



**UNSW**

## UNSW Course Outline

# **CHEM2901 Environmental Chemistry and Sustainability - 2024**

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## **General Course Information**

**Course Code :** CHEM2901

**Year :** 2024

**Term :** Term 3

**Teaching Period :** T3

**Is a multi-term course? :** No

**Faculty :** Faculty of Science

**Academic Unit :** School of Chemistry

**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 will take you on a journey through the main environmental and sustainability issues experienced by our society through the lens of a chemist. You will discover how fundamental chemistry principles can explain the rise of many of these issues but also provide solutions to

address them. Together we will answer questions such as: how do human activities affect the quality of water leading to social justice issues? What is the effect of air pollution on our atmosphere and cities? Are solar panels or cloth nappies sustainability-conscious choices? Is plastic recycling worth it? After taking this course, you will be able to make more informed, science-based, and responsible choices when it comes to sustainability in your daily life and current/future workplace. Fundamental scientific concepts that we will explore include but are not limited to the greenhouse gas effect, how solar panels and other renewable energy devices work at the molecular level, the chemistry of waste and contaminants found in water, soil, and the atmosphere. In parallel, you will develop practical thinking skills such as performing the life-cycle analysis to assess the sustainability of many products we use in our daily life and debating/advocating about a certain issue. Real world-inspired laboratory experiences such as the collection and analysis of water samples are also an exciting component of this course.

## Course Aims

This course will teach students about environmental chemistry and the role of chemistry in ensuring our sustainable future. In particular, this course aims to help students understand the chemistry of major environmental and sustainability issues we are facing nowadays. In addition, the course also aims to teach students about the fundamental chemistry principles behind critical sustainable technologies being developed in our age. The course will achieve these aims by using a wide range of learning experiences, from traditional lectures enriched with hands-on activities, to laboratory experiments, to project-based learning with a real-world consulting task.

# Course Learning Outcomes

Course Learning Outcomes
CLO1 : Explain the chemistry principles at the foundation of environmental issues and sustainable solutions.
CLO2 : Undertake toxicological analyses of environmental samples and assess properties of materials relevant to sustainability applications.
CLO3 : Report findings in a language appropriate for a specific audience.
CLO4 : Assess the environmental impact of practices and decisions at different scales, from individual to government level.
CLO5 : Propose and debate evidence-based solutions for minimizing the effect of harmful chemicals in the environment.

Course Learning Outcomes	Assessment Item
CLO1 : Explain the chemistry principles at the foundation of environmental issues and sustainable solutions.	<ul style="list-style-type: none"><li>Environmental chemistry and sustainability case study analysis</li><li>Signature assessment presentation and campaign material</li></ul>
CLO2 : Undertake toxicological analyses of environmental samples and assess properties of materials relevant to sustainability applications.	<ul style="list-style-type: none"><li>Laboratory experiences</li></ul>
CLO3 : Report findings in a language appropriate for a specific audience.	<ul style="list-style-type: none"><li>Laboratory experiences</li><li>Signature assessment presentation and campaign material</li></ul>
CLO4 : Assess the environmental impact of practices and decisions at different scales, from individual to government level.	<ul style="list-style-type: none"><li>Environmental chemistry and sustainability case study analysis</li><li>Signature assessment presentation and campaign material</li></ul>
CLO5 : Propose and debate evidence-based solutions for minimizing the effect of harmful chemicals in the environment.	<ul style="list-style-type: none"><li>Environmental chemistry and sustainability case study analysis</li><li>Laboratory experiences</li><li>Signature assessment presentation and campaign material</li></ul>

## Learning and Teaching Technologies

Moodle - Learning Management System | Echo 360

## Learning and Teaching in this course

### General description

The learning and teaching activities in this course consist of multiple teaching methods and modes of instruction which are delivered through a blended approach including Prerecorded Lectures, Workshops, Tutorials, and Laboratories. This course has been designed to engage you in learning by contextualising the content with interesting examples from current environmental and sustainability matters. In particular, the laboratory component will allow you to take on the role of environmental consultant on a real-world issue working for a Sydney-based client. As part of this experience, you will practice critical chemistry laboratory skills as well as preparing scientific reports and delivering presentations to different audiences.

