MECH6005

Advanced Manufacturing Engineering

Session 1, In person-scheduled-weekday, North Ryde 2025

School of Engineering

Contents

General Information

Unit convenor and teaching staff
Course Convenor & Lecturer
Amy Fakhfouri
amy.fakhfouri@mq.edu.au
Room 240, 3MD
Wednesday 12:00-2:00pm

Credit points
10

Prerequisites

Corequisites

Co-badged status

Unit description
This unit provides knowledge and skills of contemporary and advanced manufacturing techniques utilized in the production of polymers, ceramics, composites, and metal products. The unit offers comprehensive insights into the intricacies of various manufacturing processes and their specific requirements across diverse engineering design applications. Upon completion of this unit, students will exhibit a comprehensive understanding of the merits and demerits associated with distinct manufacturing methods in addition to demonstrating their capability of discerning the most optimal manufacturing strategies for engineering products, while also being attuned to the associated cost implications and sustainability factors.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals (UNSDGs) Industry, Innovation and Infrastructure; Responsible Consumption and Production

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Demonstrate the ability to effectively apply advanced knowledge in evaluating and assessing manufacturing processes for various engineering materials.

ULO2: Integrate manufacturing processes including techniques of assemblies to

produce complex engineering products.

ULO3: Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.

ULO4: Apply and analyse the application of innovative manufacturing techniques.

ULO5: Display proficiency in applying problem-solving techniques aligned with industry requirements.

General Assessment Information

Final examination

Assessment Type [1]: Examination

Indicative Time on Task [2]: 40 hours

Due: **Exam period**

Weighting: **30%**

The final examination will cover all the content taught in the unit.

On successful completion you will be able to:

- Draw upon in-depth knowledge to critique and appraise manufacturing processes for different engineering materials.
- Integrate manufacturing processes including techniques of assemblies to produce complex engineering products.
- Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.
- Apply and analyse the application of innovative manufacturing techniques.

Fieldtrip Report

Assessment Type [1]: Report

Indicative Time on Task [2]: 10 hours

Due: **Week 10**

Weighting: **20%**

This activity aims to help students understand real-work manufacturing techniques covered in the lectures. Students are expected to submit a report and reflect on the core manufacturing activities they watched during the trip. This assessment task is compulsory.

On successful completion you will be able to:

- Draw upon in-depth knowledge to critique and appraise manufacturing processes for different engineering materials.
- Integrate manufacturing processes including techniques of assemblies to produce complex engineering products.
- Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.
- Apply and analyse the application of innovative manufacturing techniques.

SGTA

Assessment Type [1]: Practice-based task

Indicative Time on Task [2]: 0 hours

Due: **Weekly**

Weighting: 10**%**

Development of knowledge and skills in engineering requires continual practice at authentic tasks. In each weekly SGTA class, you will undertake a range of relevant problems and discussion. Contribution to these tasks will be recorded by teaching staff to constitute this grade.

On successful completion you will be able to:

- Draw upon in-depth knowledge to critique and appraise manufacturing processes for different engineering materials.
- Integrate manufacturing processes including techniques of assemblies to produce complex engineering products.
- Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.
- Apply and analyse the application of innovative manufacturing techniques.

In-class test

Assessment Type [1]: Quiz/Test

Indicative Time on Task [2]: 30 hours

Due: **Week 4, 8 , 12**

Weighting: **30%**

This assessment task includes three 30-min quizzes conducted during lecture hours. The quizzes will be held in week 4 (Week 1-3 lecture), Week 8 (Week 4-7 lectures), and Week 12 (Week 8-11 lectures).

On successful completion you will be able to:

- Draw upon in-depth knowledge to critique and appraise manufacturing processes for different engineering materials.
- Integrate manufacturing processes including techniques of assemblies to produce complex engineering products.
- Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.
- Apply and analyse the application of innovative manufacturing techniques.

Lab report

Assessment Type [1]: Lab report

Indicative Time on Task [2]: 10 hours

Due: **Week 9, 12**

Weighting: **10%**

This task is to help students to develop knowledge and skills in the design and manufacturing of a specific product. Students are expected to undertake different manufacturing activities and record these activities. Each student is required to submit two lab reports. Report I will cover the lab activities undertaken in Week 6-7 and Report II for lab activities in Week 11. These assessments aim to help reinforce student's learning by connecting the contents in lecture to real-world practices. This assessment task is compulsory.

On successful completion you will be able to:

- Draw upon in-depth knowledge to critique and appraise manufacturing processes for different engineering materials.
- Integrate manufacturing processes including techniques of assemblies to produce complex engineering products.
- Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.
- Apply and analyse the application of innovative manufacturing techniques.

Assessment Tasks

Name	Weighting	Hurdle	Due
Final examination	30%	No	Exam period
Test on different problem set conducted during lectures	30%	No	Week 4, Week 8, Week 12
Fieldtrip Report	20%	No	Week 10
Lab report	10%	No	Report I: Week 9; Report II: Week 12
Skills application in SGTA	10%	No	Weekly

Final examination

Assessment Type [1]: Examination
Indicative Time on Task [2]: 15 hours
Due: **Exam period**
Weighting: **30%**

The final examination will cover all the content taught in the unit.

On successful completion you will be able to:

- Demonstrate the ability to effectively apply advanced knowledge in evaluating and assessing manufacturing processes for various engineering materials.
- Integrate manufacturing processes including techniques of assemblies to produce complex engineering products.
- Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.
- Apply and analyse the application of innovative manufacturing techniques.
- Display proficiency in applying problem-solving techniques aligned with industry requirements.

