UNSW Course Outline

MMAN1130 Design and Manufacturing - 2024

Published on the 30 Aug 2024

General Course Information

Course Code : MMAN1130
Year : 2024
Term : Term 3
Teaching Period : T3
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Mechanical and Manufacturing Engineering
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Have you ever wondered how devices and machines are manufactured with such precision? Have you pondered over the manufacturing process involved in creating robotic movements and appendages? All of this is possible due to fundamental machining methods. Without

understanding the physical construction of our designs, it is impossible to create successful prototypes and products.

In this course, you will learn how to create graphical outputs such as 3D models and engineering drawings that facilitate design solutions. Additionally, you will acquire the skills necessary to take your computer-aided design (CAD) model from the virtual world and machine it on a computer numerical control (CNC) machine. By the end of the term, you will have the skills and knowledge to marvel at your own machined creation.

Course Aims

This course aims to help you understand how machining processes influence design. You will be taught fundamental machining processes such as turning, milling, and hole making, and not just learn about them but also how to use them to physically build componentry. The course content seamlessly integrates practical, hands-on learning with critical computer-aided design (CAD) and computer-aided manufacturing (CAM) skills.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Identify which manufacturing processes must be used to create desired products.
CLO2 : Explain how manufacturing processes impact design and production.
CLO3 : Operate fundamental metalworking machinery to generate components.
CLO4 : Prepare components for manufacture using CAM software.
CLO5 : Construct CAD models and engineering drawings from real world inputs.
CLO6 : Interpret engineering drawings to drive manufacturing processes.
CLO7 : Recognise the role Australian Standards play in engineering practice.

Course Learning Outcomes	Assessment Item
CLO1 : Identify which manufacturing processes must be used to create desired products.	• Practical lab work • CNC Machining Assessment • Final Assignment
CLO2 : Explain how manufacturing processes impact design and production.	• CNC Machining Assessment • Final Assignment
CLO3 : Operate fundamental metalworking machinery to generate components.	• Practical lab work • CNC Machining Assessment
CLO4 : Prepare components for manufacture using CAM software.	• In-Class Tests • CNC Machining Assessment
CLO5 : Construct CAD models and engineering drawings from real world inputs.	• In-Class Tests • Final Assignment • CNC Machining Assessment
CLO6 : Interpret engineering drawings to drive manufacturing processes.	• Practical lab work • In-Class Tests • Final Assignment • CNC Machining Assessment
CLO7 : Recognise the role Australian Standards play in engineering practice.	• In-Class Tests • Final Assignment

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams | EdStem

Learning and Teaching in this course

There are three types of in-class activities in a typical week, which we refer to as the 'Lecture', 'Lab', and 'Practical' based on the timetable in the Course Schedule Section.

- 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 via Microsoft Teams.
- The Labs (Tutorial-Laboratory) are designed to allow you to practise critical software 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.
- The 'Practicals' (Project) run from Week 1 to Week 5 only and are hands-on learning sessions focusing on the use of measurement tools, hand tools, and machining processes. Attendance to these sessions are mandatory for the completion of Assessment 1.

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.

Additional Course Information

This is a 6 unit-of-credit (UoC) course and involves 6.5 hours per week (h/w) of scheduled contact. Please check your timetable on myUNSW 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 15 h/w on this course. The additional time should be spent on making sure that you understand the lecture material, completing the pre-lab work and set assignments, further reading, and revising for any examinations.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Practical lab work Assessment Format: Individual	10%	Start Date: Not Applicable Due Date: PRJ Class Time from Week 1 to Week 5
In-Class Tests Assessment Format: Individual	40%	Start Date: 2:15 pm on Friday Week 4 and Week 7. Due Date: 4:15 pm on Friday Week 4 and Week 7.
CNC Machining Assessment Assessment Format: Individual	25%	Start Date: Not Applicable Due Date: File Submission - Monday 11:55 pm in Week 8, Testing - Exam Period
Final Assignment Assessment Format: Individual	25%	Start Date: Not Applicable Due Date: Friday 11:55 pm in Week 10

Assessment Details

Practical lab work

Assessment Overview

This assessment is a practical, hands-on evaluation conducted during the PRJ classes from Week 1 to Week 5. The focus of the assessment is on the use of measurement devices, hand tools, and metal-working machinery. Students will be guided to perform a series of tasks that involve these tools and machines in class. The assessment criteria are based on students' practical skills in using these tools and machinery, as well as the quality of the physical products that students produce during these in-class activities.

Marking takes place during class time, and formal feedback on students' performance will be provided verbally during class.

Course Learning Outcomes

- CLO1 : Identify which manufacturing processes must be used to create desired products.
- CLO3 : Operate fundamental metalworking machinery to generate components.
- CLO6 : Interpret engineering drawings to drive manufacturing processes.

Detailed Assessment Description

You must attend all PRJ sessions from Week 1 to Week 5 to complete this assessment.

