MMAN1130

Design and Manufacturing

Term 2, 2022

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Darson Li	darson.li@unsw.edu.au	Please email to book a consultation	Room 408J Ainsworth Building J17	02 9065 7643

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**

**Please note that the School Office will not know when/if your course convenor is on campus or available

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 for all student enquiries. The School will only be able to refer students on to the relevant team if contacted

Important Links

- Student Wellbeing
- Urgent Mental Health & Support
- Equitable Learning Services
- Faculty Transitional Arrangements for COVID-19
- Moodle
- Lab Access
- Computing Facilities
- Student Resources
- Course Outlines
- Makerspace
- UNSW Timetable
- UNSW Handbook

Course Details

Units of Credit 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 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 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 manufacturing (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 marvelling 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 MMAN1130 course page at https://moodle.telt.unsw.edu.au/. The second is the MMAN1130 Microsoft Teams site. All official online interactions will take place or be linked clearly and appropriately from these sites.

In class: There are three types of in-class activities in a typical week, which we refer to as the Lecture, Workshop and CAD/CAM Lab based on the timetable in the Course Schedule Section. The course content is 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 theories in engineering design and manufacturing. The lecture material is available to students electronically before each class via Microsoft Teams.

The Tutorials 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.

The CAD and CAM 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 and should be worked through in your own time before the start of each class. During the labs, the pre-lab work will be expanded upon with the opportunity to seek assistance in areas of difficulty.

Additional Course Information

This is a 6 unit-of-credit (UoC) course and involves 7 hours per week (h/w) of scheduled contact. For students enrolled in Online classes, these will be conducted via Microsoft Teams. For students enrolled in Face-to-Face classes, please check your timetable for the time and location of your classes.

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 pre-lab work and set assignments, further reading, and revising for any examinations.

Assessment

Detailed information on all assessments is available through Microsoft Teams and/or course Moodle page.

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. In-Class Tests	40%	Friday 6 pm in Weeks 4 and 7	4, 5, 6, 7
2. CNC Machining Assessment	25%	File Submission - Tuesday 9 am in Week 8, Testing - Exam Period	1, 3, 4, 5, 6
3. Final Assignment	35%	Friday 11:55 pm in Week 10	1, 2, 6, 7

Assessment 1: In-Class Tests

Start date: Friday 4 pm in Weeks 4 and 7
Assessment length: 2 hours each test
Submission notes: Required files must be submitted to Moodle as per instructions in the test paper.
Due date: Friday 6 pm in Weeks 4 and 7
Deadline for absolute fail: 5 minutes after the conclusion of the test.
Marks returned: Marks are to be returned two weeks after the test.

There are two in-class tests scheduled from 4 pm - 6 pm on Fridays in Week 4 and Week 7. The tests contain a list of short answer questions, examining your computer-aided design skills including engineering drawings, computer-aided design, and computer-aided manufacture. Each test is worth 20% of your total mark. You must make yourselves available during the set time for these tests.

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Assessment criteria

The tests consist of short answer questions that demonstrate your understanding of the course material.

Assessment 2: CNC Machining Assessment

Submission notes: CAD and CAM files to be submitted to Moodle as per assessment guidelines.
Due date: File Submission - Tuesday 9 am in Week 8, Testing - Exam Period
Deadline for absolute fail: 5 calendar days after the deadline of the assessment.
Marks returned: Marks will be returned within 1 week of testing being completed.

For this assessment, you will utilise the skills you have learnt in this course to manufacture two components using CNC Milling machines located on campus. You will design and create 3D CAD models from an engineering drawing customised to your student zID. You will then generate the necessary milling processes required to manufacture these components. These components will then be compliance tested in terms of dimensional accuracy as well as functional performance.

This is not a Turnitin assignment

Assessment criteria

You will be assessed based on your file submission, as well as the final physical product. Your files will be evaluated based on the simulation time, the CAM strategy selection, and the process efficiency. The final physical product will be examined based on the complementary design decisions, the dimensional compliance, and the fit and finish of the components. Detailed assessment criteria will be released on Moodle with the assessment guidelines.