Test on different problem set conducted during lectures

Assessment Type [1]: Problem set
Indicative Time on Task [2]: 15 hours
Due: **Week 4, Week 8, Week 12**

Weighting: **30%**

This assessment task includes three 30-min test conducted during lecture hours.

On successful completion you will be able to:

- Demonstrate the ability to effectively apply advanced knowledge in evaluating and assessing manufacturing processes for various engineering materials.
- Integrate manufacturing processes including techniques of assemblies to produce complex engineering products.
- Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.
- Apply and analyse the application of innovative manufacturing techniques.
- Display proficiency in applying problem-solving techniques aligned with industry requirements.

Fieldtrip Report

Assessment Type [1]: Report
Indicative Time on Task [2]: 10 hours
Due: **Week 10**
Weighting: **20%**

This activity aims to help students understand real-work manufacturing techniques covered in the lectures. Students are expected to submit a report and reflect on the core manufacturing activities they watched during the trip.

On successful completion you will be able to:

- Demonstrate the ability to effectively apply advanced knowledge in evaluating and assessing manufacturing processes for various engineering materials.
- Integrate manufacturing processes including techniques of assemblies to produce complex engineering products.
- Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.
- Apply and analyse the application of innovative manufacturing techniques.
- Display proficiency in applying problem-solving techniques aligned with industry

requirements.

Lab report

Assessment Type [1]: Lab report
Indicative Time on Task [2]: 10 hours
Due: **Report I: Week 9; Report II: Week 12**
Weighting: **10%**

This task is to help students to develop knowledge and skills in the design and manufacturing of a specific product. Students will undertake different manufacturing activities, record these activities, and submit two lab reports. These assessments aim to help reinforce student's learning by connecting the contents in lecture to real-world practices.

On successful completion you will be able to:

- Demonstrate the ability to effectively apply advanced knowledge in evaluating and assessing manufacturing processes for various engineering materials.
- Integrate manufacturing processes including techniques of assemblies to produce complex engineering products.
- Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.
- Apply and analyse the application of innovative manufacturing techniques.
- Display proficiency in applying problem-solving techniques aligned with industry requirements.

Skills application in SGTA

Assessment Type [1]: Participatory task
Indicative Time on Task [2]: 10 hours
Due: **Weekly**
Weighting: **10%**

Development of knowledge and skills in engineering requires continual practice at authentic tasks. In each weekly SGTA class, you will undertake a range of relevant problems and discussion. Contribution to these tasks will be recorded by teaching staff to constitute this grade.

On successful completion you will be able to:

- Demonstrate the ability to effectively apply advanced knowledge in evaluating and

assessing manufacturing processes for various engineering materials.
- Integrate manufacturing processes including techniques of assemblies to produce complex engineering products.
- Apply knowledge in manufacturing post-treatment processes and the overall cost implications of manufacturing a complex engineering product.
- Apply and analyse the application of innovative manufacturing techniques.
- Display proficiency in applying problem-solving techniques aligned with industry requirements.

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[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

- **Delivery:** This unit will be presented in weekly (double) lectures; and in weekly SGTAs (10 SGTAs, 3 pracs, 1 fieldtrip).
- **Textbook**: The following textbook is recommended, but not prescribed: **FUNDAMENTALS OF MODERN MANUFACTURING: Materials, Processes, and Systems** Mikell P. Groover 4th edition, Wiley
- **Methods of Communication:** We will communicate with you via your university email or through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent from your **university email** address.
- **COVID Information:** For the latest information on the University's response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: https://www.mq.edu.au/about/coronavirus-faqs. Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

Unit Schedule

Please refer to iLearn page.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policie

s.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Assessment Procedure
- Complaints Resolution Procedure for Students and Members of the Public
- Special Consideration Policy

Students seeking more policy resources can visit Student Policies (https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit connect.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe academic integrity – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free online writing and maths support, academic skills development and wellbeing consultations.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Academic Success

Academic Success provides resources to develop your English language proficiency, academic writing, and communication skills.

- Workshops
- Chat with a WriteWISE peer writing leader
- Access StudyWISE
- Upload an assignment to Studiosity
- Complete the Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support

Macquarie University offers a range of Student Support Services including:

- IT Support
- Accessibility and disability support with study
- Mental health support
- Safety support to respond to bullying, harassment, sexual harassment and sexual assault
- Social support including information about finances, tenancy and legal issues
- Student Advocacy provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via the Service Connect Portal, or contact Service Connect.

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Engineers Australia Competency Mapping

EA Competency Standard		Unit Learning Outcomes
Knowledge and Skill Base	1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline.	ULO1 & ULO2 & ULO3 & ULO4
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	

	1.3 In-depth understanding of specialist bodies of knowledge	ULO4
	1.4 Discernment of knowledge development and research directions	ULO1 & ULO2 & ULO3 & ULO4
	1.5 Knowledge of engineering design practice	
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	ULO1 & ULO2 & ULO3 & ULO4
	2.2 Fluent application of engineering techniques, tools and resources.	ULO1 & ULO2 & ULO3 & ULO4
	2.3 Application of systematic engineering synthesis and design processes.	
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	ULO1 & ULO2 & ULO3
	3.2 Effective oral and written communication in professional and lay domains.	
	3.3 Creative, innovative and pro-active demeanour.	ULO4
	3.4 Professional use and management of information.	ULO1 & ULO2 & ULO3
	3.5 Orderly management of self, and professional conduct.	
	3.6 Effective team membership and team leadership	

Unit information based on version 2025.03 of the Handbook