CBMS188

Advanced Chemistry and Biomolecular Science I

FY1 Day 2019

Dept of Molecular Sciences

Contents

General Information

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Credit points
3

Prerequisites Admission to BAdvSc
Corequisites (CBMS102 or CBMS108) and (CBMS103 or CBMS107)
Co-badged status
Unit description This unit is a full-year unit based on contemporary topics in chemistry and biomolecular sciences. It is comprised of weekly research-focussed seminars and discussions. This unit caters for advanced students who are strong in chemistry and/or science and who are interested in pursuing a scientific career. It aims to encourage well-qualified students to reach their full potential. This unit is an extension of CBMS107 and CBMS108. The unit will treat some topics in more depth and introduce others that are not covered in the regular undergraduate units. The weekly one-hour discussion sessions will also address recent advances in the molecular sciences. Student discussions are led by research scientists of the Department of Chemistry and Biomolecular Sciences and each student is mentored by a third year advanced chemistry student. In addition, all students are encouraged to participate in the research activities of the department over the summer recess through vacation scholarships.

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:

have the capability to use the chemical database Scifinder Scholar to retrieve information on specific chemicals, find methods for the synthesis of specific chemicals and find literature on chemistry

be able to identify chiral and achiral molecules including those with multiple stereocentres, describe methods for obtaining enantiopure compounds and determine the optical purity of compounds given specific optical rotations or enantiomeric excess values.

be able to draw and assign the stereochemistry of 8 monosaccharides and relate the biosynthesis of post-translational modifications to chemical reactions and functional groups and describe the limits to the heterogeneity found in oligosaccharide structures

understand theoretical models of bonding and how these control structure and reactivity

be able to compare and contrast the different types of combinatorial chemistry and how

these relate to chemical diversity, natural products and the creation of new matter
understand the physical and chemical basis to spectroscopic techniques involved in structural characterisation of large and small molecules in chemical and biological systems
You will be able to explain the chemical processes of precipitation, diffusion and osmosis as relating to "crystal gardens", and the origin of colour in transition metal salts, at an introductory level

General Assessment Information

Assessment is based on assignments/workshops (total of 6 major topics). These assessment tasks are provided so that you will have the opportunity to use the information gained in the discussion session to test your degree of understanding of those topics and to gain discipline specific knowledge and skills as well as develop your graduate capabilities attributes. **There is no final exam for this unit**.

A satisfactory/unsatisfactory grade is obtained overall. **You must perform satisfactorily in all parts of the assessment to achieve an overall satisfactory mark**. Assignments will be marked with a A/B/C/D/F or similar marking scheme and you are encouraged to perform at the best of your abilities. A high standard of performance is expected and higher marks will allow entry into summer vacation scholarships. An unsatisfactory grade will result from a student not submitting all assignment tasks or showing a partial, superficial or faulty understanding of the topics.

Please note that CBMS107 and CBMS108 are co-requisites for this unit (unless you have done CBMS107/8 or the equivalent previously).

Assessment Tasks

Name	Weighting	Hurdle	Due
module 1	17%	Yes	S1; week 12
module 2	16%	Yes	S2; week 2
module 3	17%	Yes	S2; week 5
module 4	17%	Yes	S2; week 6 and 7
module 5	16%	Yes	S2; week 10
module 6	17%	Yes	S2; week 13

module 1

Due: **S1; week 12**

Weighting: **17%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

There will be an assignment with presentation.

On successful completion you will be able to:

- be able to identify chiral and achiral molecules including those with multiple stereocentres, describe methods for obtaining enantiopure compounds and determine the optical purity of compounds given specific optical rotations or enantiomeric excess values.

module 2

Due: **S2; week 2**
Weighting: **16%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

assignment on the chemistry of protein post-translational modifications (40%)

group (2) presentation on your assigned post-translational modification (60%)

On successful completion you will be able to:

- be able to draw and assign the stereochemistry of 8 monosaccharides and relate the biosynthesis of post-translational modifications to chemical reactions and functional groups and describe the limits to the heterogeneity found in oligosaccharide structures

module 3

Due: **S2; week 5**
Weighting: **17%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Take home exam on structure and bonding

On successful completion you will be able to:

- have the capability to use the chemical database Scifinder Scholar to retrieve information on specific chemicals, find methods for the synthesis of specific chemicals and find literature on chemistry
- understand theoretical models of bonding and how these control structure and reactivity

module 4

Due: **S2; week 6 and 7**
Weighting: **17%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

You will make an oral presentation (PowerPoint; 3 slides) and then hand in a 2000 word essay on some aspect of combinatorial chemistry you find fascinating/intriguing/interesting

On successful completion you will be able to:

- have the capability to use the chemical database Scifinder Scholar to retrieve information on specific chemicals, find methods for the synthesis of specific chemicals and find literature on chemistry
- be able to compare and contrast the different types of combinatorial chemistry and how these relate to chemical diversity, natural products and the creation of new matter

module 5

Due: **S2; week 10**
Weighting: **16%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

This will be a problem solving assignment.

On successful completion you will be able to:

- understand the physical and chemical basis to spectroscopic techniques involved in structural characterisation of large and small molecules in chemical and biological systems

module 6

Due: **S2; week 13**
Weighting: **17%**
This is a hurdle assessment task (see assessment policy for more information on hurdle assessment tasks)

Construct a webpage that explains either (a) the formation of the garden OR (b) the colours of the chemical garden. The webpage must include a video of the growing crystal garden.

