrations, SI Edition, Pearson Prentice Hall

Waldron, K.J. and Kinzel, G.L. Kinematics, Dynamics, and Design of Machinery, 2nd ed., Wiley

Digital:

<https://unswbookshop.vitalsource.com/products/-v9781119650393>

<https://unswbookshop.vitalsource.com/products/-v9781292178615>

<https://unswbookshop.vitalsource.com/products/-v9781118933329>

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.

In this course, recent improvements resulting from student feedback include changes to the assessment items to spread workload and encourage students to keep up-to-date with the content.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Zhongxiao Peng		J18-408B	02 93854142		No	Yes
Lecturer	Pietro Borghe sani		J17-408H	02 93857899		No	No

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

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, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, 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](#).

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. In particular, students should be familiar with the following:

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

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

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.

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

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

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

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

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, 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

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)

School-specific Information

Short Extensions

Short extensions are not currently applicable to Mechanical and Manufacturing Engineering Courses.

Review of Results

The purpose of a review of results is if there was a marking error. Review of results is for when you have cause to believe that there is a marking error. Review of Results cannot be used to get feedback. If you would like feedback for assessments prior to the final exam, you are welcome to contact the course convenor directly. No feedback will be provided on final exams.

Use of AI

The use of AI is prohibited unless explicitly permitted by the course convenor. Please respect this and be aware that penalties will apply when unauthorised use is detected, such as through Turnitin. If the use of generative AI, such as ChatGPT, is allowed in a specific assessment, they must be properly credited, and your submissions must be substantially your own work.

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](#)