



## UNSW Course Outline

# MATS3004 Polymer Science and Engineering 1 - 2024

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## General Course Information

Course Code : MATS3004

Year : 2024

Term : Term 2

Teaching Period : T2

Is a multi-term course? : No

Faculty : Faculty of Science

Academic Unit : School of Materials Science & 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

This course explores the fundamentals of polymer science and their application in engineering. Polymers are the main component in plastics used in everyday life throughout society. In this course, the synthesis of polymers and how their chemistry can be easily varied to achieve

tailored properties suited for different applications will be taught through a series of lectures and hands-on practical classes. Their commercial processing and manufacturing with their life cycle management will be also introduced.

## Course Aims

This course aims to introduce the students to how polymers are synthesized, modified, and characterized. The course also aims to teach students how polymers are processed for use and elaborates on the sustainability of their life cycle from extraction to end-of-life management

## Course Learning Outcomes

Course Learning Outcomes
CLO1 : Explain the synthesis of polymers using fundamental polymer chemistry.
CLO2 : Identify suitable characterization techniques based on polymer solubility and chemical structure.
CLO3 : Predict and interpret the behavior and properties of polymers as a function of their morphology and composition.
CLO4 : Work effectively as a team member to analyze scientific data and implement scientific writing.
CLO5 : Analyze technological developments in commodity and advanced polymers using the life cycle assessment.

Course Learning Outcomes	Assessment Item
CLO1 : Explain the synthesis of polymers using fundamental polymer chemistry.	<ul style="list-style-type: none"><li>• Mid-term Test</li><li>• Assignment</li></ul>
CLO2 : Identify suitable characterization techniques based on polymer solubility and chemical structure.	<ul style="list-style-type: none"><li>• Group lab report</li><li>• Mid-term Test</li><li>• Assignment</li></ul>
CLO3 : Predict and interpret the behavior and properties of polymers as a function of their morphology and composition.	<ul style="list-style-type: none"><li>• Final Exam</li><li>• Group lab report</li></ul>
CLO4 : Work effectively as a team member to analyze scientific data and implement scientific writing.	
CLO5 : Analyze technological developments in commodity and advanced polymers using the life cycle assessment.	<ul style="list-style-type: none"><li>• Final Exam</li><li>• Group lab report</li></ul>

## Learning and Teaching Technologies

Moodle - Learning Management System | Echo 360

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Final Exam Assessment Format: Individual	35%	Start Date: Not Applicable Due Date: TBA
Mid-term Test Assessment Format: Individual	35%	Start Date: 28/06/2024 09:00 AM Due Date: 28/06/2024 11:00 AM
Assignment Assessment Format: Individual	15%	Due Date: 21/06/2024 07:00 PM
Group lab report Assessment Format: Group	15%	Due Date: 02/08/2024 05:00 PM

## Assessment Details

### Final Exam

#### Assessment Overview

This written exam will cover the content taught to you in Weeks 5-10. The exam is typically of two hours' duration including 10 minutes reading time. Questions typically include multiple choice, short answers, and problem solving. The test is designed to assess your understanding of polymer morphology and mechanical properties, commodity polymers, their processing and manufacturing, and their sustainable life cycle management.

You will receive your marked exams indicating what questions were answered correctly and incorrectly. Feedback may be available through inquiry with the course convenor.

Hurdle requirement: To pass this course you are required to achieve a 45% weighted average over the mid-term test and final exam, with a minimum mark of 35% achieved in each of the tasks.

#### Course Learning Outcomes

- CLO3 : Predict and interpret the behavior and properties of polymers as a function of their morphology and composition.
- CLO5 : Analyze technological developments in commodity and advanced polymers using the life cycle assessment.

#### Detailed Assessment Description

This written exam will cover the content taught to you in Weeks 5-10. The exam is typically of two hours' duration including 10 minutes reading time. Questions typically include multiple choice, short answers, and problem solving. The test is designed to assess your understanding

of polymer morphology and mechanical properties, commodity polymers, their processing and manufacturing, and their sustainable life cycle management. You will receive your marked exams indicating what questions were answered correctly and incorrectly. Feedback may be available through inquiry with the course convenor.

### **Hurdle rules**

To pass this course you are required to achieve a 45% weighted average over the mid-term test and exam, with a minimum mark of 35% achieved in each of the tasks.

## **Mid-term Test**

### **Assessment Overview**

This written test will be held in Week 5 covering the content taught in Weeks 1-4. The test is typically of two hours' duration including 10 minutes of reading time. Questions typically include multiple choice, short answers, and problem-solving. The test is designed to assess your understanding of polymer synthesis and characterization, polymer thermodynamics and their behavior in solution.

You will receive your marked tests indicating what questions were answered correctly and incorrectly. Overall comments and worked solutions may be provided to the class.

Hurdle requirement: To pass this course you are required to achieve a 45% weighted average over the mid-term test and final exam, with a minimum mark of 35% achieved in each of the tasks.

