



MOLS7052

Research Topic: Chemical Biology

Session 2, In person-scheduled-weekday, North Ryde 2022

School of Natural Sciences

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General Information

Unit convenor and teaching staff

Unit Convenor and Lecturer

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Credit points

10

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. Chemical biology is the science of small molecules in the context of living systems. This course focuses on current topics in chemical biology, particularly experiments in which small molecules are used to probe or control biological systems in novel ways or manipulate and understand biological systems. As the goal of the course is to familiarise students with innovative recent experimental approaches and to stimulate them to explore the boundaries of chemistry and biology, the unit will be taught extensively through the primary literature. Topics may include but are not limited to: In vitro display technologies, chemical proteomics, primary and secondary metabolism, chemical tools in mammalian systems, natural products and drug discovery.

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: write out the mechanism for reactions in primary and secondary metabolism

ULO2: apply chemical rationale for the design, synthesis, and application of small molecules for the manipulation of biological systems

ULO3: apply chemical rationale for the design, synthesis, and application of small molecules for the manipulation of biological systems

ULO4: able to propose a set of experiments to elucidate the mode of action of a bioactive small molecule in the development of our understanding of cellular pathways and in drug design.

ULO5: articulate the principles underpinning forward and reverse chemical proteomics and in vitro display techniques and describe the advantages and limitations of each technique for identifying the cellular target(s) of bioactive compounds

ULO6: design and propose the synthesis of small molecule affinity probes for use in chemical biology.

General Assessment Information

Late Assessment Submission Penalty

From 1 July 2022, Students enrolled in Session based units with written assessments will have the following university standard late penalty applied. Please see <https://students.mq.edu.au/study/assessment-exams/assessments> for more information.

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark) will be applied each day a written assessment is not submitted, up until the 7th day (including weekends). After the 7th day, a grade of '0' will be awarded even if the assessment is submitted. Submission time for all written assessments is set at **11:55 pm**. A 1-hour grace period is provided to students who experience a technical concern.

For any late submission of time-sensitive tasks, such as scheduled tests/exams, performance assessments/presentations, and/or scheduled practical assessments/labs, students need to submit an application for [Special Consideration](#).

Assessments where Late Submissions will be accepted

In this unit, late submissions will accepted as follows:

- Assignments – YES, Standard Late Penalty applies

Assessment Tasks

Name	Weighting	Hurdle	Due
assignment 3	20%	No	Weeks 2,3
assignment 2	30%	No	Weeks 6,7,8
Assignments 1	30%	No	Weeks 10,11,12
Oral presentation	20%	No	Weeks 4,8

assignment 3

Assessment Type ¹: Problem set

Indicative Time on Task ²: 3 hours

Due: **Weeks 2,3**

Weighting: **20%**

assignment 3

On successful completion you will be able to:

- write out the mechanism for reactions in primary and secondary metabolism
- apply chemical rationale for the design, synthesis, and application of small molecules for

the manipulation of biological systems

- apply chemical rationale for the design, synthesis, and application of small molecules for the manipulation of biological systems
- able to propose a set of experiments to elucidate the mode of action of a bioactive small molecule in the development of our understanding of cellular pathways and in drug design.
- articulate the principles underpinning forward and reverse chemical proteomics and in vitro display techniques and describe the advantages and limitations of each technique for identifying the cellular target(s) of bioactive compounds
- design and propose the synthesis of small molecule affinity probes for use in chemical biology.

assignment 2

Assessment Type ¹: Qualitative analysis task

Indicative Time on Task ²: 4 hours

Due: **Weeks 6,7,8**

Weighting: **30%**

assignment 2

On successful completion you will be able to:

- write out the mechanism for reactions in primary and secondary metabolism
- apply chemical rationale for the design, synthesis, and application of small molecules for the manipulation of biological systems
- apply chemical rationale for the design, synthesis, and application of small molecules for the manipulation of biological systems
- able to propose a set of experiments to elucidate the mode of action of a bioactive small molecule in the development of our understanding of cellular pathways and in drug design.
- articulate the principles underpinning forward and reverse chemical proteomics and in vitro display techniques and describe the advantages and limitations of each technique for identifying the cellular target(s) of bioactive compounds
- design and propose the synthesis of small molecule affinity probes for use in chemical biology.

Assignments 1

Assessment Type ¹: Problem set

Indicative Time on Task ²: 4 hours

Due: **Weeks 10,11,12**

Weighting: **30%**

assignment 1

On successful completion you will be able to:

- write out the mechanism for reactions in primary and secondary metabolism
- apply chemical rationale for the design, synthesis, and application of small molecules for the manipulation of biological systems
- apply chemical rationale for the design, synthesis, and application of small molecules for the manipulation of biological systems
- able to propose a set of experiments to elucidate the mode of action of a bioactive small molecule in the development of our understanding of cellular pathways and in drug design.
- articulate the principles underpinning forward and reverse chemical proteomics and in vitro display techniques and describe the advantages and limitations of each technique for identifying the cellular target(s) of bioactive compounds
- design and propose the synthesis of small molecule affinity probes for use in chemical biology.

Oral presentation

Assessment Type ¹: Presentation

Indicative Time on Task ²: 4 hours

Due: **Weeks 4,8**

Weighting: **20%**

2 oral presentations

On successful completion you will be able to:

- apply chemical rationale for the design, synthesis, and application of small molecules for the manipulation of biological systems

- able to propose a set of experiments to elucidate the mode of action of a bioactive small molecule in the development of our understanding of cellular pathways and in drug design.
 - articulate the principles underpinning forward and reverse chemical proteomics and in vitro display techniques and describe the advantages and limitations of each technique for identifying the cellular target(s) of bioactive compounds
 - design and propose the synthesis of small molecule affinity probes for use in chemical biology.
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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

Unit topics will be discussed each week in small groups. There will be a strong focus on analysing and discussing recent advances reported in the primary literature. Students are expected to be actively involved in these discussions, which will require reading the assigned material BEFORE each SGTA session.

Unit Schedule

Weeks 1-4: Monoclonal Antibodies (Prof. Alison Rodger)

Weeks 5-8: Biosynthesis of Natural Products (A/Prof. Andrew Piggott)

Weeks 9-12: Small Molecules in Chemical Biology (Dr Fei Liu)

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 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.

Changes from Previous Offering

Prof. Alison Rodger will replace Prof. Peter Karuso and teach a section on monoclonal antibodies