UNSW Course Outline

MANF9543 Computer Aided Design / Computer Aided Manufacture - 2024

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General Course Information

Course Code : MANF9543
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 : Postgraduate
Units of Credit : 6

Useful Links

[Handbook](#) [Class Timetable](#)

Course Details & Outcomes

Course Description

This course teaches students the principles and applications of CAD/CAM in product and

manufacturing design and is highly relevant to future trends in automation and manufacturing processes. It teaches the underlying theory of CAD/CAM, but most importantly teaches students the skills needed to design using CAD/CAM. The School operates a number of design platforms, most notably SolidWorks and Autodesk Fusion 360 software. The course teaches the essential steps that one takes to develop a product from concept to manufacture starting with CAD, and progressing to simulation, using CAM and CAE software support.

Course Aims

This course will enable students to explore and gain further understanding of how CAD/CAM can be used in Manufacturing Industry. This course will also provide students with opportunity to explore innovation in design using SolidWorks, Fusion 360 and the Denford CAM software.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Apply systematic design principles such as "Axiomatic Design" and "VDI-2221" as part of designing automated industrial machines and processes.
CLO2 : Apply appropriate CAD/CAM software to design a component and generate the CNC code to manufacture that component using CNC manufacturing technology.
CLO3 : Apply CNC technology and other prototyping manufacturing technologies such as 3D printing to manufacture components and systems within specifications as well as with optimised machine pathways.

Course Learning Outcomes	Assessment Item
CLO1 : Apply systematic design principles such as "Axiomatic Design" and "VDI-2221" as part of designing automated industrial machines and processes.	• Team Project • VIVA Assessment
CLO2 : Apply appropriate CAD/CAM software to design a component and generate the CNC code to manufacture that component using CNC manufacturing technology.	• Quizzes x 2 • Team Project • VIVA Assessment
CLO3 : Apply CNC technology and other prototyping manufacturing technologies such as 3D printing to manufacture components and systems within specifications as well as with optimised machine pathways.	• Quizzes x 2 • Team Project • VIVA Assessment

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Team Project Assessment Format: Group	30%	Start Date: Week 4 Lecture Due Date: Week 10 Friday COB
VIVA Assessment Assessment Format: Individual	15%	Start Date: Week 4 Lecture Due Date: Week 5 Friday 5PM
Quizzes x 2 Assessment Format: Individual	55%	Start Date: N/A Due Date: Week 4 and 9 - see MyUNSW Timetable

Assessment Details
Team Project

Assessment Overview

Student will form a team (max. 4 members per team) to work on a team project that involves the design, analysis, manufacture and testing of an engineering product. Student teams are to present their work in the form of a portfolios and accompany with a product compliance testing session.

Assessment criteria

- Part A – Prototype testing - STL file (5%)
- Part B – Group Report (10%)
- Weekly progress evaluation in assigned time slot during tutorial (5%)

The weekly progress evaluation involves academics meeting with student teams where on-the-spot feedback will be provided to help student teams to improve on the team project.

Marking rubrics for Part A and B will be provided BEFORE the assessments are completed.

Course Learning Outcomes

- CLO1 : Apply systematic design principles such as "Axiomatic Design" and "VDI-2221" as part of designing automated industrial machines and processes.
- CLO2 : Apply appropriate CAD/CAM software to design a component and generate the CNC code to manufacture that component using CNC manufacturing technology.
- CLO3 : Apply CNC technology and other prototyping manufacturing technologies such as 3D printing to manufacture components and systems within specifications as well as with optimised machine pathways.

<u>Detailed Assessment Description</u>

The weighting and description in the 'Assessment Overview' is updated. Please refer below for the updated weighting and description.

Weekly evaluation: (10%)

From week 7 to week 9 (inclusive), student team will be evaluated on their progress for the major assignment. Student must be physically present to receive grade for the weekly evaluation. Feedback will be provided on-the-spot.

Final Report (20%)

A report template will be provided for each team to complete the final report. Please refer to the template for mark distribution for each part of the report.

<u>Submission notes</u>

One submission per team on Moodle

<u>Assignment submission Turnitin type</u>

Not Applicable

<u>Generative AI Permission Level</u>

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.

VIVA Assessment

<u>Assessment Overview</u>

Student will conducting an individual VIVA assessment to demonstrate their understanding and knowledge of CAD/CAM in the team project.

Marking rubrics will be provided BEFORE the assessments is completed.

Course Learning Outcomes

- CLO1 : Apply systematic design principles such as "Axiomatic Design" and "VDI-2221" as part of designing automated industrial machines and processes.
- CLO2 : Apply appropriate CAD/CAM software to design a component and generate the CNC code to manufacture that component using CNC manufacturing technology.
- CLO3 : Apply CNC technology and other prototyping manufacturing technologies such as 3D printing to manufacture components and systems within specifications as well as with optimised machine pathways.

