

General Course Information | Ngā Whakamārama

CHEM242/BCHM206

Organic Chemistry

0.125 EFTS 15 Points
Second Semester 2023

Description | Whakamahuki

The topics covered by this course are:

- π -Bonding Chemistry
- Chemoselectivity, Controlling Reactions and Nitrogen Functional Groups
- Carbonyl Chemistry II - Enols and Enolates as Nucleophiles
- Chemistry of cyclic molecules

This course runs in semester two. It counts 15 points towards a Bachelor of Science degree, and it is preferable that it is taken in conjunction with other 200-level chemistry courses.

Over the last 100 years organic chemistry has given rise to many of the beneficial features of modern daily living that we take for granted. The products of organic chemistry include medicines, dyes, and plastics. Organic chemistry also provides tools to study and understand complex systems including biological processes that are essential to life. Furthermore synthesis allows Chemists to build new molecules for a wide variety of biological and other purposes. For example, how can we design and synthesise new medicines to treat and understand disease?

CHEM242/BCHM206 expands and develops the concepts of organic chemistry taught in the first-year chemistry courses and CHEM212/BCHM212. Organic chemistry provides the critical link between the molecular sciences and biology.

The course provides a balanced treatment of organic chemistry for those who are majoring in chemistry, biochemistry or medicinal chemistry. The depth of treatment will allow students to continue their studies in either, or both, organic chemistry and biochemistry to a higher level.

Timetable | Wātaka

Sessions: Four lectures/workshops/tutorials per week; details to be confirmed on 'My Timetable' and the Web. There will be approximately 1 tutorial for every 3 lectures.

Course Lecturers

Dr Chris Fitchett (24 sessions)

ph 369 5344 Julius von Haast 626
e-mail: chris.fitchett@canterbury.ac.nz

Prof. Antony Fairbanks (12 sessions)

ph 369 5217 West 801
Email: antony.fairbanks@canterbury.ac.nz

Dr Daniel Foley (12 sessions)

ph 369479 Beatrice Tinsley 323
Email: daniel.foley@canterbury.ac.nz

Tutorials: Tutorials will be taken by the course lecturers with specific times and details provided by each lecturer. Attendance at the tutorials is strongly encouraged and attendance may be taken.

Students should note that in the Science Faculty that the average student is responsible for approximately **3.2 hours of additional study** for each hour of lecture at the 200-level.

Course Coordinator | Kairuruku Akoranga

Dr Chris Fitchett, Department of Chemistry

Julis von Haast 626, ext 95344, Email: chris.fitchett@canterbury.ac.nz

Email me if you have any queries about the course.

Assessment | Aromatawai

- Final Examination: 60%
- Mid-term tests: 40%

Examination and Formal Tests | Ngā Whakamātautau Ōkawa

Tests: Two 90 minute tests
please check MyTimetable for days and times.

Exam: Details to be advised.

Textbooks | Tuhinga

The textbook for the course is:

Clayden, Greeves, Warren and Wothers, *Organic Chemistry 2nd Edition*, OUP, 2012.

This textbook will be available in the Engineering & Physical Sciences Library, where copies will be on reserve.

Prerequisites

CHEM212 or BCHM 212

Learning Outcomes

Mastery of the topics listed below as demonstrated by your performance in the various assessment components.

Goal of the Course

The objectives of the course are to understand:

- the reactivity of chemical and biochemical systems,
- the driving forces associated with chemical and biochemical reactions,
- the process of writing chemical and biochemical reaction mechanisms, and
- the role of synthetic chemistry in chemistry and biochemistry

Summary of the Course Content

The topics covered by this course are:

Dr Chris Fitchett

Julius von Haast 626, ext 95344, chris.fitchett@canterbury.ac.nz

The Chemistry of the π -Bond:

(16 Sessions)

The π -bonds that occur in alkenes, alkynes and aromatic molecules represents the simplest functional group in organic chemistry. They are found in many biologically active compounds, and form the basis for modern organic electronics. In this section of the course we will examine the structure, formation and reactions of simple alkenes and alkynes, including conjugated and aromatic systems.

Chemoselectivity, controlling reactions and nitrogen functional groups:

(8 Sessions)

Why do the reactions of molecules give the products that they do, and how can we control them? The focus of this section of the course is the importance of selectivity of chemical reactions in chemical synthesis and biochemistry. We will explore how we can predict and understand the outcomes of reactions, with particular emphasis placed on the chemoselectivity of oxidation and reduction in the interconversion of functional groups. We will also investigate how we can control the outcome of reactions using protecting groups, with particular emphasis on chemical peptide synthesis. We will also explore the rich chemistry of nitrogen functional groups.

Prof. Antony Fairbanks

West 801, ext 95217, antony.fairbanks@canterbury.ac.nz

Carbonyl Chemistry II:

(12 Sessions)

A thorough grasp of the chemistry of the carbonyl group is essential to an understanding of organic chemistry. This part of the course will further develop your understanding of the basic reactivity of carbonyl containing compounds that you began in CHEM212/BCHM212 by considering enolization. We will look at the mechanisms of enolization processes, and the reactions of enols and enolates as nucleophiles, particularly to make C-C bonds. Central to synthetic applications of enols/enolates are the Aldol and Claisen condensation reactions, both of which will be covered in detail. The synthetic utility of enolates will then be explored by exemplification using a wide variety of processes, including intramolecular reactions. We will also consider the reactions of α/β unsaturated carbonyl compounds with nucleophiles and cascade reactions (e.g. the Robinson Ring Annelation). Finally we will also look at key aspects of control of enolate alkylation, e.g. how to achieve C vs O alkylation; how to control the regiochemistry of enolate formation; how to control reactions between two different carbonyl compounds.

Dr Daniel Foley

Beatrice Tinsley 323, ext 90479, daniel.foley@canterbury.ac.nz

Ring Chemistry:

(12 Sessions)

This part of the course will focus on the structure and special reactivity of cyclic compounds: this study is often termed 'Alicyclic Chemistry'. Topics covered will include the types of strain in cyclic molecules and their conformations. We will look at the synthesis of cyclic molecules, including considerations of both the kinetics and thermodynamics of ring closing reactions. The special reactivity of small and large rings will be rationalised by consideration of their strain energies. The stereochemistry of reactions of six membered rings will be covered in detail, including the different rates of reactions for axial or equatorial substituents. The course will conclude with an introduction to the structures of carbohydrates – which all exist as cyclic molecules.

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