### **Course Learning Outcomes**

- CLO1 : Explain the synthesis of polymers using fundamental polymer chemistry.
- CLO2 : Identify suitable characterization techniques based on polymer solubility and chemical structure.

### **Detailed Assessment Description**

This written test will be held in Week 5 covering the content taught in Weeks 1-4. The test is typically of two hours' duration including 10 minutes reading time. Questions typically include multiple choice, short answers, and problem solving. The test is designed to assess your understanding of polymer synthesis and characterization, polymer thermodynamics and their behavior in solution. You will receive your marked tests indicating what questions were answered correctly and incorrectly. Overall comments and worked solutions may be provided to the class.

### Hurdle rules

To pass this course you are required to achieve a 45% weighted average over the mid-term test and exam, with a minimum mark of 35% achieved in each of the tasks.

## **Assignment**

### Assessment Overview

For this task, you will complete an assignment in Week 4 on the topics taught in lectures 1-8. The question style will include short answers and calculations. The assignment will consist of four questions covering polymerization techniques and their kinetics, thermodynamics of polymer solution, and their characterization techniques.

The assignment is designed for you to use the knowledge you learned about the synthesis and characterization of polymers and their properties.

You will be given overall feedback as a class within 2 weeks of the due date.

### Course Learning Outcomes

- CLO1 : Explain the synthesis of polymers using fundamental polymer chemistry.
- CLO2 : Identify suitable characterization techniques based on polymer solubility and chemical structure.

### Detailed Assessment Description

For this task, you will complete an assignment in Week 4 on the topics taught in lectures 1-8. The question style will include short answers and calculation. The assignment will consist of four questions covering polymerization techniques and their kinetics, thermodynamics of polymer solution, and their characterization techniques. The assignment is designed for you to use the knowledge you learned about the synthesis and characterization of polymers and their properties. You will be given overall feedback as a class within 2 weeks of the due date.

## **Group lab report**

### Assessment Overview

You will complete laboratory group activities in Weeks 4, 7-9. Each lab activity is of two hours' duration including one hour in the laboratory and a one-hour workshop in the computer lab. In the lab, you will learn the basics of how polymers are analyzed using techniques such as FTIR, Raman, NMR, XRD, and DSC. During the workshop in the computer lab, you will work with your group on data analysis and drafting of the lab report.

You will report the results and discussion of these labs in a single group report due in Week 10.

You will receive your mark through Moodle, two weeks after submission. You will get feedback upon request on the areas you excelled at and which areas of the reports that were not answered correctly.

### Course Learning Outcomes

- CLO2 : Identify suitable characterization techniques based on polymer solubility and chemical structure.
- CLO3 : Predict and interpret the behavior and properties of polymers as a function of their morphology and composition.
- CLO5 : Analyze technological developments in commodity and advanced polymers using the life cycle assessment.

### Detailed Assessment Description

You will complete laboratory group activities in Weeks 4, 7-9. Each lab activity is of two hours' duration including one hour in the laboratory and a one-hour workshop in the computer lab. In the lab, you will learn the basics of how polymers are analyzed using techniques such as FTIR, Raman, NMR, XRD, and DSC. During the workshop in the computer lab, you will work with your group on data analysis and drafting of the lab report. You will report the results and discussion of these labs in a single group report due in Week 10. You will receive your mark through Moodle, two weeks after submission. You will get feedback upon request on the areas you excelled at and which areas of the reports that were not answered correctly.

## General Assessment Information

### Grading Basis

Standard

### Requirements to pass course

To pass this course you are required to achieve a 45% weighted average over the mid-term test and exam, with a minimum mark of 35% achieved in each of the tasks.

## Course Schedule

### Attendance Requirements

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

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Damia Mawad		Room 246, E10 Hilmer Building	+6193856642	by appointment	Yes	Yes

# Other Useful Information

## Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the [UNSW Student Code of Conduct Website](#).

## Academic Honesty and Plagiarism

**Referencing** is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at <https://student.unsw.edu.au/referencing>

**Academic integrity** is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity, plagiarism and the use of AI in assessments can be located at:

- The [Current Students site](#),
- The [ELISE training site](#), and
- The [Use of AI for assessments](#) site.

The Student Conduct and Integrity Unit provides further resources to assist you to understand

your conduct obligations as a student: <https://student.unsw.edu.au/conduct>

## Submission of Assessment Tasks

### Penalty for Late Submissions

UNSW has a standard late submission penalty of:

- 5% per day,
- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

***Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.***

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

### Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: <https://student.unsw.edu.au/special-consideration>

**Important note:** UNSW has a “fit to sit/submit” rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.



## Faculty-specific Information

### Additional support for students

- [The Current Students Gateway](#)
- [Student Support](#)
- [Academic Skills and Support](#)
- [Student Wellbeing, Health and Safety](#)
- [Equitable Learning Services](#)
- [UNSW IT Service Centre](#)
- Science EDI Student [Initiatives](#), [Offerings](#) and [Guidelines](#)