## **Lectures**

Lectures will be prerecorded and available on Moodle. About 60-90 minutes of recorded materials will be provided each week in advance of the workshops so that students have adequate time to watch the lectures.

## **Workshops**

Each week we will have a two hour workshop. Workshops will be in person. We can attempt to record them; however, there is no guarantee that the lecture recording software will capture the class correctly, especially given the interactive nature of the tutorials. Workshops will heavily rely and expand on the lecture content and also involve graded assessment tasks related to the lecture content.

## **Tutorials**

Each week we will have a one hour tutorial class. Students are expected to attend tutorials in person. We can attempt to record tutorials; however, there is no guarantee that the lecture recording software will capture the class correctly, especially given the interactive nature of the tutorials. The tutorial classes will help you prepare for the laboratory classes and your environmental consultancy task as well as help you complete lab reports and other tasks that contribute to your course grade.

## **Laboratory Classes**

Each week we will have one 3 hour laboratory class. The schedule of experiments can be found in the lab manual available on Moodle. The laboratory classes will revolve around a real-world consultancy tasks and give you the opportunity to develop new chemistry lab skills, as well as technical writing and presentation skills. Different laboratory classes will have different tasks

associated with them, examples include traditional lab reports, annotated bibliography, and delivery of presentations.

The following rules apply to laboratory classes:

- a) The following items of personal protective equipment (PPE) must be worn at all times in the laboratory: safety eyewear, a laboratory coat, fully enclosed footwear. You will not be permitted to work in thongs or open-top shoes or sandals or without a laboratory coat, or safety eyewear.
- b) Attendance to laboratory classes is mandatory. A special considerations application must be submitted if a student cannot attend a laboratory class.
- c) You must arrive at the laboratory on time or you will be excluded from the class.

## Assessments

### Assessment Structure

Assessment Item	Weight	Relevant Dates
Environmental chemistry and sustainability case study analysis Assessment Format: Individual	50%	Start Date: Date depends on specific assessment task. Please refer to Moodle course page for details. Due Date: Date depends on specific assessment task. Please refer to Moodle course page for details.
Laboratory experiences Assessment Format: Individual	25%	Start Date: Not Applicable Due Date: Not Applicable
Signature assessment presentation and campaign material Assessment Format: Group	25%	Start Date: Start date depends on specific assessment task, check Moodle page for details. Due Date: Due date depends on specific assessment task, check Moodle page for details.

### Assessment Details

#### Environmental chemistry and sustainability case study analysis

##### Assessment Overview

This assessment will consist of two parts and is the major assessment for the course:

- 1) You will complete worksheets during workshops to test your understanding of the theoretical knowledge presented in the lectures as well as the application of it discussed in the workshops.

Feedback will be released by the following workshop. Answers to the worksheets will be discussed during the workshops/tutorials to aid your learning and help prepare you for part 2 of this assessment.

2) For Part 2 of this task, you will be presented with different case studies to choose from (of equal difficulty level) and then provide a thorough analysis using knowledge developed during lectures, workshops, labs, and the signature assessment task. Timeline and feedback: you will work on it during the final exam period.

#### **Course Learning Outcomes**

- CLO1 : Explain the chemistry principles at the foundation of environmental issues and sustainable solutions.
- CLO4 : Assess the environmental impact of practices and decisions at different scales, from individual to government level.
- CLO5 : Propose and debate evidence-based solutions for minimizing the effect of harmful chemicals in the environment.

#### **Assignment submission Turnitin type**

This is not a Turnitin assignment

#### **Generative AI Permission Level**

##### **Simple Editing Assistance**

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.

