UNSW Course Outline

MMAN4200 Additive Manufacturing - 2024

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General Course Information

Course Code : MMAN4200
Year : 2024
Term : Term 2
Teaching Period : T2
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, Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Additive manufacturing, also known as 3D printing, is an emerging advanced manufacturing technique which has enjoyed a rapid growth in recent years.

This course will introduce you to the fundamental aspects of additive manufacturing. This course will focus on various additive manufacturing techniques where you will gain basic knowledge and theory about the history, development and fundamental engineering aspects of this technique. You will also cover additive manufacturing process optimization including the selection and use of materials as well as look at the current major applications where additive manufacturing is used in addition to investigating the future development of this emerging manufacturing technique

Course Aims

This course aims to provide an introduction to the fundamental and important aspects of additive manufacturing, in terms of additive manufacturing techniques, additive manufacturing process optimization and design for additive manufacturing. This course will also offer the students first-hand experience in additive manufacturing techniques.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Understand the fundamental basis and nature of additive manufacturing techniques
CLO2 : Explain the principles and develop a systematic plan for additive manufacturing process optimisation
CLO3 : Plan and execute appropriate design process for additive manufacturing
CLO4 : Relate additive manufacturing to other manufacturing techniques

Course Learning Outcomes	Assessment Item
CLO1 : Understand the fundamental basis and nature of additive manufacturing techniques	• Final exam • Online quizzes • Assignment 1 • Lab project
CLO2 : Explain the principles and develop a systematic plan for additive manufacturing process optimisation	• Final exam • Online quizzes • Assignment 1 • Lab project
CLO3 : Plan and execute appropriate design process for additive manufacturing	• Final exam • Online quizzes • Assignment 1 • Lab project
CLO4 : Relate additive manufacturing to other manufacturing techniques	• Final exam • Online quizzes • Assignment 1 • Lab project

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Additional Course Information

The lectures from week 1 to 4 will focus on various additive manufacturing techniques up to date where you will gain basic knowledge about the history, development and fundamental engineering aspects of this technique. The lecture in week 8 will be a presentation on the lab project. The lecture in week 9 will cover additive manufacturing process optimization, including materials for additive manufacturing, properties of additive manufacturing fabricated components, and applications of additive manufacturing, e.g. aerospace, automotive, biomedical, and arts and design. Week 9 will also cover additive manufacturing design where you will use commercially available software to design advanced structures for additive manufacturing. The lectures in week 10 will introduce current major applications of additive manufacturing and provide a perspective for future development of this emerging manufacturing technique.

Aside from lectures and workshops, this course also includes demonstrations where you will have first-hand experience in various additive manufacturing machines available in the School of Mechanical and Manufacturing Engineering.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Final exam Assessment Format: Individual	40%	
Online quizzes Assessment Format: Individual	10%	
Assignment 1 Assessment Format: Individual Short Extension: Yes (1 day)	25%	
Lab project Assessment Format: Group Short Extension: Yes (1 day)	25%	

Assessment Details

Final exam

Assessment Overview

Assessment length: 8 questions, 2 hours

Course Learning Outcomes

- CLO1 : Understand the fundamental basis and nature of additive manufacturing techniques
- CLO2 : Explain the principles and develop a systematic plan for additive manufacturing process optimisation
- CLO3 : Plan and execute appropriate design process for additive manufacturing
- CLO4 : Relate additive manufacturing to other manufacturing techniques

Assessment Length

8 questions, 2 hours

Assessment information

Deadline for absolute fail is n/a

Online quizzes

Assessment Overview

Assessment length: 2 quiz questions for each week, 1 hour each

Online quizzes based on weekly lectures

Course Learning Outcomes

- CLO1 : Understand the fundamental basis and nature of additive manufacturing techniques
- CLO2 : Explain the principles and develop a systematic plan for additive manufacturing process optimisation
- CLO3 : Plan and execute appropriate design process for additive manufacturing
- CLO4 : Relate additive manufacturing to other manufacturing techniques

Assessment Length

2 quiz questions for each week, 1 hour

Submission notes

Submitted via Moodle

Assessment information

Deadline for absolute fail is each Thursday 10 am Sydney time. Marks will be returned with one week.

Assignment 1

Assessment Overview

Assessment length: 3500 words

This assignment requires each student or a group of students (depending on the number of the enrolled students) to write an essay based on given topics about additive manufacturing. The topics will be provided.

Content should include: history and current status of additive manufacturing of metallic

materials for certain applications, the advantages and disadvantages of additive

manufacturing of metals for certain applications, major additive manufacturing

techniques being used to produce metal parts for certain applications, an

example of additive manufactured metal parts for certain applications, current

limitations in additive manufacturing of metals for certain applications, your

own ideas about the future development of additive manufactured metal parts for certain applications.

Course Learning Outcomes

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- CLO3 : Plan and execute appropriate design process for additive manufacturing
- CLO4 : Relate additive manufacturing to other manufacturing techniques

Assessment Length

3500 words

Submission notes

Submission via Moodle

Assessment information

Deadline for absolute fail is 5 days after due date. Marks will be returned with two weeks.

Lab project

Assessment Overview

Assessment length: 1 group presentation and project report

The students will be divided into several groups and a flexible and little project will be given to each group. Each project will be focused on polymer or metal additive manufacturing where you will need to design and fabricate a real component using the 3D printers in the lab. You will also need to talk about how your group work together to design and fabricate the component using 3D printer in your group presentation. The assessment for the project will be based on the team work, your understanding of the 3D printing process, the quality of the final component your group print and the group presentation. The lab project will be in hybrid mode (online and in-person options).

The assessment for the project will be based on:

(1) The team work;

(2) Your understanding of the 3D printing process;

(3) How you design your part;

(4) The quality of the final component your group print; and

(5) The group presentation.

Our demonstrators will also mark you during the lab activities and raise several questions regarding your lab project and knowledge of 3D printing.

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- CLO3 : Plan and execute appropriate design process for additive manufacturing
- CLO4 : Relate additive manufacturing to other manufacturing techniques

Assessment Length

1 group presentation and project report

Submission notes

Submission via Teams

Assessment information

Deadline for absolute fail is 5 days after due date. Marks will be returned with two weeks.

General Assessment Information

The final exam will be invigilated.

Grading Basis

Standard

Course Schedule

Attendance Requirements

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

Course Resources

Recommended Resources

a. UNSW Library website: https://www.library.unsw.edu.au/ b. Moodle: https://moodle.telt.unsw.edu.au/login/index.php

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.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Xiaopeng Li		Room 311B, J17		Microsoft Teams Video Chat Hours: Thursday 1500-1700	No	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

The purpose of a review of results is if there was a marking error. Review of results is for when you have cause to believe that there is a marking error. Review of Results cannot be used to get feedback. If you would like feedback for assessments prior to the final exam, you are welcome to contact the course convenor directly. No feedback will be provided on final exams.

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.

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