

CBMS791

Research Topic: Advanced Organic Chemistry

S1 Day 2019

Dept of Molecular Sciences

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General Information

Unit convenor and teaching staff Unit Convenor Fei Liu fei.liu@mq.edu.au Contact via fei.liu@mq.edu.au 4WW 330 Students are encouraged to arrange a meeting via email. Lecturer Peter Karuso peter.karuso@mq.edu.au Contact via peter.karuso@mq.edu.au 4WW232 Students are encouraged to arrange a meeting via email. Lecturer Andrew Piggott andrew.piggott@mq.edu.au Contact via andrew.piggott@mg.edu.au 4WW 334 Students are encouraged to arrange a meeting via email. Lecturer Joanne Jamie joanne.jamie@mq.edu.au Contact via joanne.jamie@mq.edu.au 4WW 231 Students are encouraged to arrange a meeting via email. Lecturer Koushik Venkatesan koushik.venkatesan@mg.edu.au Contact via koushik.venkatesan@mq.edu.au 4WW123 Students are encouraged to arrange a meeting via email. Lecturer Indrek Pernik indrek.pernik@mq.edu.au Contact via indrek.pernik@mq.edu.au 6WW308 Students are encouraged to arrange a meeting via email. Credit points

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Prerequisites Admission to MRes

Corequisites

Co-badged status

Unit description

This unit comprises study of an advanced topic in chemistry and biomolecular sciences. The area studied each year is tailored to the current student cohort. Emphasis is put on both the understanding of advanced concepts as well as their application in problem-solving and/or research environments. This unit provides the students with advanced and contemporary knowledge in the broad discipline of organic chemistry and focuses on topics that describe modern theories and practices in this area. As the control of change forms the heart of chemistry, this unit will examine the principles of change in more complex systems and in quantitative terms that are appropriate to graduate level studies. The molecular insight developed in this course will prepare students for creative research in basic and applied organic chemistry or interface fields. Topics may include but are not limited to: advanced structural chemistry and methods; mechanistic models and characterisation; advanced synthesis and catalysis; biomimetic processes and materials; molecular assemblies; reactive intermediates; and properties.

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:

Describe and outline modern theories and methods for understanding and analysing molecular structure and reactivity;

Propose the mechanism of multicomponent reactions given the starting materials and reagent or reagent and product;

Understand key molecular design and photochemistry principles to achieve light emission from transition metal complexes;

Understand the important role of organic chemistry in the development of new materials; Understand how to use small-molecule probes to interrogate complex biological systems; Understand catalyst design and the effect it has on catalytic transformations;

Comprehend primary literature such as journals and reviews and evaluate conclusions with constructive criticism;

Develop oral presentation skills for effective communication of mechanistic analysis and structural characterisation

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignments	40%	Yes	week 2, 3, 4, 5, 6, 8, 10, 11
Workshops	24%	No	Weeks 2-13
Oral presentations	36%	No	week 7, 9, 12, 13

Assignments

Due: week 2, 3, 4, 5, 6, 8, 10, 11

Weighting: 40%

This is a hurdle assessment task (see <u>assessment policy</u> for more information on hurdle assessment tasks)

8 Assignment sets in total; answering problem sets involve providing short answers and calculations with literature searches. These will be provided in class or via the unit web page. Due in the tutorial of week 2, 3, 4, 5, 6, 8, 10, 11.

On successful completion you will be able to:

- Describe and outline modern theories and methods for understanding and analysing molecular structure and reactivity;
- Propose the mechanism of multicomponent reactions given the starting materials and reagent or reagent and product;
- Understand key molecular design and photochemistry principles to achieve light emission from transition metal complexes;
- Understand the important role of organic chemistry in the development of new materials;
- Understand how to use small-molecule probes to interrogate complex biological systems;
- Understand catalyst design and the effect it has on catalytic transformations;
- Comprehend primary literature such as journals and reviews and evaluate conclusions with constructive criticism;

Workshops

Due: Weeks 2-13 Weighting: 24%

6 in total; working through problems and discussing literature topics

On successful completion you will be able to:

- Describe and outline modern theories and methods for understanding and analysing molecular structure and reactivity;
- Comprehend primary literature such as journals and reviews and evaluate conclusions with constructive criticism;

Oral presentations

Due: week 7, 9, 12, 13 Weighting: 36%

4 in total, ~20 minutes each for presenting on research of primary literature and critical analysis of results on a given topic. Due in the tutorial of week 7, 9, 12 and lecture of week
13. Attendance and participation will be part of the assessment mark.

On successful completion you will be able to:

- Describe and outline modern theories and methods for understanding and analysing molecular structure and reactivity;
- Understand key molecular design and photochemistry principles to achieve light emission from transition metal complexes;
- Understand the important role of organic chemistry in the development of new materials;
- Understand how to use small-molecule probes to interrogate complex biological systems;
- Understand catalyst design and the effect it has on catalytic transformations;
- Develop oral presentation skills for effective communication of mechanistic analysis and structural characterisation

Delivery and Resources

Lectures will be in weeks 1-12. Tutorials/workshops, each 2 hours, will be conducted from weeks 2-13 (please contact each lecturer for more details).