If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

For more information on Generative AI and permitted use please see [here](#).

You can use AI to help you improve the writing but you must not use any functions that generate or paraphrase passages of text for you.

# Laboratory experiences

## Assessment Overview

Students will participate in four wet laboratory experiences (all related to the environmental consultancy for local organisations) and will have to hand in individual lab reports.

Timeline and feedback: laboratory time (3 hrs) will be allocated each week of the course with the following plan:

- The laboratory time in week 1 will be used to have students practice the necessary laboratory skills
- The laboratory time in week 2 will be used for a field trip to collect samples for the environmental consultancy signature assessment
- The laboratory time in weeks 3-5 will be used to analyse the environmental samples from the local organisations
- The laboratory time in weeks 7-10 will be dedicated to analysing data, preparing a final presentation for the local organisations, and delivering the presentation to them.

## Course Learning Outcomes

- CLO2 : Undertake toxicological analyses of environmental samples and assess properties of materials relevant to sustainability applications.
- CLO3 : Report findings in a language appropriate for a specific audience.
- CLO5 : Propose and debate evidence-based solutions for minimizing the effect of harmful chemicals in the environment.

## Assignment submission Turnitin type

This is not a Turnitin assignment

## Hurdle rules

Attendance to laboratory sessions is mandatory. If special considerations are required, please contact the course coordinator.

## Generative AI Permission Level

## Planning/Design Assistance

You are permitted to use generative AI tools, software or services to generate initial ideas, structures, or outlines. However, you must develop or edit those ideas to such a significant extent that what is submitted is your own work, i.e., what is generated by the tool, software or service should not be a part of your final submission. You should keep copies of your iterations to show your Course Authority if there is any uncertainty about the originality of your work.

If your Convenor has concerns that your answer contains passages of AI-generated text or media that have not been sufficiently modified you may be asked to explain your work, but we recognise that you are permitted to use AI generated text and media as a starting point and some traces may remain. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

For more information on Generative AI and permitted use please see [here](#).

You can use AI to help you improve your writing. You can also use AI for some of the laboratory tasks (e.g., prep for debate activity). You must not use any functions that generate or paraphrase passages of text or other media.

## Signature assessment presentation and campaign material

### Assessment Overview

As part of the signature assessment task for this course (environmental consultancy for local organisation such as Inner West Council) you will work in groups to prepare and deliver a presentation about their laboratory findings and recommendations to the client.

Timeline and feedback: during the week 7 lab session, you will work in groups to compare your laboratory data and start putting together a draft presentation with feedback provided by the instructors. You will deliver the presentations to the client during week 10 lab time. Marks and final feedback will be provided by the end of the following week.

In addition to the presentation, you will also work with your group to prepare material in the form of their choice (e.g., video, pamphlet, short audio ad/podcast, etc) for an information campaign to help the general public understand the environmental issue raised by the client. Timeline and feedback: students will submit a one-page proposal for feedback on their idea for the assignment in week 7, feedback will be provided in week 8, and they will present their material in week 10 during lab time.

### Course Learning Outcomes

- CLO1 : Explain the chemistry principles at the foundation of environmental issues and sustainable solutions.
- CLO3 : Report findings in a language appropriate for a specific audience.
- CLO4 : Assess the environmental impact of practices and decisions at different scales, from individual to government level.
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For more information on Generative AI and permitted use please see [here](#).

You can use AI to help you improve your writing. You can also use it to generate some initial ideas and brainstorm. You must not use any functions that generate or paraphrase passages of text or other media.

