

General Course Information

CHEM 340 Environmental Chemistry and Toxicology

0.1250 EFTS 15 Points
First Semester 2023

Description

This course runs in semester one. It counts 15 points towards a Bachelor of Science degree. It is preferably taken in conjunction with other 300-level chemistry courses.

Environmental chemistry and toxicology covers the study of chemistry in the biosphere - the fundamental chemical processes and the impact of humankind on them. We will discuss the properties of atmospheric, terrestrial, and aquatic systems, with particular reference to environmental pollutants, and the analytical methods used to monitor them. We will also explore mechanisms of toxicity of environmental pollutants and their impact on the environment.

Timetable

Lectures & Workshops: 3 hours of lectures/problem-solving workshops per week. Details to be confirmed on 'My Timetable' and the web.

Students should note that in the Science Faculty that the average student is responsible for approximately 4.5 hours of additional study for each hour of lecture/workshop contact time at the 300-level.

Course Coordinator

Brett Robinson, School of Physical and Chemical Sciences
West 812, ext **92587** Email: brett.robinson@canterbury.ac.nz

Email me if you have any queries about the course.

Assessment

- Assignment 1: Laura Revell 10%
- Assignment 2: Ian Shaw 25%
- Assignment 3: Sally Gaw 25%
- Exam: (3 hours): Material from Sally and Brett 40%

Examination and Formal Tests

Exam: **Three** hours, details to be advised.

Tutorial Assessment

Three assignments.

Textbooks

No required textbook. Resources will be made available online.

Prerequisites

P: 15 points from CHEM281, BCHM281 or CHEM247, plus 15 points from ENVR201, CHEM211, CHEM212, BCHM212, CHEM255 or CHEM251

R: CHEM324; ENCH444

Web-based resources

Various learning resources (lecture material, reference links, quizzes, discussion forums etc.) for this course are available via the University of Canterbury's *Learn* web site -- <http://learn.canterbury.ac.nz/>. This site will also be used regularly as a means of communication and information distribution for all of your Canterbury courses. You should familiarise yourself with *Learn* as soon as possible.

Goal of the Course

A specialised third year course to build on prior study in chemistry and develop an advanced understanding of environmental chemistry and toxicology

Learning Outcomes

- Develop the ability to apply scientific principles and concepts
- Develop problem-solving skills
- Understand, evaluate, access and critically review new chemical information
- Understand, evaluate, access and critically review the context of environmental science
- Demonstrate the ability to think independently about chemical concepts
- Develop a more in-depth knowledge of environmental chemistry and toxicology
- Effectively access and use information relevant to environmental chemistry and toxicology
- Communicate effectively in written English

Transferable Skill Register

As a student in this course I will develop the following skills:

- Problem solving. This is a key skill that is transferable to most careers.
- Recognition of the multi-faceted aspects of environmental science
- Pattern recognition and logical analysis. A key feature to higher level chemistry is the ability to understand similarities between processes and use this pattern recognition to address complex issues in a logical fashion.
- Critical analysis of data. This is a key skill that is transferable to most careers.
- Science communication. A particularly important skill is being able to communicate scientific principles.

Summary of the Course Content

SOIL CHEMISTRY AND PROCESSES (12 lectures)

Soil is of central importance in environmental chemistry because it affects the movement of contaminants into water and air and because soils are both a source and a sink of contaminants. This course will provide students with a fundamental understanding of soil chemistry and processes, particularly those that influence plant growth and the fluxes of contaminants

Lecturer: Professor Brett Robinson, Room West 812, ext 92587, brett.robinson@canterbury.ac.nz

AIR QUALITY (4 lectures)

Air quality is important for human health and is a key issue for many cities around the world. This section of the course will explore the chemistry behind atmospheric pollution including photochemical smog, particulate matter/aerosols and indoor air pollution.

Lecturer: Associate Professor Laura Revell, West 805, ext 90169, laura.revell@canterbury.ac.nz

ENVIRONMENTAL FATE OF ORGANIC CONTAMINANTS (8 lectures)

Understanding the sources, environmental fate and bioavailability of contaminants is necessary for preventing and managing the environmental and human health risks associated with discharging contaminants into the wider environment. This section of the course will explore the sources and environmental fate of organic contaminants.

