



CHEM2601

Synthesis

Session 1, In person-scheduled-weekday, North Ryde 2025

School of Natural Sciences

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General Information

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Credit points

10

Prerequisites

CHEM1001 and CHEM1002

Corequisites

Co-badged status

Unit description

This unit serves the needs of students who wish to major in chemistry or biomolecular sciences, as well as those pursuing related disciplines in biological, medical, materials and health sciences. It will be valuable to anyone with an interest in how organic and inorganic compounds react with one another, and how chemists use this knowledge of molecular interactions to synthesise new compounds with desirable properties (eg, new pharmaceuticals, new catalysts, and new materials). The unit focuses on the principles, mechanisms and synthetic procedures of organic and inorganic compounds. Topics include: chemical reactivity; stereochemistry; introduction to the spectroscopic identification of compounds; reaction mechanisms; and synthetic methods. The study of these mechanisms and methods provides an understanding of chemical processes and reactivity applicable in designed and living systems. The practical component is aimed at developing laboratory skills and deductive reasoning; it comprises syntheses of various classes of compounds and identification of unknown compounds by chemical and spectroscopic means.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals ([UNSDGs](#)) Good Health and Well Being; Industry, Innovation and Infrastructure

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Predict the relative reactivity of a series of related compounds

ULO2: Assess the risks and hazards associated with working in a synthetic laboratory environment

ULO3: Plan and carry out different types of synthetic reactions: specifically, perform functional group transformations to change one molecule into another and use carbon-carbon, carbon-nitrogen, carbon-oxygen, and metal-based bond forming reactions to construct larger molecules in a laboratory setting with confidence in a safe and efficient manner

ULO4: Use spectroscopic information to deduce the structure of simple organic and inorganic molecules

ULO5: Purify organic and inorganic compounds using basic synthetic techniques

ULO6: Write a report in a scientific format

General Assessment Information

Requirements to Pass this Unit

To pass this unit you must:

- Attempt all assessments, and
- Achieve a total mark equal to or greater than 50%, and
- Actively participate in all hurdle activities

Hurdle Activities

As explained in the assessment section, practicals/experiments are the hurdle activities as they have interconnected learning outcomes and demonstrate the necessary techniques. A passing grade in the practical component (hurdle) is required to pass the unit. You are allowed one missed practical without a medical certificate but missing two or more practicals even with approvals means serious risk of failing the unit, in which case you must consult with the unit convenors for options or you will fail the unit if left unaddressed. Further details are in the laboratory manual/notes (see the iLearn website).

General Faculty Policy on assessment submission deadlines and late submissions:

Online assessments, in-class activities, or scheduled tests/quizzes and exam must be undertaken at the time indicated in the unit guide or provided on iLearn. Late assessments generally will not be accepted for all iLearn online quizzes/test/exercises in this unit. The submission time for all uploaded assessments is 11:55 pm. A grace period of 1-hour will be provided to students who experience a technical concern. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration (see the section on Special Consideration)

-Periodic spot tests or quizzes (see unit iLearn site for details and specific dates) are to help you with revising and keeping up with the unit material as the semester progresses, and late submission is not accepted. The answers will be provided afterwards. You can miss any or all of the periodic quizzes without apparent penalty (you do not need a special consideration request for missing this). However, no make-up tests/quizzes will be given, and the final exam's mark will be automatically used for a missed spot test or quiz. This means that you should engage regularly and keep up with the content.

-The week 4 in-class/in-person test (the specific date, format, and coverage will be given on the iLearn website) is aimed at providing early feedback to your learning outcomes. There will be no make-up exam for this test. With an approved special consideration, your final exam mark will be used for a missed in-class test mark.

-For practical-related online assessments, due dates will be extended only with an approved special consideration request. Further extensions with approved special considerations may be permitted. No late submission accepted after extended due dates. Please refer to the unit's iLearn website for further details.

Special Consideration

The [Special Consideration Policy](#) aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. *If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through <https://connect.mq.edu.au>.*

Assessment Tasks

Name	Weighting	Hurdle	Due
In-class Test	15%	No	Week 4; see iLearn for details
Practical Assessment	30%	Yes	Weeks 2-13; see iLearn for details
Final Examination	40%	No	Final examination period of S1
Weekly quizzes	15%	No	Weeks 2-13; see iLearn for details

In-class Test

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 6 hours

Due: **Week 4; see iLearn for details**

Weighting: **15%**

In-Class test. See the Student Unit Guide for further details.

On successful completion you will be able to:

- Predict the relative reactivity of a series of related compounds
- Use spectroscopic information to deduce the structure of simple organic and inorganic molecules

Practical Assessment

Assessment Type ¹: Lab report

Indicative Time on Task ²: 24 hours

Due: **Weeks 2-13; see iLearn for details**

Weighting: **30%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)

These experiments have interconnected learning outcomes and demonstrate the necessary techniques. Some of the practical sessions will be done in the format of "dry-lab" (e.g. workshops) to develop independence in problem solving.

