UNSW SYDNEY | Australia's Global University

Mechanical and Manufacturing Engineering

Course Outline

Term 2 2020

MMAN2130

DESIGN AND MANUFACTURING

Contents

1. Staff contact details

Contact details and consultation times for course convenor

Name: Mr Daniel Eggler
Tel: (02) 9385 6474
Email: d.eggler@unsw.edu.au
Moodle: https://moodle.telt.unsw.edu.au/mod/page/view.php?id=2869027
Microsoft Teams Video Chat Hours: Monday 1-2pm and Friday 3-4pm. You must arrange an appointment via email.

IMPORTANT: All initial communication must be through email. Your email must contain the following:

- Your name and student number
- An appropriate email subject
- You must use your UNSW email
- A minimum level of email etiquette is expected

Failure to meet these criteria will result in your email remaining unanswered.
suggested template for emails is below:

Dear [Staff Member name],

(Your question/request/concern here)

Regards,

(Your name), z1234567

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

Head Demonstrator
Name: Mr Timothy Spooner
Email: timothy.spooner@unsw.edu.au

Please see the course Moodle.

2. Important links

- Moodle
- Lab Access
- Health and Safety
- Computing Facilities
- Student Resources
- Course Outlines
-
- Engineering Student Support Services Centre
- Makerspace
- UNSW Timetable
- UNSW Handbook
- UNSW Mechanical and Manufacturing Engineering

3. Course details

Credit points

This is a 6 unit-of-credit (UoC) course and involves 6 hours per week (h/w) of scheduled online contact.

The normal workload expectations of a student are approximately 25 hours per term for each UOC, including class contact hours, other learning activities, preparation and time spent on all assessable work.

You should aim to spend about 12 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**	**Delivery Mode**
Lectures	Monday/Friday	11am – 1pm/1pm – 3pm	Microsoft Teams Live Stream Event
Problem Solving Sessions	Tuesday	11am – 12pm	Microsoft Teams Channel
	Tuesday	12pm – 1pm	Microsoft Teams Channel
	Tuesday	1pm – 2pm	Microsoft Teams Channel
	Thursday	2pm – 3pm	Microsoft Teams Channel
CAD Labs	Thursday	10am – 11am	Microsoft Teams Channel

All classes in T2 2020 will be online. Please consult this course's Moodle module for details about delivery.

Summary and Aims of the course

Have you ever considered how we make devices and machines? Wondered how a car engine was made with such precision? Perhaps puzzled at the manufacturing required for robotic appendages and movement? All of this is possible by utilising fundamental machining methods. Only with an appreciation for *how* our designs are physically constructed is it possible to create successful prototypes and products.

In this course you will understand how machining processes influence design. Fundamental machining processes such as the turning, milling and hole making are taught. You will not only learn about them but how to use them to physically build componentry. This practical, hands-on content is seamlessly integrated with critical computer-aided design (CAD) and

computer-aided manufacture (CAM) skills. You will learn how to generate graphical outputs such as 3D models and engineering drawings to facilitate design solutions. You will acquire the skills necessary to take your CAD model from the virtual world and machine it on a computer numerical control (CNC) machine. Remember this moment: by the end of this term, you will be marveling at your own machined creation.

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.	Identify which manufacturing processes must be used to create desired products.	PE1.1, PE1.5, PE2.2
2.	Explain how manufacturing processes impact design and production.	PE1.1, PE1.3, PE1.5, PE2.2, PE2.3
3.	Operate fundamental metalworking machinery to generate components.	PE1.5, PE2.2, PE2.3, PE3.3, PE3.5
4.	Prepare components for manufacture using CAM software.	PE1.5, PE2.2, PE2.3, PE3.2
5.	Construct CAD models and engineering drawings from real world inputs.	PE1.5, PE2.2, PE2.3, PE3.2, PE3.3, PE3.4
6.	Interpret engineering drawings to drive manufacturing processes.	PE1.1, PE1.3, PE1.5, PE2.2, PE2.3, PE3.2, PE3.4
7.	Recognise the role Australian Standards play in engineering practice.	PE1.5, PE1.6, PE2.3, PE3.1, PE3.2, PE3.4

4. Teaching strategies

Online: There are two online forums for participation in this class. The first is the Moodle Platform, specifically the MMAN2130 course at https://moodle.telt.unsw.edu.au/. The second is the MMAN2130 Team site hosted in Microsoft Teams. All official online interactions will take place or be linked clearly and appropriately from these sites.

