BMOL3202

Macromolecules

Session 2, Special circumstances, North Ryde 2021

Archive (Pre-2022) - Department of Molecular Sciences

Contents

Session 2 Learning and Teaching Update

The decision has been made to conduct study online for the remainder of Session 2 for all units WITHOUT mandatory on-campus learning activities. Exams for Session 2 will also be online where possible to do so.

This is due to the extension of the lockdown orders and to provide certainty around arrangements for the remainder of Session 2. We hope to return to campus beyond Session 2 as soon as it is safe and appropriate to do so.

Some classes/teaching activities cannot be moved online and must be taught on campus. You should already know if you are in one of these classes/teaching activities and your unit convenor will provide you with more information via iLearn. If you want to confirm, see the list of units with mandatory on-campus classes/teaching activities.

Visit the MQ COVID-19 information page for more detail.

General Information

Unit convenor and teaching staff
Unit Convenor
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Credit points
10

Prerequisites
130cp at 1000 level or above including CHEM2201 or CBMS200 or BMOL2201 or CBMS201

Corequisites

Co-badged status
BMOL6202

Unit description
This unit outlines molecular principles underlying macromolecules and nano-materials that find a wide range of applications from nanotechnology, biomedical research, to bio-engineering. Practices common in these fields to design, prepare, synthesise and then isolate new materials will be emphasized. Molecular properties leading to the 3D shape of macromolecules will be reviewed. Contemporary structural and imaging based methods to view and characterise macromolecules, both natural and synthetic, will be examined. In particular, attention will be given to the chemical, biochemical and structural characterisation of the building blocks of the living world including nucleic acids, proteins, and polysaccharides. Recent advances and landmark reports from the current literature will be examined. The unit will be delivered through workshops, seminars, lab work and project-based learning.

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: Describe and apply the underlying principles for synthesising and engineering macromolecules and other synthetic particle-based nanomaterials. Apply this knowledge to design and conduct experiments to synthesise macromolecules in the laboratory.
ULO2: Describe bio-macromolecular forms and architectures (size/shape) for proteins, sugars and nucleotides.
ULO3: Interpret and draw sound conclusions from analytical and biophysical data.
ULO4: Describe the principles of contemporary analytical tools to image and characterise the structural features of bio-macromolecules and synthetic macromolecules. Utilise these techniques to collect experimental data on one or more macromolecule.
ULO5: Apply basic concepts from thermodynamics and kinetics to interpret molecular mechanisms of macromolecule systems.
ULO6: Extract and interpret information from a variety of sources concerning macromolecules, including the contemporary scientific literature.

General Assessment Information

Your written reports may be subjected to analysis by Turnitin. Due dates for assessment tasks are on the ilearn site and assignments must be submitted through the ilearn site, where appropriate.

No extensions will be granted, unless a case for Special Consideration (Disruption to Study) has been approved. Late reports will be penalised by deduction of 10% of total available marks for each 24 hour period delay. It is your responsibility to ensure all documents submitted on line are correct and readable.

Assessment Tasks

Name	Weighting	Hurdle	Due
Workshop reports x 3	15%	No	Week 5, 8, 11
Lab Reports	30%	No	Week 6, 8, 10, 12
Case study	15%	No	Week 11, 12
Final Exam	40%	No	University examination period

Workshop reports x 3

Assessment Type [1]: Report
Indicative Time on Task [2]: 18 hours
Due: **Week 5, 8, 11**
Weighting: **15%**

There will be five workshops in total. THREE short workshop reports (from workshops 2, 3 and 4) will be due two weeks after the workshop sessions. The first submission is formative, the second worth 7% and the third worth 8% of the total.

On successful completion you will be able to:

- Describe bio-macromolecular forms and architectures (size/shape) for proteins, sugars and nucleotides.
- Interpret and draw sound conclusions from analytical and biophysical data.
- Apply basic concepts from thermodynamics and kinetics to interpret molecular mechanisms of macromolecule systems.

Lab Reports

Assessment Type [1]: Lab report
Indicative Time on Task [2]: 24 hours
Due: **Week 6, 8, 10, 12**
Weighting: **30%**

There will be FOUR practicals in total. A lab report is to be submitted two weeks after all four practicals. The first two lab reports will be worth 5% each. The final two will be worth 10% each.

On successful completion you will be able to:

- Describe and apply the underlying principles for synthesising and engineering macromolecules and other synthetic particle-based nanomaterials. Apply this knowledge to design and conduct experiments to synthesise macromolecules in the laboratory.
- Interpret and draw sound conclusions from analytical and biophysical data.
- Describe the principles of contemporary analytical tools to image and characterise the structural features of bio-macromolecules and synthetic macromolecules. Utilise these techniques to collect experimental data on one or more macromolecule.
- Apply basic concepts from thermodynamics and kinetics to interpret molecular mechanisms of macromolecule systems.

Case study

Assessment Type [1]: Case study/analysis
Indicative Time on Task [2]: 10 hours
Due: **Week 11, 12**
Weighting: **15%**

A short 10 minute presentation will be given (online) on a contemporary macromolecule.

On successful completion you will be able to:

- Describe bio-macromolecular forms and architectures (size/shape) for proteins, sugars and nucleotides.
- Describe the principles of contemporary analytical tools to image and characterise the structural features of bio-macromolecules and synthetic macromolecules. Utilise these techniques to collect experimental data on one or more macromolecule.
- Extract and interpret information from a variety of sources concerning macromolecules, including the contemporary scientific literature.

Final Exam

Assessment Type [1]: Examination
Indicative Time on Task [2]: 20 hours

Due: **University examination period**
Weighting: **40%**

The final 3hr examination will cover all sections of the unit (lectures, lab practicals, workshops and assignments) and is designed to address specific understanding of all the concepts presented within the course.