## **General Assessment Information**

### Grading Basis

Standard

### Requirements to pass course

- Attendance to the laboratory sessions
- Attempting all assessment types with satisfactory performance (> 50%)

# Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	[Prerecorded] Life cycle assessment
	Workshop	Life cycle assessment
	Tutorial	Course intro + field trip intro
	Laboratory	Lab induction and microplastic lab with practice samples
Week 2 : 16 September - 22 September	Lecture	Plastics and plastic recycling
	Workshop	Plastics and plastic recycling
	Tutorial	Lab 1 data analysis + field trip safety briefing
	Laboratory	Field work for sample collection (Tempe - Mackey Park)
Week 3 : 23 September - 29 September	Lecture	Plastics and plastic recycling
	Workshop	Plastics and plastic recycling
	Tutorial	Instrument data analysis tutorial
	Laboratory	Water and soil samples analysis: rotating microplastics, water quality, instrumental (heavy metals and PFAS)
Week 4 : 30 September - 6 October	Lecture	Water quality & persistent pollutants
	Workshop	Water quality & persistent pollutants
	Tutorial	Annotated bibliography workshop with librarian
	Laboratory	Water and soil samples analysis: rotating microplastics, water quality, instrumental (heavy metals/PFAS)
Week 5 : 7 October - 13 October	Lecture	Water quality & persistent pollutants
	Workshop	Water quality & persistent pollutants
	Tutorial	Public Holiday – no tutorial
	Laboratory	Water and soil samples analysis: rotating microplastics, water quality, instrumental (heavy metals/PFAS)
Week 7 : 21 October - 27 October	Lecture	Water quality & persistent pollutants
	Workshop	Water quality & persistent pollutants
	Tutorial	Data analysis and submission from lab weeks 3-5
	Laboratory	Data analysis + client presentation planning
Week 8 : 28 October - 3 November	Lecture	Air quality
	Workshop	Air quality
	Tutorial	Public speaking workshop
	Laboratory	Debate activity prep
Week 9 : 4 November - 10 November	Lecture	Air quality
	Workshop	Air quality
	Tutorial	Feedback on draft of slides for client presentation
	Laboratory	Debate activity
Week 10 : 11 November - 17 November	Lecture	Air quality
	Workshop	Air quality
	Tutorial	Q&A
	Laboratory	Client presentation delivery

## Attendance Requirements

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

# Course Resources

## Prescribed Resources

- Laboratory manual: a copy of the laboratory manual (including important safety notes) is available on Moodle
- Lectures slides and recordings
- Material and resources from workshops and tutorials (e.g., practice worksheets)

## Recommended Resources

There is no set textbook for this course and the content delivered by the lecturers will suffice to learn the material in the course. If you are interested in furthering your understanding of a specific topic please talk to your lecturers about recommended textbooks and resources. Please also note that as part of the course we will teach you how to search and read the scientific literature as well as other resources in order to gain a deeper understanding of current environmental and sustainability topics.

## Additional Costs

The following PPE must be supplied by students:

- Cotton button up lab coat
- Safety glasses

These can be purchased in the bookshop or grad store on campus or external retailers (eg hardware stores).

## Course Evaluation and Development

The course this year will see the introduction of new lecture topics and activities. We are eager to receive both formal (as part of regular course evaluations) and informal feedback from the students.

## Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Martina Lessi o				By appointment	Yes	Yes
Lecturer	Shannan Mais ey					No	No
	Jeffrey Black					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](#)

## School-specific Information

### UNSW Changes to Special Consideration: Short Extension

The School of Chemistry has carefully reviewed all of its assessments to determine whether they are suitable for automatic short extensions as set out by the UNSW Short Extension Policy. The current deadline structures for all assessment tasks in the School of Chemistry already accommodate the possibility of unexpected circumstances that may lead students to require additional time for submission. **The School of Chemistry has opted out of the UNSW Short Extension provision for all its courses**, and we have already integrated flexibility into our assessment deadlines. This decision is subject to revision in response to the introduction of new course offerings. All students may still apply for Special Consideration for any assessment via the usual procedures.

## School Contact Information

Level 1, Dalton Building (F12)

W: [www.chemistry.unsw.edu.au](http://www.chemistry.unsw.edu.au)

Also see: **Contacts and Support** section of the course Moodle page (where applicable)