UNSW AUSTRALIA

Course outline

Semester 2 2016

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 Kellermann
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Contact details and consultation times for additional lecturers/demonstrators/lab staff

Name: Dr Mark Whitty
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Head Demonstrator
Name: Dr Jay Sul
Email: j.sul@unsw.edu.au

Contact details for other demonstrators will be available on Moodle.

Communication should be made in the first instance with your own class demonstrator, then with the head demonstrator if unresolved and finally by email to the lecturers.

2. Course details

Credit Points

This is a 6 unit-of-credit (UoC) course, and involves 5 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.

There is no parallel teaching in this course.

Contact hours

	Day	Time	Location
Lectures (Weeks 1-12)	Monday	12noon - 2pm	Ainsworth G03
	Tuesday	12noon – 1pm	Ainsworth G03
Web Lecture	Available after the in-class lectures each week		
Problem Solving Sessions (Weeks 2-13)	Tuesday	3pm – 5pm	Ainsworth 101, Quad G044, Red Centre West M010
	Wednesday	9am – 11am	Ainsworth 101, Ainsworth 201, Quad G044
	Thursday	3pm – 5pm	Ainsworth 101, Ainsworth 201, Quad G044

Lectures commence in week 1 and run until week 12. Problem Solving Sessions commence in week 2 and run until week 13.

Laboratory experiments will be conducted in the Undergraduate Teaching Laboratory (116) in the Willis Annexe (building J18). The space will be open from 9am – 1pm and 2pm – 4pm during the weeks in which laboratory experiments will be conducted. No specific times are allocated, and the equipment is available on a first come first served basis.

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 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

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, specifically the Engineering Mechanics course at http://moodle.telt.unsw.edu.au/course/view.php?id=16714. 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, Friday 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.

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	Smart Sparrow or Test	Lab work	Suggested Readings
1	Introduction, Newton's laws, Vectors, Dimensions, Forces and Moments	Quiz 1			M&K(S) 1/1. M&K(D) 1/2-1/5; 2/2-8; C/7.
2	Free Body Diagrams, Equilibrium and Equivalent Loads	Quiz 2	FBDs		M&K(S) 2/6,9; 3/2-4.
3	1-D, 2-D Kinematics, Projectile Motion, Circular motion	Quiz 3	Test 1		M&K(D) 2/2-6.
4	Relative Motion, Particle Kinetics, Friction	Quiz 4	Projectile Motion		M&K(D) 2/8, 3/1-5; M&K(S) 6/1-5.
5	Work, Energy and Power, Impulse and Momentum, Impact	Quiz 5	Friction		M&K(D) 3/6-10, 12.
6	Rigid body Kinematics	Quiz 6	Test 2		M&K(D) 5/1-6.
7	Mass Moments of Inertia, Fixed-axis Rotation, Rigid Body Translation	Quiz 7	Work & Energy	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 & Momentum	Impulse and Momentum Laboratory Report Due	M&K(D) 6/5-6.
9	Trusses and Determinacy	Quiz 9	Test 3	Rolling Disc Laboratory Experiment	M&K(S) 3/3-4; 4/1-4.
Mid-Semester Break					
10	(No lecture Monday) Distributed Forces, Centroids, Centre of Mass, Applications	Quiz 10	Trusses	Rolling Disc Laboratory Report Due	M&K(S) 5/1-4,6.
11	Shear Force and Bending Moment	Quiz 11	Centroids		M&K(S) 5/7.
12	Machines and Frames	Quiz 12	Test 4	Shear Force and Bending Moment Laboratory Experiment	M&K(S) 4/6.
13	Revision (Monday lecture only)		Shear Force & Bending Moment	Shear Force and Bending Moment Laboratory Report Due	

5. Assessment

Assessment overview

Assessment	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Marks returned
4 x Class Tests	1 hour each	28% (7 marks each)	1, 2, 3, 4	Understanding of lecture material	During PSSs in weeks 3, 6, 9 and 12.	One week after test
12 x Moodle Quizzes	Multiple attempts until the due date and time	12% (1 mark each)	1, 2, 3, 4	Understanding of lecture material	5pm Fridays, each week from 1 – 12.	Instantly
8 x Smart Sparrow Adaptive eLearning Tutorials	Unlimited attempts until the due date and time	8% (1 mark each)	1, 2, 3, 4	Understanding of lecture material	5pm Fridays, weeks 2, 4, 5, 7, 8, 10, 11, 13.	Instantly
3 x Individual Laboratory Reports	See report descriptions on Moodle	12% (4 marks each)	1, 3, 4, 5	Correctness, completeness and professionalism of report	5pm Fridays, weeks 8, 10, 13.	Two weeks after submission
Final exam	3 hours	40%	1, 2, 3, 4	Understanding of all course content	Exam period, date TBC.	Upon release of final results

Assignments

Further details of individual assessment tasks will be provided on Moodle, including submission procedures and the criteria by which grades will be assigned.

Presentation

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

Submission

Late submission of online quizzes, adaptive tutorials and lab reports is **not** permitted in this course. 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.

Examinations

In class tests are scheduled during Problem Solving Sessions as listed in the assessment schedule above.

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.

All online activities such as Smart Sparrow activities will be linked from the Moodle course homepage.

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

School's website http://www.engineering.unsw.edu.au/mechanical-engineering/
http://info.library.unsw.edu.au/web/services/services.html

7. Course evaluation and development

Feedback on the course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) 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 was conducive to continued online learning and this has been maintained. Prior to that, improvements included moving to a single platform for online content delivery and assessment.

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

David Kellermann and Mark Whitty
July 2016

Appendix A: Engineers Australia (EA) 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