Mechanical and Manufacturing Engineering

Course Outline

Term U1 2020

ENGG1300

Engineering Mechanics

Contents

1. Staff contact details

Contact details for Course Convenor

Name: Dr. Bernd Gludovatz
Office location: Ainsworth (J17) 311-G
Tel: (02) 9385 4006
Email: b.gludovatz@unsw.edu.au
Moodle: https://moodle.telt.unsw.edu.au/login/index.php

Contact details for Demonstrators

Name: Boming Zhang
Email: boming.zhang@unsw.edu.au
Name: Yutong Ji
Email: yutong.ji@unsw.edu.au

Queries and consultation

For queries and consultation, proceed in the following order:

1) Ask during the demonstration classes
2) Post questions and queries on Microsoft Teams (access in a browser teams.microsoft.com or install the app on your mobile phone and/or tablet)
3) Ask/email your demonstrator
4) Ask/email your lecturer
5) Arrange for a consultation time with your lecturer

For content-related queries (including assessments) please refer to your demonstrators/ lecturers, whereas for organisational issues please contact the course convenor.

If you email your demonstrator or lecturer, please:

- Clearly include the course code (ENGG1300) in your email subject
- Include all information about your query in the email text. For example, rather than saying “in Question 5 of the problem set”, take a screenshot or photo of Question 5 so we can answer your question on the spot.

2. Important links

- Moodle
- Lab Access
- Computing Facilities
- Student Resources
- Course Outlines
- Engineering Student Support Services Centre

3. Course details

Credit Points

This is a 6 unit-of-credit (UoC) course, and involves 15 hours per week (h/w) of face-to-face contact.

Given the compact nature of this summer course, you should aim to spend 37.5 h/w on this course (including contact hours). Additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

Contact hours

All in-class activities will start on **Monday 06/01/2020** (Week 2 of the summer term) and then follow the schedule specified in the table below. This means that lectures and tutorials will happen every Monday, Wednesday and Friday starting from **Monday 06/01/2020** until **Monday 03/02/2020**, with the exception of Monday 27/01/2019 (Australia Day holiday).

	Day	**Time**	**Location**
Lecture	Monday	9 am – 12 pm	ELECTRICAL ENG G03 (K-G17-G03)
	Wednesday	9 am – 12 pm	ELECTRICAL ENG G03 (K-G17-G03)
	Friday	9 am – 12 pm	ELECTRICAL ENG G03 (K-G17-G03)
Problem solving sessions	Monday	1 pm – 3 pm	ELECTRICAL ENG G03 (K-G17-G03)
	Wednesday	1 pm – 3 pm	ELECTRICAL ENG G03 (K-G17-G03)
	Friday	1 pm – 3 pm	ELECTRICAL ENG G03 (K-G17-G03)

In addition to lectures and tutorials, walk-in lab sessions are planned for an assessed practical experience on Wednesday 15/01/2020 in Week 3 (and potentially Friday of the same week, 17/01/2020, if more slots are required due to high enrolment). There will be no classes and no tutorials on these two days.

Please refer to your class timetable for the learning activities you are enrolled in and attend only those classes.

Summary and Aims of the course

This is your 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.

For many of you, this course is a direct pre-cursor to two Year 2 courses: MMAN2400 – 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 high-quality 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.

Student learning outcomes

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown.

The full list of Stage 1 Competency Standards may be found in Appendix A.

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 bodies in two dimensions, equilibrium conditions, linear momentum and impact, kinetic and potential energy and internal forces and bending moments in beams.	1.1, 1.2, 2.1, 3.2
2.	Define engineering systems in a mechanically useful way and describe their equilibrium or motion in mathematical and graphical fashion and be able to relate this description to the principles of engineering mechanics.	1.1, 1.2, 2.1, 2.2, 3.2
3.	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.	1.1, 1.2, 2.1
4.	Demonstrate an ability to communicate clearly and precisely about technical matters related to Engineering Mechanics.	1.6, 3.2
5.	Accomplish hands on tasks that require the application of knowledge of Engineering Mechanics.	2.1, 2.2

4. 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. Additionally, you will have access to a course forum through Microsoft Teams to discuss content, examples and questions.

In class: There are two types of in-class activities in a typical week, which we refer to as Lectures (Monday, Wednesday and Friday), and Problem Solving Sessions (Monday, Wednesday and Friday) 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. We are trying to transform you into engineers and critical thinkers in the discipline.
2. **Peer Interaction:** Learning is a social activity, and research shows that you will learn most and 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.

5. Course schedule

Days where there is no in-class activity are shaded in grey.

