



## UNSW Course Outline

# MATS6008 Advanced Functional Materials - 2024

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## General Course Information

Course Code : MATS6008

Year : 2024

Term : Term 3

Teaching Period : T3

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

Students will investigate the design, composition, processing methods, structure, physical properties and applications of a range of advanced functional materials. You will learn a number of techniques associated with the fabrication and physical property testing of functional

materials. You will explore how the properties of these materials can be tuned through careful control over material chemistry or the fabrication method chosen for their production. You will learn to apply what you have learned to design new functional materials suitable to specific applications from the viewpoint of Materials Science and Engineering.

## **Course Aims**

This course aims to provide students with a detailed understanding of a range of functional materials including magnetic and superconducting materials, ferroelectric materials, materials for energy storage and 2-D materials. These are a rapidly emerging class of materials that exhibit novel physical properties and find applications in a wide range of fields such as catalysis, electronic devices, actuators and sensors.

# Course Learning Outcomes

Course Learning Outcomes
CL01 : Compare the key structural elements of particular sub-classes of functional materials that control their behaviour.
CL02 : Develop an understanding of functional materials' behaviour for the design of new materials with novel properties.
CL03 : Examine the relationships between composition, processing route, microstructure, properties and applications of advanced functional materials.
CL04 : Evaluate how variations in composition and processing route can lead to the tuning of properties for specific applications.
CL05 : Communicate about functional materials effectively in written formats.

Course Learning Outcomes	Assessment Item
CL01 : Compare the key structural elements of particular sub-classes of functional materials that control their behaviour.	<ul style="list-style-type: none"><li>• Final Exam</li><li>• Advanced Functional Materials Essay</li></ul>
CL02 : Develop an understanding of functional materials' behaviour for the design of new materials with novel properties.	<ul style="list-style-type: none"><li>• Final Exam</li><li>• Advanced Functional Materials Essay</li></ul>
CL03 : Examine the relationships between composition, processing route, microstructure, properties and applications of advanced functional materials.	<ul style="list-style-type: none"><li>• Laboratory workbook</li><li>• Final Exam</li><li>• Advanced Functional Materials Essay</li></ul>
CL04 : Evaluate how variations in composition and processing route can lead to the tuning of properties for specific applications.	<ul style="list-style-type: none"><li>• Laboratory workbook</li><li>• Final Exam</li></ul>
CL05 : Communicate about functional materials effectively in written formats.	<ul style="list-style-type: none"><li>• Laboratory workbook</li><li>• Advanced Functional Materials Essay</li></ul>

## Learning and Teaching Technologies

Moodle - Learning Management System

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Final Exam Assessment Format: Individual	45%	
Advanced Functional Materials Essay Assessment Format: Individual	30%	
Laboratory workbook Assessment Format: Individual	25%	

## Assessment Details

### Final Exam

#### Assessment Overview

You will undertake a 2 hr written exam covering the content taught within the whole course. The exam will be held during the final exam period. You will be asked to apply the concepts learnt during the course to answer several question types including some fact-based questions, some questions requiring brief explanations, and some requiring short calculations.

Feedback is available through inquiry with the course convenor.

#### Course Learning Outcomes

- CL01 : Compare the key structural elements of particular sub-classes of functional materials that control their behaviour.
- CL02 : Develop an understanding of functional materials' behaviour for the design of new materials with novel properties.
- CL03 : Examine the relationships between composition, processing route, microstructure, properties and applications of advanced functional materials.
- CL04 : Evaluate how variations in composition and processing route can lead to the tuning of properties for specific applications.

#### 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](#).

# Advanced Functional Materials Essay

## Assessment Overview

This task will require you to discuss a class or a subclass of functional materials. You will then be required to:

- i. explain the relationship between composition, processing, structure, physical properties and potential applications of the selected class/subclass of functional material, and
- ii. evaluate the strengths and weaknesses of the material, as well as implications for the potential applications.

The assignment will be issued in week 2 and submission is in week 4. Written feedback will be given on the returned assignment before the end of week 4.

Task Length: no word limit, brief concise answers

## Course Learning Outcomes

- CL01 : Compare the key structural elements of particular sub-classes of functional materials that control their behaviour.
- CL02 : Develop an understanding of functional materials' behaviour for the design of new materials with novel properties.
- CL03 : Examine the relationships between composition, processing route, microstructure, properties and applications of advanced functional materials.
- CL05 : Communicate about functional materials effectively in written formats.

## Generative AI Permission Level

### **No Assistance**

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## **Laboratory workbook**

## Assessment Overview

You will assess and analyse laboratory results on two functional materials topics, and write an associated lab report. You will be required to draw on the results to discuss the relationship between processing route, structure and properties of the sample materials and critique how changes in processing route affect behaviour of the material to suit specific applications.

The assignment will be issued in week 7 and submission is in week 9. Written feedback will be

given on the returned lab report within 2 weeks after submission.

### Course Learning Outcomes

- CL03 : Examine the relationships between composition, processing route, microstructure, properties and applications of advanced functional materials.
- CL04 : Evaluate how variations in composition and processing route can lead to the tuning of properties for specific applications.
- CL05 : Communicate about functional materials effectively in written formats.

### Generative AI Permission Level

#### **No Assistance**

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## **General Assessment Information**

### **Short Extensions:**

The School of Materials Science and Engineering has reviewed its range of assignments and projects to determine their suitability for automatic short extensions as set out by the UNSW Short Extension Policy. After consultation with teaching staff and examination of our course offerings, we consider our current deadline structures already accommodate the possibility of unexpected circumstances that may lead students to require additional days for submission. Consequently, the School does not offer the Short Extension provision in its MATS courses but students, if needed, can apply for formal Special Consideration via the usual procedure.

### Grading Basis

Standard

## **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
	Jan Seidel					No	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](#)