Assessment Length

5 hours class contact.

Submission notes

Required work must be submitted as instructed during class.

Criteria with marking rubric

Criteria: Accuracy of measurement.

Fail -

Pass -

Credit -

Distinction -

High Distinction -

Criteria: Use of hacksaws and files.

Fail -

Pass -

Credit -

Distinction -

High Distinction -

Criteria: Filleting and chamfering.

Fail -

Pass -

Credit -

Distinction -

High Distinction -

Criteria: Tapping.

Fail -

Pass -

Credit -

Distinction -

High Distinction -

Criteria: Attending the turning processes demonstration.

Fail -

Pass -

Credit -

Distinction -

High Distinction -

Criteria: Attending the milling processes demonstration.

Fail -

Pass -

Credit -

Distinction -

High Distinction -

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

Not Applicable

Generative AI is not considered to be of assistance to you in completing this assessment. If you do use generative AI in completing this assessment, you should attribute its use.
For more information on Generative AI and permitted use please see here.

In-Class Tests

Assessment Overview

Assessment length: 2 hours each test.

There are two in-class tests scheduled. The tests contain short answer questions and practical tasks, examining your understanding of course content, including engineering standards, engineering drawings, computer-aided design, and computer-aided manufacture. Each test is worth 20% of your total mark.

Marking will be against specific criteria in a marking guide, and formal feedback on your assessment task will be provided within two weeks from the date of the test on Moodle.

Course Learning Outcomes

- CLO4 : Prepare components for manufacture using CAM software.
- CLO5 : Construct CAD models and engineering drawings from real world inputs.
- CLO6 : Interpret engineering drawings to drive manufacturing processes.
- CLO7 : Recognise the role Australian Standards play in engineering practice.

Assessment Length

2 hours each test.

Submission notes

Required files must be submitted to Moodle as per instructions in the test paper.

Assessment information

You have two hours to complete the test **and** upload your files. Ensure you leave enough time for the submission process. This is your responsibility. **Late submissions under 5 minutes will incur a 50% penalty. Late submissions after 5 minutes will receive a zero grade.**

Deadline for absolute fail: 5 minutes after the submission deadline of the test.

Assignment submission Turnitin type

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

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.
For more information on Generative AI and permitted use please see here.

CNC Machining Assessment

Assessment Overview

For this assessment, you will utilise the skills you learned in this course to manufacture a set of 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 tested in terms of dimensional accuracy as well as functional performance.

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.

Formal feedback on your file submission will be provided on Moodle within 14 days from the due date of the assignment. Feedback on the final product will be provided during the testing event in the exam period.

Course Learning Outcomes

- CLO1 : Identify which manufacturing processes must be used to create desired products.
- CLO2 : Explain how manufacturing processes impact design and production.
- CLO3 : Operate fundamental metalworking machinery to generate components.
- CLO4 : Prepare components for manufacture using CAM software.
- CLO5 : Construct CAD models and engineering drawings from real world inputs.
- CLO6 : Interpret engineering drawings to drive manufacturing processes.

Assessment Length

NA

Submission notes

CAD and CAM files to be submitted to Moodle as per assessment guidelines.

Assessment information

You will be required to attend a full-day event in person (with a one-hour window) during the exam period to test your prototype. Failure to attend this event will result in a loss of marks.

Deadline for absolute fail: 5 days after the submission deadline.

Assignment submission Turnitin type

This is not a Turnitin assignment

Generative AI Permission Level

Not Applicable

Generative AI is not considered to be of assistance to you in completing this assessment. If you do use generative AI in completing this assessment, you should attribute its use.
For more information on Generative AI and permitted use please see here.

Final Assignment

Assessment Overview

Assessment length: Up to 20 pages.

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 processes, process planning documents, measurement and hand tools, and high-volume manufacturing considerations. You will submit a pdf document containing your responses to the guided questions, together with your CAD models.

Assessment criteria

Marking will be against specific criteria in a marking guide, and formal feedback on your assessment task will be provided upon the release of the final course grade on Moodle.

Course Learning Outcomes

- CLO1 : Identify which manufacturing processes must be used to create desired products.
- CLO2 : Explain how manufacturing processes impact design and production.
- CLO5 : Construct CAD models and engineering drawings from real world inputs.
- CLO6 : Interpret engineering drawings to drive manufacturing processes.
- CLO7 : Recognise the role Australian Standards play in engineering practice.

Assessment Length

Up to 20 pages.

Submission notes

Submit your files to two separate assignment submission boxes on Moodle as per assessment guidelines.

Assessment information

Deadline for absolute fail: 5 days after the submission deadline.

Assignment submission Turnitin type

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

Generative AI Permission Level

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.
If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.
For more information on Generative AI and permitted use please see here.

General Assessment Information

Detailed information on all assessments is available on the course Moodle page.