Detailed Assessment Description

The weighting and description in the 'Assessment Overview' is updated. Please refer below for the updated weighting and description.

Each student produces a 3D printed prototype that will undergo destructive testing. Each student will be provided with a target load to reach in the destructive testing. Mark will be assigned based on whether their product meet the design specification and how close the target load is met. You will receive on-the-spot feedback for this assessment.

Each student needs to submit a 'STL' file containing their design by Week 5, Tuesday, by 5PM.

Testing will be conducted in Week 6, Friday from 9AM to 12PM.

Assessment Length

N/A

Submission notes

One STL file per student on Moodle

Assignment submission Turnitin type

Not Applicable

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.

Quizzes x 2

Assessment Overview

Assessment length: 2 hours per quiz

Students are to complete two individual online quizzes. Quiz 1 examines students' skill in CAD, and Quiz 2 examines student skill in both CAD and CAM. Assessment criteria Marking rubrics will be announced.

Assessment criteria

Quiz 1 (25%): The assessment will be graded based on the quality of the 3D Part/Assembly and 2D Engineering Drawing, specifically on:

- Level of completion
- Number and accuracy of features included
- Proportion of the part and drawing

Quiz 2 (30%): The assessment will be graded based on the quality of the CAM part, specifically on:

- Order of the operations
- Correct use of operations
- Appropriate feed rate and spindle rate
- Correct choice of tools

Marking rubrics will be provided AFTER the assessments are completed.

Course Learning Outcomes

- CLO2 : Apply appropriate CAD/CAM software to design a component and generate the CNC code to manufacture that component using CNC manufacturing technology.
- CLO3 : Apply CNC technology and other prototyping manufacturing technologies such as 3D printing to manufacture components and systems within specifications as well as with optimised machine pathways.

Detailed Assessment Description

Student must be physically present in the School computer lab for all quizzes. Failure to attend the quiz in-person will automatically result in zero grade for that assessment.

Assessment Length

90 minutes

Assignment submission Turnitin type

Not Applicable

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.

General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	• CAD VS CAM CS CAE • Basic CAD modellings • Basic 2D engineering drawings
	Tutorial	• Part modelling exercise in Solidworks Part 1 • 2D engineering drawing exercise in Solidworks Part 1
Week 2 : 16 September - 22 September	Lecture	• Advanced CAD modellings • Using 'callout' in 2D engineering drawings • Construct assemblies in Solidworks
	Tutorial	• Part modelling exercise in Solidworks Part 2 • 2D engineering drawing exercise in Solidworks Part 2 • Part and assembly engineering drawings exercise
Week 3 : 23 September - 29 September	Lecture	• Apply the basic design framework - VDI-2221 • Introduction to rapid prototyping - 3D printing
	Tutorial	• Practice CAD exam
Week 4 : 30 September - 6 October	Lecture	• Introduction to the major assignment • CAD Exam Revision and Q&A
	Tutorial	• Team forming • Brainstorm idea on the major assignment • Product design for the major assignment in Solidworks
	Assessment	• CAD Exam in the School Computer Lab
Week 5 : 7 October - 13 October	Lecture	• Introduction to injection moldings • Molding tool in Solidworks
	Tutorial	• Continue working on the major assignment
	Assessment	• Major assignment product STL file submission
Week 6 : 14 October - 20 October	Lecture	• Introduction to 2D and 3D CAM operations • Learn how to use Fusion360 Manufacturing
	Tutorial	• 2D operations exercise in Fusion360 • Continue working on the major assignment
Week 7 : 21 October - 27 October	Lecture	• Advanced CAM operations in Fusion360
	Tutorial	• 3D operations exercise in Fusion360 • Continue working on the major assignment
	Assessment	• Weekly progress check for major assignmnet
Week 8 : 28 October - 3 November	Lecture	• Major assignment consultation
	Tutorial	• Practice CAM exam
	Assessment	• Weekly progress check for major assignmnet
Week 9 : 4 November - 10 November	Lecture	• Major assignment consultation • CAM exam consultation
	Tutorial	• Major assignment consultation
	Assessment	• CAM Exam in the School Computer Lab
	Assessment	• Weekly progress check for major assignmnet
Week 10 : 11 November - 17 November	Lecture	• Major assignment consultation • Warp-up session of the course
	Tutorial	• Major assignment consultation

Attendance Requirements

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

Course Resources

Course Evaluation and Development

The 3D printing and testing assessment has been proven engaging and successful, this year students are given a target load for their prototype that involves in-depth critical think and planning to further improve the 'hands-on' experience.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Ronald Ting Tai Chan		ME507	Contact via MS Teams	Contact via MS Teams	Yes	Yes

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](#)