Assessment 3: Final Assignment

Assessment length: Up to 20 pages.
Submission notes: Submission to Turnitin box on Moodle as per assessment guidelines.
Due date: Friday 11:55 pm in Week 10
Deadline for absolute fail: 5 calendar days after the due date of the assignment.
Marks returned: Marks to be returned upon release of final marks.

In this assessment, you will need to conduct a few case studies with guided questions about the link between design and manufacture, covering all course content, including engineering drawings, material and machining process selection, and high volume manufacturing considerations. You will submit a pdf document containing your responses to the guided questions on Moodle.

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Assessment criteria

You will be assessed based on your understanding and application of the course content, as well as the formatting of your submission.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

Lectures will be delivered online via Microsoft Teams and will be recorded. Workshops and CAD and CAM Labs are delivered either online or in-person based on student enrollment and are NOT recorded.

View class timetable

Timetable

Date	Type	Content
Week 1: 30 May - 3 June	Lecture	Wednesday 10 am - 12 pm: Fundamentals of Machining Friday 4 pm - 6 pm: Engineering Standards and Engineering Drawings
	Tut-Lab	CAD Labs: Sketching in SOLIDWORKS
Week 2: 6 June - 10 June	Lecture	Wednesday 10 am – 12 pm: Overview of CAD Friday 4 pm – 6 pm: Hole Making
	Workshop	Australian Standards and the Engineers Who Love Them
	Tut-Lab	CAD Labs: 3D Parts in SOLIDWORKS
Week 3: 13 June - 17 June	Lecture	Wednesday 10 am – 12 pm: Turning Processes Friday 4 pm – 6 pm: Milling Processes
	Workshop	Engineers, Technical Operators and the Drawings Bridge That Binds Them
	Tut-Lab	CAD Labs: Engineering Drawings in SOLIDWORKS
Week 4: 20 June - 24 June	Lecture	Wednesday 10 am – 12 pm: Overview of CAM
	Tut-Lab	CAM Labs: Computer-aided Manufacture (CAM)
	Assessment	Friday 4 pm – 6 pm: **Engineering Standards and Engineering Drawings Test**
Week 5: 27 June - 1 July	Workshop	Machining and its Importance in Engineering
	Tut-Lab	CAM Labs: Computer-aided Manufacture (CAM)
Week 6: 4 July - 8 July	Tut-Lab	CAD and CAM Labs: Optional Open Consultation

Week 7: 11 July - 15 July	Lecture	Wednesday 10 am – 12 pm: Open Consultation
	Tut-Lab	CAD Labs: Assemblies and Mates
	Assessment	Friday 4 pm – 6 pm: **CAD and CAM Test**
Week 8: 18 July - 22 July	Lecture	Wednesday 10 am – 12 pm: Process Planning Friday 4 pm – 6 pm: High Volume Manufacture - Part I
	Workshop	You can Design It... Can You Build It?
	Tut-Lab	CAD and CAM Labs: Open Consultation
	Assessment	CNC Machining Assessment File Submission Due.
Week 9: 25 July - 29 July	Lecture	Wednesday 10 am – 12 pm: High Volume Manufacture - Part II
	Tut-Lab	CAD and CAM Labs: Open Consultation
Week 10: 1 August - 5 August	Lecture	Wednesday 10 am – 12 pm: Open Consultation
	Tut-Lab	CAD and CAM Labs: Open Consultation
	Assessment	Final Assignment Submission Due.

Resources

Prescribed Resources

Engineering Drawing, A. W. Boundy, McGraw Hill (8th Edition).

Recommended Resources

Manufacturing Engineering and Technology, S. Kalpakjian and S. R. Schmid, Pearson (8th Edition).

