



UNSW Course Outline

MATS6109 Polymer Materials Science - 2024

Published on the 22 May 2024

General Course Information

Course Code : MATS6109

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 : Postgraduate

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. The course will also focus on the mechanical properties and failure modes of polymers while in usage. This topic will be taught through actual case studies.

Course Aims

This course aims to introduce the students to how polymers are synthesized, modified, and characterized. The course also aims to engage the students with current issues (design and failure) related to polymeric products, making their learning relevant to real-world situations.

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 : Articulate the common strategies used to optimise the mechanical properties of polymeric materials and their resultant structure/property relationship. |
| CLO4 : Critically assess case studies of failure of commodity polymers using structure-function relationships. |
| CLO5 : Examine the literature to design a polymeric product with the desired properties to meet a specific commercial demand. |
| CLO6 : Communicate design concepts related to polymeric products both verbally and in writing. |

| Course Learning Outcomes | Assessment Item |
|--|---|
| CLO1 : Explain the synthesis of polymers using fundamental polymer chemistry. | <ul style="list-style-type: none">AssignmentMid-term Test |
| CLO2 : Identify suitable characterization techniques based on polymer solubility and chemical structure. | <ul style="list-style-type: none">Mid-term Test |
| CLO3 : Articulate the common strategies used to optimise the mechanical properties of polymeric materials and their resultant structure/property relationship. | <ul style="list-style-type: none">Polymer Design ProjectAssignment |
| CLO4 : Critically assess case studies of failure of commodity polymers using structure-function relationships. | <ul style="list-style-type: none">Critical Review PosterPolymer Design Project |
| CLO5 : Examine the literature to design a polymeric product with the desired properties to meet a specific commercial demand. | <ul style="list-style-type: none">Critical Review PosterPolymer Design Project |
| CLO6 : Communicate design concepts related to polymeric products both verbally and in writing. | <ul style="list-style-type: none">Critical Review PosterPolymer Design Project |

Learning and Teaching Technologies

Moodle - Learning Management System | Echo 360

Assessments

Assessment Structure

| Assessment Item | Weight | Relevant Dates |
|---|--------|--|
| Assignment Assessment Format: Individual | 15% | Due Date: 21/06/2024 07:00 PM |
| Polymer Design Project Assessment Format: Group | 30% | Due Date: 09/08/2024 11:59 PM |
| Mid-term Test Assessment Format: Individual | 35% | Start Date: 28/06/2024 09:00 AM Due Date: 28/06/2024 11:00 AM |
| Critical Review Poster Assessment Format: Individual | 20% | Start Date: Not Applicable Due Date: 24/07/2024 02:00 PM |

Assessment Details

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 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 to use knowledge you have 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.
- CLO3 : Articulate the common strategies used to optimise the mechanical properties of polymeric materials and their resultant structure/property relationship.

Polymer Design Project

Assessment Overview

You will submit during the final exam period a group report summarizing your research on a particular polymeric product. The project is tailored to provide you the opportunity to research a

polymer and its use in a commercial product. The project should present an overview of the polymer properties and propose modification or alternative design of the product to address one aspect of its commercial use.

This activity is designed to evaluate your synthesis of the literature, your project management and communication skills, and your teamwork skills.

30% is a group mark which will be weighted based on student contribution. Feedback will be provided upon request from the course convenor.

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

Course Learning Outcomes

- CLO3 : Articulate the common strategies used to optimise the mechanical properties of polymeric materials and their resultant structure/property relationship.
- CLO4 : Critically assess case studies of failure of commodity polymers using structure-function relationships.
- CLO5 : Examine the literature to design a polymeric product with the desired properties to meet a specific commercial demand.
- CLO6 : Communicate design concepts related to polymeric products both verbally and in writing.

Hurdle rules

To pass this course you are required to achieve a 45% weighted average over the mid-term test and the polymer design project, 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 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 the polymer design project, 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.

Hurdle rules

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

Critical Review Poster

Assessment Overview

In this task, you will need to complete a critical review of a research paper relevant to the design project. You will be required to submit in Week 9 your review in the form of a 1-slide poster (15%) and give a 3-minute presentation (5%).

The critical review poster is designed to evaluate your ability to source relevant literature and to articulate effectively and concisely scientific concepts.

You will receive your mark on the poster through Moodle, one week after submission. You will be also given feedback on your presentation skills.

Course Learning Outcomes

- CLO4 : Critically assess case studies of failure of commodity polymers using structure-function relationships.
- CLO5 : Examine the literature to design a polymeric product with the desired properties to meet a specific commercial demand.
- CLO6 : Communicate design concepts related to polymeric products both verbally and in writing.

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 the polymer design project, 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 |
| Lecturer | Giulia Silvani | | | | | No | No |

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](#)