CHEM2601

Synthesis

Session 1, In person-scheduled-weekday, North Ryde 2024

School of Natural Sciences

Contents

General Information

Unit convenor and teaching staff
Lecturer/Unit convenor
Fei Liu
fei.liu@mq.edu.au
Contact via fei.liu@mq.edu.au
4WW 330
Make an appointment

Lecturer
Koushik Venkatesan
Koushik.venkatesan@mq.edu.au
Contact via Koushik.venkatesan@mq.edu.au
4WW 123
Make an appointment

Lecturer
Alf Garcia-Bennett
Alf.garcia@mq.edu.au
Contact via Alf.garcia@mq.edu.au
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

Requirements to Pass this Unit To pass this unit you must: • Attempt all assessments as required, and • Achieve a total mark equal to or greater than 50%, and • Participate in, and undertake all hurdle activities

Hurdle Activities As explained in the assessment section, practials/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 whick case you must consult with the unit convenor 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 quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide. Late assessments generally will not be accepted for all iLearn online quizzess/test/exercises in this unit. The submission time for all uploaded assessments is 11:55 pm. A 1-hour grace period 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 as explained below: -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 course material as the course progresses, and late submission is not accepted. 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 4 (the specific date, format, and coverage will be given on the iLearn website). Late submission is not accepted and there will be no make-up exam for the mid-semester test. With an approved special consideration, your final exam mark will be used for a missed mid-semester test mark. -For pratical-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.

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 ask.mq.edu.au.

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
Final Examination	40%	No	Final examination period of S1
In-class Test	15%	No	Week 4; see iLearn for details
Weekly quizzes	15%	No	Weeks 2-13; see iLearn for details

Name	Weighting	Hurdle	Due
Practical Assessment	30%	Yes	Weeks 2-13; see iLearn for details

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

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 - This will be in a week 4 class (covering weeks 1-3 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

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

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

[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 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.

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/ 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.

Some of the practical sessions will be used as workshops, and your attendance and active participation in the 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, guided problem-solving sessions where you will be asked to answer final exam style questions with more independence - some exam questions will be drawn straight from the workshop questions. The location will be announced via iLearn. Once you have chosen your group (A or B) and a practical session, you will attend the same session slot for the entire semester. 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

COVID Information

For the latest information on the University’s response to COVID-19, please refer to the Coronavirus infection page on the Macquarie website: https://www.mq.edu.au/about/coronavirus-faqs. Remember to check this page regularly in case the information and requirements change during semester. If there are any changes to this unit in relation to COVID, these will be communicated via iLearn.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (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). 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 Advocacy provides independent advice on MQ policies, procedures, and processes

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.

Unit information based on version 2024.02 of the Handbook