Lecturer: Professor Sally Gaw, Room BT318, ext 95904, sally.gaw@canterbury.ac.nz

UNDERSTANDING, ASSESSING AND REGULATING ENVIRONMENTAL RISK (12 lectures)

Environmental toxicology is the study of the effects of chemicals on the environment in its broadest sense. Environmental toxicologists study impacts on animals, plants, bacteria, etc. that make up ecosystems. For example, a pesticide (*i.e.* hazard) used by a farmer will have adverse effects on ecosystems, but the risk of adverse effects depends on the environmental concentration, and the acceptability of the risk depends on the benefit of using the pesticide. The risk/benefit balance is used to regulate the use of chemicals (*e.g.* pesticides) that might contaminate the environment.

Environmental toxicologists identify environmental hazards, determine the risk associated with them, and set these risks in the context of benefit. They work at four levels, hazard identification, exposure determination, risk assessment, and regulation.

In this section of the course we will explore these four levels of environmental regulation by learning about the methods used by environmental toxicologists and exploring specific examples (*e.g.* 1080, human and veterinary medicines, environmental estrogens).

Assessment: you will write an environmental risk assessment based on environmental toxicity data for a specific compound.

Lecturer: Professor Ian Shaw, Room 762, ext 94302, ian.shaw@canterbury.ac.nz

Timetable 2023: Note that due to ongoing COVID-19 and the emergence of new variants, the order of the lecturers may change. In some cases, lectures may be online only. You will be informed of any changes.

Week	Mon 14h00-15h00	Tue 11h00-12h00	Thr 13h00-14h00
1	Revell	Revell	Revell
2	Revell	Shaw	Shaw
3	Shaw	Shaw	Shaw
4	Shaw	Shaw	Shaw
5	Shaw	Shaw	Shaw
6	Shaw	Gaw	Gaw
7	Gaw	Gaw	Gaw
8	Gaw	Gaw	Gaw
9	Robinson	Robinson	Robinson
10	Robinson	Robinson	Robinson
11	Robinson	Robinson	Robinson
12	Robinson	Robinson	Robinson

GENERAL INFORMATION | TE KIMI MŌHIOHIO 2023

Policy on 'Dishonest Practice' | Ngā Takahitanga me ngā Tinihanga

The University has strict guidelines regarding 'dishonest practice' and 'breach of instructions' in relation to the completion and submission of examinable material. In cases where dishonest practice is involved in tests or other work submitted for credit, a department may choose to not mark such work – see the online guidelines in relation to ['Academic Integrity'](#).

The School of Physical and Chemical Sciences upholds this policy. It considers plagiarism, collusion, copying and ghost writing – all detailed below – to be unacceptable and dishonest practices:

- **Plagiarism | Tārua Whānako** is the presentation of any material (text, data or figures, on any medium including computer files) from any other source without clear and adequate acknowledgement of the source. Note that the use of **AI generative tools such as ChatGPT** for assessment work is *strictly forbidden*, except where the lecturer concerned has specifically granted approval.
- **Collusion** is the presentation of work performed in whole, or in part, in conjunction with another person or persons, but submitted as if it has been completed by the named author alone. This interpretation is not intended to discourage students from having discussions about how to approach an assigned task and incorporating general ideas that come from those discussions into their own individual submissions, but acknowledgement is necessary.
- **Copying** is the use of material (in any medium, including computer files) produced by another person or persons with or without their knowledge and approval. **This includes copying of the lab reports (raw data may be shared within the group if permitted or required by the experiment) – data analysis and interpretation of obtained results MUST be performed individually.**
- **Ghost writing** is the use of other person(s) (whether with or without payment) to prepare all or part of an item of work submitted for assessment.

Special consideration of assessment | Ngā Pairuri Motuhake

['Special Consideration'](#) (previously termed 'Aegrotat Application') for an item of assessment is for students who have covered the work involved but have been prevented from demonstrating their knowledge or skills at the time of the assessment due to unforeseen circumstances, whether illness, injury, bereavement, car crash or any other extenuating circumstance *beyond one's control*. Special Consideration for a test/exam may be because a student has not sat it or has done so with impaired performance. Applications can be submitted via the above link and must be made **no later than five working days after the assessment due date**. Note that special consideration is **not available for items worth less than 10% of the overall course mark**. In the case of illness or injury, medical consultation should normally have taken place either shortly before or within 24 hours after the due date for the required work or test/examination.