On successful completion you will be able to:

- Predict the relative reactivity of a series of related compounds
- Assess the risks and hazards associated with working in a synthetic laboratory environment
- Plan and carry out different types of synthetic reactions: specifically, perform functional group transformations to change one molecule into another and use carbon-carbon, carbon-nitrogen, carbon-oxygen, and metal-based bond forming reactions to construct larger molecules in a laboratory setting with confidence in a safe and efficient manner
- Use spectroscopic information to deduce the structure of simple organic and inorganic molecules
- Purify organic and inorganic compounds using basic synthetic techniques
- Write a report in a scientific format

Final Examination

Assessment Type ¹: Examination

Indicative Time on Task ²: 18 hours

Due: **Final examination period of S1**

Weighting: **40%**

The final exam is designed to address specific understanding of all the topics presented within the course and to show that the knowledge obtained can be applied to new problems.

On successful completion you will be able to:

- Predict the relative reactivity of a series of related compounds
- Use spectroscopic information to deduce the structure of simple organic and inorganic molecules

Weekly quizzes

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 24 hours

Due: **Weeks 2-13; see iLearn for details**

Weighting: **15%**

These weekly quizzes/tests are performed in the SGTA face-to-face to encourage continuous learning.

On successful completion you will be able to:

- Predict the relative reactivity of a series of related compounds
- Use spectroscopic information to deduce the structure of simple organic and inorganic molecules

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Recommended Texts and/or Materials

Online TopHat “Organic Chemistry” (please see details on the unit’s iLearn website)

“Organic Chemistry”, 9th Edition (2016) by John McMurry; Cengage Learning (recommended)*

“Organic Chemistry – Study Guide and Solutions Manual”, 9th Edition (2016) by Susan McMurry; Cengage Learning (recommended)*

Molecular Model Set for Organic Chemistry (recommended)*

“Pushing Electrons. A Guide for Students in Organic Chemistry”, 4th Edition (2014)

by Daniel P. Weeks, Cengage Learning (recommended)*

Inorganic Chemistry by Gary L. Miessler, Paul J. Fischer and Donald A. Tarr, 5th Edition, (2014) Pearson (required)*

“Introduction to Solid State Chemistry” by Smart and Moore, 4th Edition (2012) Taylor and Francis (recommended)*

*Textbooks for this unit can be purchased online from Booktopia.

Copies of the texts are also available in the library. Please see the unit's iLearn website for

further details such as **Unit Schedule/Week 1 and methods of communication**

Please regularly check your iLearn page as well as class announcements for detailed information, updates, and efficient ways of communication.

Active participation in class is ESSENTIAL to your success in this unit. These are not to be viewed as traditional “lectures” for passive information uptake but used to emphasise key points and concepts with relevant examples with your active participation. Studying the material to be covered BEFORE coming to a lecture class is particularly productive in maximising the learning outcomes in class. Historically, non-participation has a much more deleterious effect that is ultimately reflected in exam performances.

Circumstances such as routine demands of employment/financial need or extra-curricular activities, routine family problems, and difficulties adjusting to university life and stress associated with the demands of academic work, are not unforeseeable circumstances beyond your control and should not be used as an excuse to miss a class. Most of the class material will be available on the unit website, while there will be some provided in class. While recorded lectures are available in this unit, they must not be used in place of active class participation but rather serve as useful resources for reviewing the content.

SGTAs are critical for effective learning with demonstrations of how to solve problems in order to do well in tests/exams. **There are no SGTAs in week 1.** Regular attendance of a SGTA is key to keeping up with the unit content.

Practicals are compulsory and must be done on-campus. The detailed lab practical notes/schedule is provided through the unit's iLearn website. The class is divided into two groups (Group A and Group B) for attending the practicals/ workshops according to Group A Schedule and Group B Schedule (on iLearn). Participation in the practicals is compulsory, and no make-up labs will be available. Failure to attend more than once without a special consideration approval will result in being failed. **There are no practicals in the 1st week.** The students are to use the 1st week practical time to plan and prepare for general practical requirements such as performing risk assessments of experiments and safety review. Please see iLearn instructions for details.

Some of the practical sessions will be used as workshops for problem solving with more independence as well as learning how to communicate the chemistry, and your attendance and active participation in these sessions is compulsory and marks will be awarded for your interactive/active contributions. (more details on iLearn). The class is divided into two groups (Group A and Group B) for attending the workshops (similar to the practicals) according to Group A Schedule and Group B Schedule. Students are expected to attempt the questions prior to attending and bring in all relevant course notes and textbooks for the workshops.

Once you have chosen your group (A or B) and a practical session, you will attend the same session slot for the entire semester.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to

Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies](https://students.mq.edu.au/support/study/policies) (<https://students.mq.edu.au/support/study/policies>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit connect.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

The Writing Centre

[The Writing Centre](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via the [Service Connect Portal](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Changes from Previous Offering

No change in unit content and structure however we value student feedback and encourage students to provide constructive feedback to the teaching staff directly whenever it arises and via student surveys, such that we improve the learning outcomes collaboratively.

Unit information based on version 2025.04 of the [Handbook](#)