



# CHEM2601

## Synthesis

Session 1, Weekday attendance, North Ryde 2021

*Archive (Pre-2022) - Department of Molecular Sciences*

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### Disclaimer

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### Notice

As part of [Phase 3 of our return to campus plan](#), most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to [timetable viewer](#). To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

## General Information

Unit convenor and teaching staff

Unit Convenor/Lecturer

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make an appointment

Lecturer

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Lecturer

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make an appointment

Credit points

10

Prerequisites

(CHEM1001 or CBMS107 or CBMS103) and (CHEM1002 or CBMS108 or CBMS101 or CBMS102)

Corequisites

Co-badged status

CHEM6601

### 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.

## 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

If you miss a practical class, mid-term test/exam, or are late for completing an assessment due to illness or misadventure, you are required to 1) submit a request for special consideration no later than five (5) working days after the due date and 2) email the Unit Convenor. A passing

grade in the practical component (hurdle) is required to pass the unit. Attendance in the practicals is compulsory, and no make-up labs will be available. Failure to attend more than once without a special consideration approval through ask.mq will result in failing this hurdle. Please find further information on Special Consideration here: <https://students.mq.edu.au/study/my-study-program/special-consideration>

Periodic spot tests or quizzes (normally 10 minutes each) will come randomly (online through iLearn) to help you with revising and keeping up with the course material as the course progresses. The questions in the periodic quizzes resemble those in the exams. 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 will be given, and the final exam's mark will be used for a missed spot test or quiz. This means that you should engage regularly and keep up with the content.

The mid-semester test (50 minutes) will be in week 6 (the specific date and coverage will be given on the iLearn website). It will be in a similar format to that of past exams and covers weeks 1 to 5 material. There will be no make-up exam for the mid-semester test, and with an approved special consideration, your final exam mark will be used for a missed mid-semester test mark.

Please refer to the unit's iLearn website for further details (normally available for viewing early to mid Feb.)

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#"><u>Periodic online quizzes to encourage continuous learning</u></a>	10%	No	Weeks 1-13 excluding week 6. See iLearn for details.
<a href="#"><u>Practical Assessment</u></a>	20%	Yes	Weeks 2-13; see iLearn for details
<a href="#"><u>Workshop</u></a>	5%	No	Weeks 6, 7, 12, and 13
<a href="#"><u>Midsemester Test</u></a>	15%	No	Week 6
<a href="#"><u>Final Examination</u></a>	50%	No	Final examination period of S1

### Periodic online quizzes to encourage continuous learning

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 6 hours

Due: **Weeks 1-13 excluding week 6. See iLearn for details.**

Weighting: **10%**

Spot tests may be conducted at any stage in class. They are to encourage continuous learning of the course material.

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 <sup>1</sup>: Lab report

Indicative Time on Task <sup>2</sup>: 12 hours

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

Weighting: **20%**

**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. The student is required to participate in all practical sessions and allowed no more than one missed practical without a medical certificate. The student is required to perform the experiments according to instructions and complete post-lab exercises/reports satisfactorily.

Missing two or more practicals even with approved disruption-based exemptions means that the learning outcomes of this hurdle requirement have not been met. In this case, the student should consult with the lecturer-in-charge for options. Otherwise, a fail mark may result from this hurdle and ultimately a fail mark for the unit.

Details on what is expected for assessment of the practical component, including penalties for late submissions, are provided in the laboratory manual/notes (see the iLearn website). The mark will reflect the level of practical performance and safety/laboratory techniques seen within the laboratory as well as clear presentation, interpretation of results and addressing of specific questions within post-lab exercises/writing up.

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

## Workshop

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 8 hours

Due: **Weeks 6, 7, 12, and 13**

Weighting: **5%**

The workshops are essentially long tutorial sessions in which students practice exam style questions and develop independence in problem solving.

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

## Midsemester Test

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 6 hours

Due: **Week 6**

Weighting: **15%**

Mid-semester Test - There will be a 50 minute test in week 6 class (covering weeks 1-5 material).

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

## Final Examination

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 18 hours

Due: **Final examination period of S1**

Weighting: **50%**

The final exam will be 3 hours in length with 10 minutes reading time. It 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

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<sup>1</sup> 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.

<sup>2</sup> 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

You must regularly check the unit web page for course related information. The web page for this unit can be found at: <http://ilearn.mq.edu.au>

### Required and Recommended Texts and/or Materials

- Online TopHat “Organic Chemistry” (required; please see sign up 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 <https://www.booktopia.com.au/c>oop. Copies of the texts are also available in the library. Please see the unit's iLearn website for further details.

## Unit Schedule

The timetable may be subject to change so please check on the University web site at: <http://www.timetables.mq.edu.au/>. You must regularly check the unit web page for course related information. The web page for this unit can be found at: <http://ilearn.mq.edu.au>

Lecture classes are online only. 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 class participation but rather serve as useful resources for reviewing the content.

Tutorial classes will be offered on-campus and online. Tutorials are critical for effective learning and practicing how to solve problems in order to do well in tests/exams. There are no tutorials in week 1. You should choose one from the three sessions on offer (two on campus and one online) and stick with the same session throughout the semester.

Workshops attendance and active participation (either on-campus or online) in the problem-solving workshop sessions is compulsory, and marks will be awarded for your interactive contributions. The class is divided into two groups (Group A and Group B) for attending the workshops (as well as practicals, please see the next paragraph) according to Group A Schedule and Group B Schedule (on iLearn). Students are expected to attempt the questions prior to attending and bring in all relevant course notes and textbooks for the workshops. The workshop problems will be on the iLearn website closer to the dates. Workshops are long tutorial sessions where you will be asked to answer final exam style questions - some exam questions will be drawn straight from the workshop questions. The location will be announced via iLearn.

Practicals are compulsory and must be done on-campus. The detailed lab practical notes/workshop 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. Some of the lab sessions will be workshops on problem solving. Workshops are essentially long tutorial sessions where you will be asked to answer final exam style questions – some final exam questions will be drawn straight from the workshop questions. Please refer to iLearn instructions for further details. There are no practicals in the 1st week. The students are to use the 1st week practical time to self study and prepare for general practical requirements such as performing risk assessments of experiments and safety review. Please see iLearn instructions for details.

**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](#)
- [Grade Appeal Policy](#)
- [Complaint Management 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 [ask.mq.edu.au](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Student Support

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

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [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

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](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.