UNSW AUSTRALIA

Course outline

Semester 1 2017

Never Stand Still | Engineering | Mechanical and Manufacturing Engineering

MMAN1300

ENGINEERING MECHANICS

Contents

1. Staff contact details

Contact details and consultation times for course convenor

Name: Dr. David C. Kellermann
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Contact details and consultation times for additional lecturers/demonstrators/lab staff

Name: Dr Majid Warkiani
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Contact details for Head Demonstrator

Name: Mr. Muhammad Danish Haneef
Office location: Ainsworth 408, Desk 20
Email: m.haneef@unsw.edu.au

Queries and consultation

For queries and consultation, proceed in the following order:

1) Ask your peers
2) Ask your demonstrator
3) Post to the Moodle forum
4) Email the head demonstrator
5) Email your lecturer
6) Arrange for a consultation time with your lecturer

If you email your head demonstrator or lecturer, please include all information in the email, 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.

Contact details and consultation times for additional demonstrators:

Name	**Contact email address**
Muhammad Danish Haneef *(HEAD DEMONSTRATOR)*	m.haneef@unsw.edu.au
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2. Course details

Credit Points

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

The UNSW website states “The normal workload expectations of a student are approximately 25 hours per semester for each UoC, including class contact hours, other learning activities, preparation and time spent on all assessable work. Thus, for a full-time enrolled student, the normal workload, averaged across the 16 weeks of teaching, study and examination periods, is about 37.5 hours per week.”

This means that you should aim to spend about 9 h/w on this course. The 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

	Day	**Time**	**Location**
Lecture	Tuesday	4:05pm - 6pm	Elec Eng G24
	Wednesday	2:05pm - 3pm	Elec Eng G24
Problem Solving Session (PSS) Wks 1-13	Wednesday	3:00 - 5:00pm	Civil Engineering 102
	Wednesday	3:00 - 5:00pm	Ainsworth Building 201
	Wednesday	3:00 - 5:00pm	Quadrangle G045

Summary 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.

Aims of the course

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.

Student learning outcomes

This course is designed to address the below learning outcomes 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

3. 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 Tuesday Lecture, Wednesday 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. 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.

4. Course schedule

Week	Topic	Moodle Quiz	Lab work	Suggested Readings
1	1-D, 2-D Kinematics, Projectile Motion, Circular motion	Quiz 1		M&K(D) 2/2-5
2	Relative Motion, Particle Kinetics, Friction	Quiz 2		M&K(D) 2/8, 3/1-5; M&K(S) 6/1-3.
3	Introduction, Newton's laws, Vectors, Dimensions, Forces and Moments	Quiz 3		M&K(S) 1/1. M&K(D) 1/2-6; C/7.
4	Free Body Diagrams, Equilibrium and Equivalent Loads	Quiz 4		M&K(S) 2/6,9; 3/2-4.
5	Work, Energy and Power, Impulse and Momentum, Impact	Quiz 5		M&K(D) 3/6-10, 12.
6	Rigid body Kinematics	Quiz 6		M&K(D) 5/1-6.
7	Mass Moments of Inertia, Fixed-axis Rotation, Rigid Body Translation	Quiz 7	Impulse and Momentum Laboratory Experiment	M&K(D) B/1; 6/1-4.
8	General Planar Motion, Rigid Body Work and Energy	Quiz 8	Impulse and Momentum Laboratory Report Due	M&K(D) 6/5-6.

9	Trusses and Determinacy	Quiz 9	Rolling Disc Laboratory Experiment	M&K(S) 3/3-4; 4/1-4.
10	Distributed Forces, Centroids, Centre of Mass, Applications	Quiz 10	Rolling Disc Laboratory Report Due	M&K(S) 5/1-4,6.
11	Shear Force and Bending Moment	Quiz 11		M&K(S) 5/7.
12	Machines and Frames, Revision	Quiz 12	Shear Force and Bending Moment Laboratory Experiment	M&K(S) 4/6.
13	No Lecture		Shear Force and Bending Moment Laboratory Report Due	

