



CHEM2601

Synthesis

Session 1, In person-scheduled-weekday, North Ryde 2022

School of Natural Sciences

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General Information

Unit convenor and teaching staff

Unit Convenor/Lecturer

Fei Liu

fei.liu@mq.edu.au

Contact via 9850 8312

4WW 330

make an appointment

Lecturer

Koushik Venkatesan

koushik.venkatesan@mq.edu.au

Contact via 98508296

4WW 123

make an appointment

Lecturer

Alf Garcia-Bennett

alf.garcia@mq.edu.au

Contact via 9850 8285

4WW 338

make an appointment

Credit points

10

Prerequisites

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

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.

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

General Faculty Policy on assessment submission deadlines and late submissions:

Online quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide. Should these activities be missed due to illness or misadventure,

students may apply for Special Consideration.

All other assessments must be submitted by 5:00 pm on their due date (also will be confirmed on iLearn). Should these assessments be missed due to illness or misadventure, students should apply for Special Consideration.

Assessments not submitted by the due date will receive a mark of zero **unless** late submissions are specifically allowed as indicated in the unit guide or on iLearn.

If late submissions are permitted as indicated in the unit guide or on iLearn a consistent penalty will be applied for late submissions as follows:

A 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20% is due 5 pm on 1 January. Student A submits the assessment at 1 pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15, resulting in the loss of three (3) marks. Student A is then awarded a final mark of 12/20.

Late submissions will not be accepted for all iLearn online quizzes/test/exercises unless you have a special consideration approval.

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 10-20 minutes each) will be online through iLearn to help you with revising and keeping up with the course material as the course progresses (dates TBA). 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 automatically 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 one week before semester start)

Assessment Tasks

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

Periodic online quizzes to encourage continuous learning

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 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 ¹: Lab report

Indicative Time on Task ²: 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 ¹: Problem set

Indicative Time on Task ²: 8 hours

Due: **Weeks 6, 7, 12, and 13; see iLearn for details**

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 ¹: Quiz/Test

Indicative Time on Task ²: 6 hours

Due: **Week 6; see iLearn for details**

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 ¹: Examination

Indicative Time on Task ²: 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

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

COVID Information and on-campus classes

On-campus teaching continues to be scheduled for Session 1, 2022. Masks are compulsory for all classes in indoor spaces and social distancing will be implemented wherever possible. Students will also be required to sanitise surfaces before and after use.

Students are requested to minimise the risk of spreading COVID to themselves and others in

accordance with the university and NSW Health guidelines: <https://www.mq.edu.au/about/corona-virus-faqs> and <https://www.nsw.gov.au/covid-19/stay-safe>.

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.

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 class participation but rather serve as useful resources for reviewing the content.

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.** Regular attendance of a tutorial is key to keeping up with the unit content.

Workshops attendance and active participation 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. **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.

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>

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 \(https://students.mq.edu.au/su\)](https://students.mq.edu.au/su)

[pport/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>) 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 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 Enquiries

Got a question? Ask us via [AskMQ](#), 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.