	Day	Date	Topic of lectures and problem solving sessions	Laboratory	Suggested Readings
Week 1	Mon	06/01	Introduction to statics; vectors; units; force systems, moments and couples		M&K(S) Ch1-2
	Tue	07/01			
	Wed	08/01	Equilibrium; free body diagrams; Equations of Equilibrium; Structures and Trusses		M&K(S) Ch3 M&K(S) Ch4
	Thu	09/01			
	Fri	10/01	Structures and Trusses (continued)		M&K(S) Ch4
Week 2	Mon	13/01	Beams; shear force; bending moment		M&K(S) Ch4-5
	Tue	14/01			
	Wed	15/01		Lab experiment Sessions (in case of high enrolment also on Fri 17/01)	
	Thu	16/01			
	Fri	17/01			
Week 3	Mon	20/01	Introduction to Dynamics: Newton's law and rectilinear motion		M&K(D) Ch1-2
	Tue	21/01			
	Wed	22/01	Particle kinematics		M&K(D) Ch2
	Thu	23/01			
	Fri	24/01	Particle kinetics: work, kinetic and potential energy; Linear/ angular impulse and momentum		M&K(D) Ch3
Week 4	Mon	27/01	Australia Day (Public holiday, no class)		
	Tue	28/01			
	Wed	29/01	Kinetics of particle systems		M&K(D) Ch4
	Thu	30/01			
	Fri	31/01	Plane kinematics of rigid bodies		M&K(D) Ch5
Week 5	Mon	03/02	Plane kinetics of rigid bodies		M&K(D) Ch6
	Tue	04/02			
	Wed	05/02	Review		
	Thu	06/02			
	Fri	07/02			

6. Assessment

Assessment overview

All assessment items are individual.

Assessment task	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date, time	Deadline for absolute fail	Marks returned
Quiz	1 hour	20%	1, 2, 3	Correctness	Week 3, Friday 17/01/2020 10pm (22:00)	N/A	Next working day
Individual Laboratory Report	8 pages max	30%	1, 2, 3, 4	Correctness, completeness, professionalism of report	Week 5, Tuesday 28/01/2020 10pm (22:00)	Sunday after due date, 12 noon	Within 1 week
Final exam	2 hours	50%	1, 2, 3, 5	Understanding of all course content, demonstrating problem solving ability	Exam period, date TBA.	N/A	Upon release of final results

The Quiz will be opened on Moodle at 10am on Thursday, 16/01/2020 and will be open until 10pm on Friday, 17/01/2020. The quiz will assess the material covered thus far (statics).

Lab report instruction and criteria for assessment will be published on Moodle in week 3 before the lab sessions. The completed lab reports must be submitted online using Moodle within the specified deadline.

Assessment Criteria

See assignment-specific information released on the Moodle website together with the assignment.

Moodle quiz

- Correctness of the answers based on understanding of material

Laboratory Reports

- Interpretation of the experimental results for the required information described in the handout
- Understanding the relationship between the theory covered during the lectures and the experimental results in the laboratory
- Presentation of report 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 Moodle Gradebook is correct, and must be checked within one week of release

Final examination

- 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 50% in the final examination and overall

Assignments

Presentation

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.

Submission

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.

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.

Work submitted after the ‘deadline for absolute fail’ is not 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 are clearly indicated in the course outline, and such assessments receive a mark of zero if not completed by the specified date. Examples include:

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

Marking

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.

Examinations

You must pass the final exam in order to pass the course.

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods: February for Summer Term, May for T1, August for T2, and December for T3.

Please visit myUNSW for Provisional Examination timetable publish dates.

For further information on exams, please see the Exams webpage.

Calculators

You will need to provide your own calculator, of a make and model approved by UNSW, for the examinations. The list of approved calculators is shown at student.unsw.edu.au/exam-approved-calculators-and-computers

It is your responsibility to ensure that your calculator is of an approved make and model, and to obtain an “Approved” sticker for it from the School Office or the Engineering Student Centre prior to the examination. Calculators not bearing an “Approved” sticker will not be allowed into the examination room.

Special consideration and supplementary assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, see the information on UNSW’s Special Consideration page.

7. Expected resources for students

Recommended textbooks (available through the UNSW bookshop)

Meriam J.L., Kraige L.G. Engineering Mechanics:
Vol. 1 – Statics, 7th Edition, SI Version. Wiley. (referred to as M&K(S))
Vol. 2 – Dynamics, 7th Edition, SI Version. Wiley. (referred to as M&K(D))

Students are strongly recommended to purchase both these textbooks as they will be used both in this course and in later mechanics courses.

UNSW Library website: https://www.library.unsw.edu.au/
Moodle: https://moodle.telt.unsw.edu.au/login/index.php

8. 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.

This course is offered in the summer for the second time. Due to the compact nature of summer courses, modifications in assessment items (both number and nature) and teaching material/activities have been carried out to ensure the best learning outcomes for students. Feedback from students will be vital for further improvements.

9. 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: 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

10. Administrative matters and links

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

- Attendance
- UNSW Email Address
- Computing Facilities
- Special Consideration
- Exams
- Approved Calculators
- Academic Honesty and Plagiarism
- Student Equity and Disabilities Unit
- Health and Safety
- Lab Access
- Makerspace
- UNSW Timetable
- UNSW Handbook
- UNSW Mechanical and Manufacturing Engineering

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex 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
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (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