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	Tuesday: Engineering Standards Friday: Engineering Drawings
	Tut-Lab	Sketching in SOLIDWORKS
	Project	Measurement Tools Location: Undergraduate Teaching Lab (Room 214A) in Willis Annexe J18
Week 2 : 16 September - 22 September	Lecture	Tuesday: Fundamentals of Machining Friday: Hole Making
	Tut-Lab	3D Parts in SOLIDWORKS
	Project	Hand Tools Location: Undergraduate Teaching Lab (Room 214A) in Willis Annexe J18
Week 3 : 23 September - 29 September	Lecture	Tuesday: Turning Processes Friday: Milling Processes
	Tut-Lab	Engineering Drawings in SOLIDWORKS
	Project	Project Work Submission and Marking. Location: Undergraduate Teaching Lab (Room 214A) in Willis Annexe J18
Week 4 : 30 September - 6 October	Lecture	Tuesday: Overview of CAM
	Tut-Lab	Computer-aided Manufacture (CAM) in Fusion 360
	Project	Turning Processes. Location: Workshop (Room 119) in Willis Annexe J18
	Assessment	Friday 2 pm – 4:30 pm: Engineering Standards and Engineering Drawings Test
Week 5 : 7 October - 13 October	Lecture	Tuesday: Tolerances and Fit Friday: Guest Lecture: Design and Manufacture - A Machinist Perspective
	Tut-Lab	Computer-aided Manufacture (CAM) in Fusion 360
	Project	Milling Processes. Location: Workshop (Room 119) in Willis Annexe J18
Week 6 : 14 October - 20 October	Online Activity	Optional Open Consultations
Week 7 : 21 October - 27 October	Lecture	Tuesday: Open Consultation for CAD and CAM Test and CNC Machining Assessment
	Tut-Lab	Assemblies and Mates in SOLIDWORKS
	Assessment	Friday 2 pm – 4:30 pm: CAD and CAM Test
Week 8 : 28 October - 3 November	Lecture	Tuesday: Process Planning Friday: High Volume Manufacture - Part I
	Tut-Lab	Assembly Drawings in SOLIDWORKS
	Assessment	CNC Machining Assessment File Submission Due.
Week 9 : 4 November - 10 November	Lecture	Tuesday: High Volume Manufacture - Part II Friday: Industry Guest Lecture: David Murray from Volkswagen Australia
	Tut-Lab	Final Assignment Help Session
Week 10 : 11 November - 17 November	Lecture	Tuesday: Open Consultation for Final Assignment Friday: No lecture.
	Tut-Lab	Open Consultation
	Assessment	Final Assignment Submission Due.

Attendance Requirements

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

General Schedule Information

Lectures will be delivered online via Microsoft Teams with an in-person attendance option (pre-registration required). Lectures are recorded.

Labs (TUT-LAB) are delivered face-to-face in a computer lab and are NOT recorded. Please refer to your timetable on myUNSW for the time and location of your lab sessions.

Praticals (PRJ) are delivered face-to-face in the Undergraduate Teaching Lab and the Workshop in Willis Annexe J18, and are NOT recorded. Attendance to these class are mandatory for the completion of **Assessment 1** - Practical lab work.

Course Resources

Prescribed Resources

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

Prescribed Software: SOLIDWORKS 2023, Fusion 360 and Microsoft Teams.

Recommended Resources

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

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.

In this course, recent improvements resulting from student feedback include publishing sample solutions to weekly CAD and CAM exercises, introducing more hands-on activities, and redesigning marking criteria for assignments to focus on the process rather than the outcome.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Darson Li		Room 408J Ainsworth Building J17			Yes	Yes
Lecturer	Leigh Huang					No	No
Head demonstrator	Jessie Lum					No	No
Administrator	Shiva Abdoli					No	No

Other Useful Information

Academic Information

I. 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, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, 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.

II. 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

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: https://www.unsw.edu.au/engineering/student-life/student-resources/program-design.

Note: This course outline sets out the 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 or your primary learning management system (LMS) 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/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagarism

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.

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 or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

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 some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

Engineering Student Support Services – The Nucleus - enrolment, progression checks, 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

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)

School-specific Information

Short Extensions

Short extensions are not currently applicable to Mechanical and Manufacturing Engineering Courses.

Review of Results

If you believe that there has been a marking error, you can request a review of results. Review of results cannot be used to get feedback.

If you would like feedback for assessments, you are welcome to contact the course convenor directly.

Use of AI

The use of AI is prohibited unless explicitly permitted by the course convenor. Please respect this and be aware that penalties will apply when unauthorised use is detected, such as through Turnitin. If the use of generative AI, such as ChatGPT, is allowed in a specific assessment, they must be properly credited, and your submissions must be substantially your own work.

Final Exam in Exam Period

For courses with a centrally timetabled final exam, students must be available for the entire exam period from Mon-Sat until your exact exam date is confirmed.

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