On successful completion you will be able to:

- Describe and apply the underlying principles for synthesising and engineering macromolecules and other synthetic particle-based nanomaterials. Apply this knowledge to design and conduct experiments to synthesise macromolecules in the laboratory.
- Describe bio-macromolecular forms and architectures (size/shape) for proteins, sugars and nucleotides.
- Interpret and draw sound conclusions from analytical and biophysical data.
- Describe the principles of contemporary analytical tools to image and characterise the structural features of bio-macromolecules and synthetic macromolecules. Utilise these techniques to collect experimental data on one or more macromolecule.
- Apply basic concepts from thermodynamics and kinetics to interpret molecular mechanisms of macromolecule systems.

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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

Lectures: There are two lectures per week as per the university timetable. Lectures are delivered online and will also be recorded. Some lectures may be pre-recorded and made available prior to the scheduled lecture; and then followed up by an online Q&A session with the lecturer. All lecture material will be made available in iLearn.

Workshop Sessions (Dry-lab): There are six scheduled workshop sessions in total. These will be delivered online. Workshops 1 and 3 (week 2 and week 5 respectively) are optional in attendance and will cover lab report writing skills and provide additional help to students on lab reports. Workshop 6 sessions will be held over two weeks (weeks 11 and 12) and is when oral

presentations will be given. There are THREE workshop sessions that have associated reports to be submitted (workshops 2, 4 and 5). These are held online in weeks 3, 7 and 9. Participation for workshop sessions 3, 7 and 9 is a required part of the unit to complete the associated workshop reports. If you cannot attend, a Special Consideration request must be submitted if you wish your absence to be considered.

Laboratory Sessions (Wet-lab): 3 hour Laboratory sessions are scheduled according to the timetable. There are two timetabled sessions available.

Practicals 1 and 2 will be held online, please see iLearn for details during the scheduled weeks. Practicals 3 and 4 will be held on-campus at Science labs in 14 Sir Christopher Ondaatje Ave (E7B) 349 Science Lab. In total, there are FOUR lab sessions held in weeks 4, 5, 8 and 10. Attendance at laboratory sessions is COMPULSORY. If you cannot attend, you must submit a Special Consideration request if you wish your absence to be considered.

** Due to COVID, students must bring their own lab coats to be allowed to enter the labs. It is also recommended that students bring their own safety glasses. However, these will be provided if students to not have their own safety glasses. Other PPE will be provided.

Textbooks: There is no required text for this unit. Reading material will be advised by your lecturer. A list of suggested reading material and text will be made available on iLearn and through the library website https://libguides.mq.edu.au/leganto.

Unit Schedule

This table is an indication only of lecture topics and the scheduling of practical/workshop sessions. The order/content and dates for certain activities may change. Changes to this schedule will be communicated via iLearn.

Week	Week starting	Lecture 1 (online)		Lecture 2 (online)		Workshop sessions (online)	Practical (on campus and online)
							Tuesday 2-5pm OR Wednesday 10-1pm. Held in14 Sir Christopher Ondaatje Ave - 347/349/350 Labs
		Monday: 12 - 1 p.m		**Tuesday 1 - 2 p.m**		**Thursday 10 - 12**	
1	26-Jul	Introduction	PP	Introduction	PP	no workshop	no prac
2	2-Aug	Chemistry of non-covalent Interactions	PP	Chemistry of non-covalent Interactions	PP	#1 - how to write prac reports (online, optional)	-
3	9-Aug	Folding & stability of macromolecules in solution	PP	Folding & stability of macromolecules in solution	PP	#2: WorkshopFold IT (on campus, report to be submitted)	-

4	16-Aug	Folding & stability of macromolecules in solution	PP	Biological Macromolecules	PP	-	Prac 1: Cyclodextrin Host-Guest Chemistry (online)
5	23-Aug	Biological Macromolecules	PP	Biological Macromolecules	PP	#3. Extra prac help session (online, optional)	-
6	30-Aug	Biological Macromolecules	MA	Synthesis & self-assembly	AGB	-	Prac 2: Myoglobin unfolding (thermodynamics) (online)
7	6-Sep	Synthesis & self-assembly	AGB	Synthesis & self-assembly	AGB	#4. Biomolecules workshop Part A (oncampus, report to be submitted)	-
Mid-semester break: 13-24 Sept							
8	27-Sep	Special Topics: Molecules built to specific shapes (nanogold)	YW	Characterising Macromolecules	PP	-	Prac 3: making and characterisation of nanogold particles (on campus)
9	4-Oct	Characterising Macromolecules	PP	Characterising Macromolecules	PP	#5. Biomolecules workshop Part B (oncampus, report to be submitted)	-
10	11-Oct	Characterising Macromolecules	AGB	Characterising Macromolecules	AGB	-	Prac 4: Spectroscopic characterization of amyloid fibril formation by lysozyme (on campus)
11	18-Oct	Characterising Macromolecules	PP	Characterising Macromolecules	PP	#6. Case studies: Oral Presentations (15%)	-
12	25-Oct	Special Topics: Molecules built to specific shapes	PP	Special Topics: Molecules built to specific shapes	PP	#6. Case studies: Oral Presentations (15%)	-
13	1-Nov	Special Topics: Molecules built for specific functions	PP	Revision		no workshop	no prac
		Lecturer code: PP - Phani Potluri; YW - Yuling Wang; AGB - Alf Garcia Bennett; MA - Morten Andersen					

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
- Grade Appeal Policy
- Complaint Management 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

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 help you improve your marks and take control of your study.

- Getting help with your assignment
- Workshops
- StudyWise
- 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

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.