In class: There are three in-class activities in a typical week which we refer to as the Lecture, Problem Solving Class and CAD Lab based on the timetable in Section 3. The online 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 understanding the field of design and manufacturing in mechanical engineering; not as simply memorising 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 as possible, this course 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.

The lectures in this course will cover core concepts and background theory in manufacturing and engineering design. The lecture material is available to students electronically before each class via Moodle.

The CAD Labs are designed to allow you to practise critical skills in the areas of computer-aided design and manufacture. Pre-lab work will be available before the start of class and is able to be worked through in your own time. During the labs, the pre-lab work will be expanded upon with opportunity to seek assistance in areas of difficulty.

The Problem Solving Sessions will provide important contextualisation between the practical skills being taught in the labs, the concepts being introduced in the lectures and highlight how these are related when designing and manufacturing in the real world.

5. Course schedule

Lecture Schedule

Week	Topic	Delivery Mode
1 (Mon/Fri)	Fundamentals of Machining / Australian Standards and Engineering Drawings	Online
2 (Mon/Fri)	No Lecture (Public holiday) / Overview of CAD	Online
3 (Mon/Fri)	Hole Making / Turning Processes	Online
4 (Mon/Fri)	Milling Processes / Overview of CAM	Online
5 (Mon/Fri)	No Lecture / No Lecture	Online
6 (Mon/Fri)	No Lecture / No Lecture	Online
7 (Mon/Fri)	No Lecture / No Lecture	Online
8 (Mon/Fri)	Process Planning / High Volume Manufacture	Online
9 (Mon/Fri)	No Lecture / No Lecture	Online
10 (Mon/Fri)	No Lecture / No Lecture	Online

Problem Solving Schedule

Week	Topic	Delivery Mode
1	No Class	Online
2	Australian Standards and the Engineers Who Love Them	Online
3	Engineers, Technical Operators and the Drawings Bridge That Binds Them	Online
4	Machining and its Importance in Engineering	Online
5	No Class	Online
6	No Class	Online
7	Consultation Time	Online
8	You Can Design It… Can You Build It?	Online
9	Start Ups, Commercial Manufacturers and the Processes That Drive Them	Online
10	Consultation Time	Online

6. Assessment

Assessment overview

Assessment	Group Project? (# Students per group)	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Computer-aided Design and Manufacturing Tests (2)	No	1 hour	2 x 20%	4,5,6,7	All course content from weeks 1-5 inclusive.	During week 4 and 7 CAD labs	N/A	Two weeks after test
Machining Theory Test	No	1.5 hours	15%	1,2,6,7	Topics include Fundamentals of Machining, Hole Making, Turning Processes, Milling Processes	Week 9	N/A	Two weeks after test)
CNC Machining Assessment	No	N/A	20%	3,4,5,6	All course content from weeks 1-5 inclusive.	File to be submitted in week 8. Compliance testing to be livestreamed in Week 10.	N/A	Two weeks after testing concludes
Final Report	No	2000 words	25%	1,2,6,7	All course content from weeks 1-10 inclusive.	Week 10 Fri 23:55	Week 11 Fri 23:55	Upon release of final marks

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 be available for all quizzes, tests and examinations.

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 submitting an assessment or sitting an exam.

Please note that 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.

7. Expected resources for students

- *Manufacturing Engineering and Technology*, S. Kalpakjian and S R Schmid. Prentice Hall
- *Engineering Drawing*, A. W. Boundy, McGraw Hill (7th Edition).

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.

In this course, recent improvements resulting from student feedback include redesigning marking criteria for CAD classes in such a way that focuses on process rather than outcome. Lecture content has been realigned to ensure relevance to assessment.

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, 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

10. 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

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