Note that you may be required to sit a special exam or your grade may not be changed if there is insufficient evidence of your performance from other invigilated assessment items in the course. **You have the right to appeal any decision.**

It is important to understand that Special Consideration is only available *where course work has been covered*, and the inability to demonstrate this fully is both *no longer possible* AND is due to *unexpected circumstances beyond one's control*. Thus Special Consideration is **NOT available for:**

- essays, assignments or quizzes where an extension of time is available to complete the assessment item (see below for the process to involved);
- missed lectures during the semester;
- experiencing examination anxiety;
- having several examinations or assessments close together;
- known impairment, such as chronic illness (medical or psychological), injury or disability unless medical evidence confirms that the circumstances were exacerbated, despite appropriate management, at the time of assessment;
- mistaking the date or time of an examination (this is a circumstance one can control!);
- failing to turn up to an examination or test because of sleeping in (a circumstance as above!);
- where applications are repeatedly made for the same or similar reason, then the application may be declined on the grounds that the reason is not unexpected;

- where the application is made at the time of the assessment but the supporting documentation is received significantly after this date or after the date results are released; or
- the application is made following the release of results (unless under exceptional circumstances).

Extensions of deadlines | Tononga Wā Āpiti

Where an extension may be granted for an assessment item, this will be decided by application to the course co-ordinator and/or the lecturer concerned.

Late withdrawal from a course

If you are prevented by extenuating circumstances from completing the course after the final date for withdrawing from the course, you may apply for special consideration for late discontinuation. For details on special consideration, or to make an application, refer to the Examinations Office website <http://www.canterbury.ac.nz/exams/>. Applications must be submitted **within five days** of the end of the main examination period for the semester.

Missing of tests | Te Matangaro i ngā Whakamātautau

In rare cases a student will not be able to sit a test. In such cases, the student should consult with the course co-ordinator to arrange alternative procedures. **This must be done well in advance of the set date for the test.**

Past tests and exams

Past tests can be found on our [Chemistry Undergraduate](#) website. Past exams can be found on the [Library website](#).

Submission of reports and assignments

Reports (including lab reports) and assignments should be handed in on time. Extensions will be granted only in exceptional circumstances (such as illness or bereavement). If an extension is required, as early as possible you should request it from the lecturer concerned.

Note: If you do not submit an assignment for assessment, you will be allotted zero marks, which will affect your final result. You should ensure that you pick up marked assignments and keep them until the end of the course as evidence that the work was completed and marked in the case that either is disputed. To guard against accidental loss, it would be prudent to keep photocopies or electronic copies of anything submitted.

Late Work

Acceptance of late work for assessment will be at the discretion of the course coordinator and/or the lecturer concerned. If your assessment is likely to be late, please contact the relevant of these people **before the assessment is due**. Never assume that an extension will be automatically granted – some courses have the policy of no late work being accepted. A commonly exercised policy is to deduct 10% of the total marks for each day that the work is late, where weekends and public holidays also count as such days.

Marks and Grades | Taumata Ako

The following numbers should be considered as a guide to the expected grades under normal circumstances. The School reserves the right to adjust mark/grade conversions, if necessary.

Please note that for all invigilated assessments (tests and exams) worth 33% and above, failure to obtain a mark of at least 40% will result in a final grade no higher than an R at 100 and 200 level; in general this requirement will not be applied at 300 level, but if it is then the course coordinator will inform the class and it will result in a final grade no higher than a C–.

Grade:	A+	A	A–	B+	B	B–	C+	C	C–	D	E
Minimum mark %:	90	85	80	75	70	65	60	55	50	40	0

Reconsideration of Grades

Students should, in the first instance, speak to the course co-ordinator about their marks. If they cannot reach an agreeable solution, or have questions about their grade in a course, students should then speak to the Director of Undergraduate Studies, [Assoc Prof Greg Russell](#). Students can appeal any decision made on their

final grade. You can apply at the Registry for reconsideration of the final grade within four weeks of the date of publication of final results. Be aware that there are time limits for each step of the appeals process.

Students with Disabilities | Te Whaikaha

Students with disabilities should speak with someone at [Equity and Disability Service](#), phone: 369 3334 (or ext. 93334), email: eds@canterbury.ac.nz.

Academic Advice

[Assoc Prof Greg Russell](#) is the coordinator of undergraduate chemistry courses. His interest is in the academic performance and well-being of all such students. Anyone experiencing problems with their chemistry courses or requiring guidance about their B.Sc. in Chemistry should get in contact with Greg.

Staff-Class Rep Liaison

[Assoc Prof Greg Russell](#) is in charge of liaison with students in chemistry courses. Your class will appoint a student representative to the liaison committee at the start of the semester. Please feel free to talk to the Academic Liaison or the student rep about any problems or concerns that you might have.

Greg Russell (greg.russell@canterbury.ac.nz, tel. 369 5129)

Director of Undergraduate Studies

School of Physical and Chemical Sciences

2023