Lectures will be presented as a combination of formal lectures and interactive Q&A discussions. Some lecture material will be available on the unit web site, while other material will be provided in the lecture class. At the graduate level, the students are expected to demonstrate a high level of independence in their learning. This means reading the required materials (and beyond), searching in primary literature, working through problems outside of lectures. Working on the assignment questions with peer consultation is permitted; however, individualised thought processes must be clearly demonstrated. In the tutorials/workshops the students will present their seminars on assigned topics. All students will be expected to participate in discussions.

The main source of materials will be from the primary literature (i.e. journal articles, reviews, and sections of research books). Francis A. Carey and Richard J. Sundberg's Advanced Organic Chemistry A&B is the recommended text and an electronic copy of this can be downloaded from ilearn or the library's web site. This text should be used as a reference or background source for the topics discussed.

Students are expected to use iLearn and access the web pages regularly for announcements, relevant links downloadable course material, and other supporting information. The staff will be available for consultations in person after an appointment has been made via email.

The offer this year is similar to the year before with some changes of specific topics drawn from the current primary literature.

Unit Schedule

The main source of materials will be from the primary literature (i.e. journal articles, reviews, and sections of research books). Francis A. Carey and Richard J. Sundberg's Advanced Organic Chemistry A is the recommended text and provides a general indication of topics of covered and the order of coverage.

Learning and Teaching Activities

Lectures

The theory associated with the unit content is presented

Tutorial sessions

Students work through problems (that are similar to those encountered in examinations associated with the content of the relevent module

Presentations

Students provide literature reviews and their critical analyses

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.m q.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-centr al). 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
- <u>Special Consideration Policy</u> (*Note: The Special Consideration Policy is effective from 4* December 2017 and replaces the Disruption to Studies Policy.)

Undergraduate students seeking more policy resources can visit the <u>Student Policy Gateway</u> (<u>htt</u> <u>ps://students.mq.edu.au/support/study/student-policy-gateway</u>)</u>. It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (http s://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/p olicy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

Results

Results published on platform other than <u>eStudent</u>, (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 <u>eStudent</u>. For more information visit <u>ask.mq.edu.au</u> or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

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

Learning Skills

Learning Skills (<u>mq.edu.au/learningskills</u>) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

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

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

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

When using the University's IT, you must adhere to the <u>Acceptable Use of IT Resources Policy</u>. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcome

• Comprehend primary literature such as journals and reviews and evaluate conclusions with constructive criticism;

Assessment tasks

- Assignments
- Workshops

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Describe and outline modern theories and methods for understanding and analysing molecular structure and reactivity;
- Propose the mechanism of multicomponent reactions given the starting materials and reagent or reagent and product;
- Understand key molecular design and photochemistry principles to achieve light

emission from transition metal complexes;

- Understand the important role of organic chemistry in the development of new materials;
- Understand how to use small-molecule probes to interrogate complex biological systems;
- Understand catalyst design and the effect it has on catalytic transformations;
- Comprehend primary literature such as journals and reviews and evaluate conclusions with constructive criticism;

Assessment task

Assignments

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Describe and outline modern theories and methods for understanding and analysing molecular structure and reactivity;
- Propose the mechanism of multicomponent reactions given the starting materials and reagent or reagent and product;
- Comprehend primary literature such as journals and reviews and evaluate conclusions with constructive criticism;

Assessment tasks

- Assignments
- Workshops

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Describe and outline modern theories and methods for understanding and analysing molecular structure and reactivity;
- Propose the mechanism of multicomponent reactions given the starting materials and reagent or reagent and product;
- Understand key molecular design and photochemistry principles to achieve light emission from transition metal complexes;
- Understand how to use small-molecule probes to interrogate complex biological systems;
- Understand catalyst design and the effect it has on catalytic transformations;
- Comprehend primary literature such as journals and reviews and evaluate conclusions with constructive criticism;

Assessment tasks

- Assignments
- Workshops

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

- Understand key molecular design and photochemistry principles to achieve light emission from transition metal complexes;
- Understand the important role of organic chemistry in the development of new materials;
- Understand how to use small-molecule probes to interrogate complex biological systems;
- Understand catalyst design and the effect it has on catalytic transformations;
- Develop oral presentation skills for effective communication of mechanistic analysis and structural characterisation

Assessment tasks

- Workshops
- Oral presentations

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

Learning outcomes

- Understand the important role of organic chemistry in the development of new materials;
- Develop oral presentation skills for effective communication of mechanistic analysis and structural characterisation

Assessment tasks

- Assignments
- · Oral presentations