

MOLS8211 Protein Discovery and Analysis

Session 1, In person-scheduled-weekday, North Ryde 2025

School of Natural Sciences

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General Information

Unit convenor and teaching staff Paul Haynes paul.haynes@mq.edu.au

Credit points 10

Prerequisites

Admission to GradDipRes or GradCertRes or (BMOL6202 and BMOL6201 and Admission to GradDipBiotech or MBiotech)

Corequisites

Co-badged status

Unit description

This unit outlines molecular principles underlying developments in protein science and research. As well as detailing separation technologies, the course addresses structural biology, protein analysis and bioinformatics. Practices common in the biotechnology and pharmaceutical industries to isolate recombinant proteins are emphasized. Protein purification and analysis methods are introduced and discussed in detail. Molecular properties leading to the 3D shape of proteins are explored, using a range of computer modelling techniques.

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: Design appropriate procedures for isolating and purifying proteins.

ULO2: Demonstrate understanding of the chemical properties of proteins, and how they these relate to protein purification and function.

ULO3: Use various software approaches to visualize and analyze 3D structural features of proteins.

ULO4: Describe protein topology forms and architectures, and recognize how these are encoded within a primary sequence.

ULO5: Extract and interpret information from relevant literature sources regarding the structure and function of proteins.

General Assessment Information

To pass this unit you need to: Achieve a total mark equal to or greater than 50% across all assessments.

We strongly encourage all students to actively participate in all learning activities. Regular engagement is crucial for your success in this unit, as these activities provide opportunities to deepen your understanding of the material, collaborate with peers, and receive valuable feedback from instructors, to assist in completing the unit assessments. Your active participation not only enhances your own learning experience but also contributes to a vibrant and dynamic learning environment for everyone.

Late Assessment Submission Penalty

Unless a Special Consideration request has been submitted and approved, a 5% penalty (of the total possible mark of the task) will be applied for each day a written report or presentation 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. 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. For any late submission of time-sensitive tasks, such as scheduled tests/ exams, performance assessments/presentations, and/or scheduled practical assessments/labs, please apply for Special Consideration.

Assessments where Late Submissions will be accepted

• Practical report - Standard Late Penalty applies

Special Consideration Policy

The <u>Special Consideration Policy</u> aims to support students who have been impacted by shortterm circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment.

Descriptions of Assessment Activities and other information

- Submission of Assessments practical report and project presentation and components to be submitted via Turnitin link on the iLearn site.
- Assessment Criteria marking rubrics are available on the iLearn site

Assessment Tasks

Name	Weighting	Hurdle	Due
Practical report	20%	No	week 8
Final exam	40%	No	Examination Period
Pet Protein Purification Project	40%	No	week 12

Practical report

Assessment Type 1: Report Indicative Time on Task 2: 17 hours Due: **week 8** Weighting: **20%**

Students will complete a protein purification activity and write a report including the techniques used and the results achieved.

On successful completion you will be able to:

- Design appropriate procedures for isolating and purifying proteins.
- Demonstrate understanding of the chemical properties of proteins, and how they these relate to protein purification and function.
- Describe protein topology forms and architectures, and recognize how these are encoded within a primary sequence.

Final exam

Assessment Type 1: Examination Indicative Time on Task 2: 35 hours Due: **Examination Period** Weighting: **40%**

An invigilated formal examination covering all aspects of the scientific content of the unit.

On successful completion you will be able to:

• Design appropriate procedures for isolating and purifying proteins.

- Demonstrate understanding of the chemical properties of proteins, and how they these relate to protein purification and function.
- Use various software approaches to visualize and analyze 3D structural features of proteins.
- Describe protein topology forms and architectures, and recognize how these are encoded within a primary sequence.

Pet Protein Purification Project

Assessment Type 1: Project Indicative Time on Task 2: 35 hours Due: **week 12** Weighting: **40%**

Each student will be assigned a 'pet protein' of biochemical or medical importance as a case study throughout this Unit. The project includes making and presenting a real-life 3-D physical model of the protein structure.

On successful completion you will be able to:

- Demonstrate understanding of the chemical properties of proteins, and how they these relate to protein purification and function.
- Use various software approaches to visualize and analyze 3D structural features of proteins.
- Describe protein topology forms and architectures, and recognize how these are encoded within a primary sequence.
- Extract and interpret information from relevant literature sources regarding the structure and function of proteins.

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

Class scheduling

Weekly lectures will be delivered in person, with recordings made available via iLearn for revision purposes.

Weekly workshops will be held in person, and will include worksheets and other activities to reinforce the learning of the lecture content.

Lectures: Thursday 11 AM – 1 PM, 14SCO T2.

Workshops: Thursday 2 PM - 3 PM 12SW 430

Our practical class will be held in the 14ER 130/150 laboratories during semester break, Monday 14th of April to Thursday, 17th of April.

Methods of Communication

The unit convenor will communicate mainly via Discussion Forum and Announcements on the iLearn site, and also via emails to students MQ email addresses. Personal email addresses must not be used.

Unit Schedule

Mols8211 Lecture schedule for 2025

Week	Date	Subject 2025
1	Thursday 27 feb	 1 - Intro to Protein Structure 2 - Protein functional groups
2	6 Mar	3 - Isolating proteins4 - protein staining
3	13 Mar	5 – Protein purification I 6 – Protein purification II
4	20 Mar	7 – Protein folding 8 – Protein secondary structures
5	27 Mar	9 – folding domains and motifs 10 – membrane proteins

6	3 Apr	11 - Protein dynamics12 - bioinformatics
7	10 Apr	13 – UV and CD spectra 14 - Spectroscopic methods
	17 Apr	Midsem break week 1
	24 Apr	Midsem break week 2
8	1 May	15,16 Protein NMR
9	8 May	17,18 Protein crystallography
10	15 May	19 Mass spectrometry I 20 Mass spectrometry II
11	22 May	21,22 Cryo Electron Microscopy
12	29 May	Pet protein presentations
13	5 Jun	Revision

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policie s.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 <u>Student Policies</u> (<u>https://students.mq.edu.au/su</u> <u>pport/study/policies</u>). 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 <u>Policy Central</u> (<u>https://policies.mq.e</u> <u>du.au</u>) and use the <u>search tool</u>.

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 <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>connect.mq.edu.au</u> or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe <u>academic integrity</u> – 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 <u>online writing an</u> d maths support, academic skills development and wellbeing consultations.

Student Support

Macquarie University provides a range of support services for students. For details, visit <u>http://stu</u> dents.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
- <u>Safety support</u> to respond to bullying, harassment, sexual harassment and sexual assault
- · Social support including information about finances, tenancy and legal issues
- <u>Student Advocacy</u> provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via the Service Connect Portal, or contact Service Connect.

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.

Changes from Previous Offering

To enable students more time to focus on learning, understanding and reflecting on the content of our unit we have revised the assessment structure. There are now only three assessments: a practical report, Pet Protein project and final exam. Although no marks are associated with attendance, all activities provide you with key content designed to help you understand content and complete the assessments.

We value student feedback to be able to continually improve the way we offer our units. As such we encourage students to provide constructive feedback via student surveys, to the teaching staff directly, or via the FSE Student Experience & Feedback link in the iLearn page. Student feedback from the previous offering of this unit was positive overall, with students pleased with the clarity around assessment requirements and the level of support from teaching staff. We will continue to strive to improve the level of support and the level of student engagement.

Unit information based on version 2025.06 of the Handbook