School of Physical and Chemical Sciences

General Course Information

CHEM 340
Environmental Chemistry and Toxicology

0.1250 EFTS 15 Points
First Semester 2022

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

Examination and Formal Tests
Exam: **Two** hours, details to be advised.

Tutorial Assessment
Three assignments.

Textbooks
No required textbook. Resources will be made available online.

Prerequisites
P: 30 points from CHEM281; CHEM211; CHEM255; WATR201
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 animal, 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 2022: Note that due to COVID-19, the order of the lecturers may change. In some cases, lectures may be online only. You will be informed of any changes.

Week starting	Week	Mon 14h00-15h00	Wed 15h00-16h00	Thr 11h00-12h00
21-Feb	1	All	Robinson	Robinson
28-Feb	2	Robinson	Robinson	Robinson
7-Mar	3	Robinson	Robinson	Robinson
14-Mar	4	Robinson	Robinson	Robinson
21-Mar	5	Revell	Revell	Revell
28-Mar	6	Revell	Gaw	Gaw
4-Apr	7	Gaw	Gaw	Gaw
		MID SEMESTER BREAK		
2-May	8	Gaw	Gaw	Gaw
9-May	9	Shaw	Shaw	Shaw
16-May	10	Shaw	Shaw	Shaw
23-May	11	Shaw	Shaw	Shaw
30-May	12	Shaw	Shaw	Shaw

GENERAL INFORMATION 2022

Chemistry Department Policy on 'Dishonest Practice'

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 ('Academic Integrity and Breach of Instruction Regulations').

The Department of Chemistry upholds this policy. It considers plagiarism, collusion, copying, and ghost writing to be unacceptable and dishonest practices:

- ***Plagiarism*** 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.
- ***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) (with, or without payment) to prepare all or part of an item of work submitted for assessment.

Additional Information

Special consideration of assessment*:** If you feel that illness, injury, bereavement or any other critical extenuating circumstance beyond your control has prevented you from completing an item of assessment or affected your performance in that assessment, you may apply for special consideration. Special consideration is not available for items worth less than 10% of the course. Applications for special consideration should be made **within five days** of the due date for the work or examination. In the case of illness or injury, medical consultation should normally have taken place shortly before, or within 24 hours after, the due date for the required work or the date of the test or examination. For details on special consideration, or to make an application, refer to the Examinations Office website http://www.canterbury.ac.nz/exams/. ***You have the right to appeal any decision.

Extensions of deadlines: Where an extension may be granted for an assessment item, this will be decided by application to the course co-ordinator.

Late withdrawal from the 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*:** 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: these can be found on our website using the link below:
www.chem.canterbury.ac.nz/for/undergraduate.shtml

***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 will be at the discretion of the course coordinator. Please contact the coordinator if your assessment is likely to be late.

Marks and Grades: 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 (phone 3694228). 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: 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
2022