On successful completion you will be able to:

- You will be able to explain the chemical processes of precipitation, diffusion and osmosis as relating to "crystal gardens", and the origin of colour in transition metal salts, at an

introductory level

Delivery and Resources

No required text. Background readings from co-requisite CBMS107 and CBMS108 may be required.

Lectures in Semester 1 will be Thursday 9-10 AM in 8SCO 214 (or E3B 214).

Lectures in Semester 2 will be Thursday 2-4 PM in 8SCO 214 (or E3B 214).

Unit Schedule

Please visit iLearn for details.

Learning and Teaching Activities

lectures

39 lecture/discussion groups

workshop

learn how to use SciFinder Scholar

presentation

deliver 2 presentation with PowerPoint

assignments

Complete 4 essay/assignments

web page

create one web page for crystal gardens

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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 *(**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 Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). 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 (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-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 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

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) 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 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.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- understand theoretical models of bonding and how these control structure and reactivity
- You will be able to explain the chemical processes of precipitation, diffusion and osmosis as relating to "crystal gardens", and the origin of colour in transition metal salts, at an introductory level

Assessment tasks

- module 3
- module 6

Learning and teaching activities

- Complete 4 essay/assignments
- create one web page for crystal gardens

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning and teaching activities

- Complete 4 essay/assignments

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcomes

- be able to draw and assign the stereochemistry of 8 monosaccharides and relate the biosynthesis of post-translational modifications to chemical reactions and functional groups and describe the limits to the heterogeneity found in oligosaccharide structures
- understand theoretical models of bonding and how these control structure and reactivity
- be able to compare and contrast the different types of combinatorial chemistry and how these relate to chemical diversity, natural products and the creation of new matter
- understand the physical and chemical basis to spectroscopic techniques involved in structural characterisation of large and small molecules in chemical and biological systems

Assessment tasks

- module 3
- module 4
- module 5

Learning and teaching activities

- 39 lecture/discussion groups
- deliver 2 presentation with PowerPoint
- Complete 4 essay/assignments

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- have the capability to use the chemical database Scifinder Scholar to retrieve information on specific chemicals, find methods for the synthesis of specific chemicals and find literature on chemistry
- be able to identify chiral and achiral molecules including those with multiple stereocentres, describe methods for obtaining enantiopure compounds and determine the optical purity of compounds given specific optical rotations or enantiomeric excess values.
- be able to draw and assign the stereochemistry of 8 monosaccharides and relate the biosynthesis of post-translational modifications to chemical reactions and functional groups and describe the limits to the heterogeneity found in oligosaccharide structures
- understand theoretical models of bonding and how these control structure and reactivity
- be able to compare and contrast the different types of combinatorial chemistry and how these relate to chemical diversity, natural products and the creation of new matter
- understand the physical and chemical basis to spectroscopic techniques involved in structural characterisation of large and small molecules in chemical and biological systems
- You will be able to explain the chemical processes of precipitation, diffusion and osmosis as relating to "crystal gardens", and the origin of colour in transition metal salts, at an introductory level

Assessment tasks

- module 1
- module 2
- module 3
- module 4
- module 5
- module 6

Learning and teaching activities

- 39 lecture/discussion groups
- Complete 4 essay/assignments

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and

systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- be able to identify chiral and achiral molecules including those with multiple stereocentres, describe methods for obtaining enantiopure compounds and determine the optical purity of compounds given specific optical rotations or enantiomeric excess values.
- understand theoretical models of bonding and how these control structure and reactivity
- be able to compare and contrast the different types of combinatorial chemistry and how these relate to chemical diversity, natural products and the creation of new matter
- understand the physical and chemical basis to spectroscopic techniques involved in structural characterisation of large and small molecules in chemical and biological systems
- You will be able to explain the chemical processes of precipitation, diffusion and osmosis as relating to "crystal gardens", and the origin of colour in transition metal salts, at an introductory level

Assessment tasks

- module 1
- module 3
- module 4
- module 5
- module 6

Learning and teaching activities

- deliver 2 presentation with PowerPoint
- Complete 4 essay/assignments

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcome

- understand the physical and chemical basis to spectroscopic techniques involved in structural characterisation of large and small molecules in chemical and biological systems

Assessment tasks

- module 1
- module 5

Learning and teaching activities

- learn how to use SciFinder Scholar
- Complete 4 essay/assignments

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- be able to draw and assign the stereochemistry of 8 monosaccharides and relate the biosynthesis of post-translational modifications to chemical reactions and functional groups and describe the limits to the heterogeneity found in oligosaccharide structures
- be able to compare and contrast the different types of combinatorial chemistry and how these relate to chemical diversity, natural products and the creation of new matter
- You will be able to explain the chemical processes of precipitation, diffusion and osmosis as relating to "crystal gardens", and the origin of colour in transition metal salts, at an introductory level

Assessment tasks

- module 2
- module 4
- module 6

Learning and teaching activities

- deliver 2 presentation with PowerPoint
- Complete 4 essay/assignments

- create one web page for crystal gardens

Changes from Previous Offering

Students are advised to do a maximum of 3 other subjects in S2 (and 4 other subjects in S1). CBMS107 and CBMS108 are co-requisites.

The content/format of CBMS188 is similar to that of last year.

The unit convenor has changed from Prof. Peter Karuso to Dr. Fei Liu.

CBMS188 is required for the BAdvSc program, by permission and with an equivalent ATAR (>96) or with HD grade(s) in both CBMS107 and 108.