5. Assessment

Assessment overview

Assessment task	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date, time	Deadline for absolute fail	Marks returned
4 x Class Tests	45 mins each	24% (6 marks each)	1, 2, 3, 4	Understanding of lecture material	During PSS in weeks 4, 7, 10 and 13.	-	Within 2 weeks after each test
12 x Weekly PSS and Moodle quiz	Weekly	24% (1 + 1 marks each week)	1, 2, 3, 4	Weekly problem solving attempts	PSS: WK X+1 Quiz: 7pm Fridays, weeks 1-12	PSS: WK X+2 Quiz: No late submissions	Same day
3 x Individual Laboratory Reports	10 pages max	12% (4 marks each)	1, 3, 4, 5	Correctness, completeness, professionalism of report	5pm Fridays, weeks 8, 10, 13.	5pm the Monday after	Within 2 weeks after the due date
Final exam	2 hours	40%	1, 2, 3, 4	Understanding of all course content	Exam period, date TBC.	-	Upon release of final results

Assessment Criteria

Block Tests and 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.

Laboratory Reports:

- 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 report in accordance with the MECHENG guidelines
- Attendance and participation during the laboratory experiments.

A pass in this course requires a mark of 50% in assessments and final examination.

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

Late submissions will be penalised 4 marks per calendar day until zero (including weekends). An extension may only be granted in exceptional circumstances. Where an assessment task is worth less than 20% of the total course mark and you have a compelling reason for being unable to submit your work on time, you must seek approval for an extension from the course convenor ***before the due date***. Special consideration for assessment tasks of 20% or greater must be processed through student.unsw.edu.au/special-consideration.

It is always worth submitting late assessment tasks when possible. Completion of the work, even late, may be taken into account in cases of special consideration.

Where there is no special consideration granted, the 'deadline for absolute fail' in the table above indicates the time after which a submitted assignment will not be marked, and will achieve a score of zero for the purpose of determining overall grade in the course.

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

Inability to attend the block tests on one of these times for reasons such as work commitments, holidays etc. cannot, unfortunately, be accommodated with a class of this

size. Of course, arrangements will be made for emergencies such as illness. Arrangements for each type of assessment are tabulated below.

Type of Assessment	
Block tests 1-4	No supplementary
Weekly assessment	PSS and Moodle, no late submissions
Laboratory	Reports submission via Moodle
Final Examination	Standard UNSW special considerations for supplementary

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods, which are June for Semester 1 and November for Semester 2.

Provisional Examination timetables are generally published on myUNSW in May for Semester 1 and September for Semester 2

For further information on exams, please see the Exams section on the intranet.

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 School intranet, and the information on UNSW's Special Consideration page.

6. Expected resources for students

Essential 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 later mechanics courses.

Moodle site for MMAN1300, access via: http://moodle.telt.unsw.edu.au/my/

School's website: http://www.engineering.unsw.edu.au/mechanical-engineering/

Other Resources

If you wish to explore any of the lecture topics in more depth, then other resources are available and assistance may be obtained from the UNSW Library: https://www.library.unsw.edu.au/

7. Course evaluation and development

Feedback on the course is gathered periodically using various means, including the 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.

Feedback from a previous instance of the course suggested that a large number of small assessment tasks were conducive to accumulating knowledge in mechanics of solids. Few suggestions were raised from the previous year with regards to instructions in the lab handout. Recent improvements to the course as a response to student feedback include:

- Providing clear instructions in the lab handouts for what to be assessed.
- Changing report submission date to return reports with feedback to students prior to the study period.

You are greatly encouraged to provide feedback on all aspects of the course using email and the discussion forum within Moodle.

8. 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

Further information on School policy and procedures in the event of plagiarism is available on the intranet.

9. Administrative matters

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, Participation and Class Etiquette
- UNSW Email Address
- Computing Facilities
- Assessment Matters (including guidelines for assignments, exams and special consideration)
- Academic Honesty and Plagiarism
- Student Equity and Disabilities Unit
- Health and Safety
- Student Support Services

Dr. David C. Kellermann
17 February 2017

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