MMAN2130

Design and Manufacturing

Term Three // 2020

School of Mechanical and Manufacturing Engineering // UNSW Engineering

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Daniel Eggler	d.eggler@unsw.edu.au	Wednesday 14:00 - 15:00, Friday 14:00 - 15:00	Ainsworth 402H	(02) 9385 6474

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* ‰ Web

(for inbound students)

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 9 student enquiries

Course Details

Credit Points 6

Summary 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 *fmu* 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.

Course Learning Outcomes

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

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.

Additional Course Information

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.

Assessment

Detailed information on all assessments is available through Moodle.

Assessment Tasks

Assessment task	Weight	Due Date	Student Learning Outcomes Assessed
Computer-aided Design Skills	40%	Week 4/Week 7	4, 5, 6, 7
CNC Machining Assessment	25%	Week 8	3, 4, 5, 6
Report	35%	Week 10	1, 2, 6, 7

Assessment Details

Assessment 1: Computer-aided Design Skills

Start date: Not Applicable

Details:

Testing computer-aided design skills covering engineering drawings, computer-aided design and computer-aided manufacture.

Additional details:

2 x 20% tests. Test 1 and 2 will be held in Weeks 4 and 7 during the Friday lecture, respectively.

Assessment 2: CNC Machining Assessment

Start date: Not Applicable

Details:

Design, CAD, CAM and manufacture components using CNC machinery.

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Resources

Prescribed Resources

C l e g l c c p g l e B p _ u g l e, A. W. Boundy, McGraw Hill (7th Edition).

Recommended Resources

K _ l s d _ a r s p g l e C l e g l c c p g l e _ l b R c a f l m j m e w, S. Kalpakjian and S R Schmid. Prentice Hall

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.

assessment performance, you are eligible to apply for Special Consideration prior to submitting an assessment or sitting an exam.

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.

Please note that students will not be required to provide any documentary evidence to support absences from any classes missed because of COVID-19 public health measures such as

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. *Nj_eg_pgqk _r SLQU gq bcdglcb _q sqgle rfc umpbq mp gbc_q md mrfcpq _lb n_qqgle rfck mdd _q wmsp mul,*

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

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Academic Information

Credit points

Course credit is calculated in Units-Of-Credit (UOC). The normal workload expectation for one UOC is approximately 25 hours per term. This includes class contact hours, private study, other learning activities, preparation and time spent on all assessable work.

Most coursework courses at UNSW are 6 UOC and involve an estimated 150 hours to complete. Each course includes a prescribed number of hours per week (h/w) of scheduled face-to-face and/or online contact. Any additional time beyond the prescribed contact hours should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

On-campus class attendance

Public distancing conditions must be followed for all T3 face-to-face classes. To ensure this, only students enrolled in those classes will be allowed in the room. Class rosters will be attached to corresponding rooms and circulated among lab demonstrators. No over-enrolment is allowed in face-to-face class. Students enrolled in online classes can swap their enrolment from online to other additional, but limited, number of on-campus classes by Sunday, Week 1. Please refer to your course's Microsoft Teams and Moodle sites for more information about class attendance for in-person and online class sections/activities.

Your health and the health of those in your class is critically important. You must stay at home if you are sick or have been advised to self-isolate by NSW health or government authorities. Current alerts and a list of hotspots can be found here. You will not be penalised for missing a face-to-face activity due to illness or a requirement to self-isolate. We will work with you to ensure continuity of learning during your isolation and have plans in place for you to catch up on any content or learning activities you may miss. Where this might not be possible, an application for fee remission may be discussed. Further information is available on any course Moodle or Teams site.

- Approved Calculators
- Academic Honesty and Plagiarism

Important Links

- Moodle
- Lab Access
- Health and Safety
- Computing Facilities
- Student Resources

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	
Engineering application ability	