UNSW Library website: https://www.library.unsw.edu.au/

Moodle: https://moodle.telt.unsw.edu.au/login/index.php

Microsoft
Teams:
https://teams.microsoft.com/l/team/19%3aKIuARGpjH1rY3uQ22pdtYc8dNraCmhWeS8t0KLiPtFg1%40thread.tacv2/conversations?groupId=ec481716-4a0f-4924-a5f6-e6b45e26f14b&tenantId=3ff6cfa4-e715-48db-b8e1-0867b9f9fba3

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 very seriously, and continual improvements are made to the course based, in part, on such feedback.

You can also provide anonymous feedback at any time during the term via https://forms.office.com/r/eK8QqKRtqp

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

Submission of Assessment Tasks

Assessment submission and marking criteria

Should the course have any non-electronic assessment submission, these should have a standard School cover sheet.

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.

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.

Late policy

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) 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. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For example:

- Your course has an assessment task worth a total of 100 marks.
- You submit the assessment 2 days (or part thereof) late (i.e. from 24-48 hours after the deadline).
- The submission is graded and awarded a mark of 65/100.
- A late penalty of 10 marks is deducted from your awarded mark (2 days @ 5% of 100 marks).
- Your adjusted final score is 55/100.

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:

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

Examinations

You must be available for all quizzes, tests and examinations. For courses that have final examinations,

these are held during the University examination periods: February for Summer Term, May for T1, August for T2, and November/December for T3.

Please visit myUNSW for Provisional Examination timetable publish dates. For further information on exams, please see the Exams webpage.

Special Consideration

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.

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 isolation**. UNSW will **not** be insisting on medical certificates from anyone deemed to be a positive case, or when they have recovered. Such certificates are difficult to obtain and put an unnecessary strain on students and medical staff.

Applications for special consideration **will** be required for assessment and participation absences – but no documentary evidence **for COVID-19 illness or isolation** will be required.

Special Consideration Outcomes

Assessments have default Special Consideration outcomes. The default outcome for the assessment will be advised when you apply for Special Consideration. Below is the list of possible outcomes:

Outcome	Explanation	Example
Time extension	Student provided more time to submit the assessment	e.g. 1 more week of time granted to submit a report
Supplementary assessment	Student provided an alternate assessment at a later date/time	e.g. a supplementary exam is scheduled during the supplementary exam period of the term
Substitute item	The mark for the missed assessment is substituted with the mark of another assessment	e.g. mark for Quiz 1 applied also applied as mark for Quiz 2, meaning if a student achieved a mark of 20/30 for Quiz 1 and was granted Special Consideration for Quiz 2, a mark of 20/30 would be applied for Quiz 2, etc
Exemption	All course marks are recalculated excluding this assessment and its weighting	e.g. The course has an assessment structure of: - Assignments 30%, - Lab report 30%, - Final Exam 40%. If the Lab report is missed and student is granted Special Consideration, then the assessment structure may be reweighted as follows: - Assignments 50% - Final Exam 50% as though the Lab report did not exist
Non-standard	Course Coordinator is contacted for the outcome when special consideration is granted as the outcome differs on a case-by-case basis	e.g. typical for group assessments where time extension supplementary assessment could be granted to the group member, time extension could be granted to the whole group, etc. Clarify with your Course Convenor for

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

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, for both regular and intensive terms. 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

****T1-2022 UPDATE****
- -

Public distancing conditions must be followed for all face-to-face classes. To ensure this, only students enrolled in those classes will be allowed in the room. No over-enrolment is allowed in face-to-face classes. Students enrolled in online classes can swap their enrolment from online to 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.

In certain classroom and laboratory situations where physical distancing cannot be maintained or there is a high risk that it cannot be maintained, face masks will be considered **mandatory PPE** for students and staff.

For more information, please refer to the
FAQs: https://www.covid-19.unsw.edu.au/safe-return-campus-faqs

Guidelines

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

Note: This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit

https://interestingengineering.com/9-most-satisfying-cnc-milling-machine-videos-on-the-internet

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

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	
PE2.1 Application of established engineering methods to complex engineering 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	
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	✓
PE3.2 Effective oral and written communication in 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	