



MOLS7211

Protein Discovery and Analysis

Session 1, In person-scheduled-weekday, North Ryde 2022

School of Natural Sciences

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General Information

Unit convenor and teaching staff

Unit convenor

Alison Rodger

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6WW 302

By arrangement

Unit co-convenor

Sophie Goodchild

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Credit points

10

Prerequisites

Admission to MRes

Corequisites

Co-badged status

Unit description

This unit outlines molecular principles underlying today's developments in protein science and biomedical research. As well as detailing modern 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. Analysis methods are introduced in relation to proteomics, genomics and biochemical research. Molecular properties leading to the 3D shape of proteins are detailed and contemporary structure methods outlined.

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 handling proteins

ULO2: Demonstrate a chemical understanding of proteins (gene products), in vivo and in

vitro

ULO3: Utilise contemporary web tools for protein analysis

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

ULO5: Extract and interpret information from literature sources concerning proteins

General Assessment Information

Late submissions are allowed in this unit, but see the General Faculty Policy on assessment submission deadlines and late submissions below:

Online quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration.

All other assessments must be submitted by 5:00 pm on their due date. Should these assessments be missed due to illness or misadventure, students should apply for Special Consideration.

Assessments not submitted by the due date will receive a mark of zero **unless** late submissions are specifically allowed as indicated in the unit guide or on iLearn.

If late submissions are permitted as indicated in the unit guide or on iLearn a consistent penalty will be applied for late submissions as follows:

A 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20% is due 5 pm on 1 January. Student A submits the assessment at 1 pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15, resulting in the loss of three (3) marks. Student A is then awarded a final mark of 12/20.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>In class quizzes</u>	40%	No	Weeks 2, 6, 8, 12/13 Monday-Wednesday
<u>"Pet Protein" Sequence Analysis & Purification</u>	15%	No	Week 5 Friday
<u>Molecular graphics</u>	10%	No	Week 7 Friday
<u>Protein Production Practical</u>	15%	No	Week 10 Friday

Name	Weighting	Hurdle	Due
"Pet Protein" Model and Seminar	20%	No	Week 13 Friday

In class quizzes

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 25 hours

Due: **Weeks 2, 6, 8, 12/13 Monday-Wednesday**

Weighting: **40%**

Short answer quizzes for continual assessment

On successful completion you will be able to:

- Demonstrate a chemical understanding of proteins (gene products), in vivo and in vitro
- Describe protein topology forms and architectures, and recognise how these are encoded within a primary sequence

"Pet Protein" Sequence Analysis & Purification

Assessment Type ¹: Case study/analysis

Indicative Time on Task ²: 15 hours

Due: **Week 5 Friday**

Weighting: **15%**

Each student will be assigned a protein of industrial/medical importance as a case study throughout this Unit. You will conduct a literature search to discover the purification procedures historically used to isolate this protein, and report on the background chemistry underlying these procedures.

On successful completion you will be able to:

- Demonstrate a chemical understanding of proteins (gene products), in vivo and in vitro
- Utilise contemporary web tools for protein analysis
- Extract and interpret information from literature sources concerning proteins

Molecular graphics

Assessment Type ¹: Case study/analysis

Indicative Time on Task ²: 14 hours

Due: **Week 7 Friday**

Weighting: **10%**

You will use molecular graphics (program PyMOL) to view the 3D structure of a GTP-ase protein to understand its binding and function.

On successful completion you will be able to:

- Demonstrate a chemical understanding of proteins (gene products), in vivo and in vitro
- Describe protein topology forms and architectures, and recognise how these are encoded within a primary sequence
- Extract and interpret information from literature sources concerning proteins

Protein Production Practical

Assessment Type ¹: Lab report

Indicative Time on Task ²: 10 hours

Due: **Week 10 Friday**

Weighting: **15%**

Follow the procedures for preparation and isolation of a protein, and analyse the characteristics of your sample.

On successful completion you will be able to:

- Design appropriate procedures for isolating and handling proteins
- Demonstrate a chemical understanding of proteins (gene products), in vivo and in vitro
- Utilise contemporary web tools for protein analysis

“Pet Protein” Model and Seminar

Assessment Type ¹: Creative work

Indicative Time on Task ²: 20 hours

Due: **Week 13 Friday**

Weighting: **20%**

Research the literature concerning the 3D structure and structure determination method for your assigned protein. Construct a model that shows the three-dimensional shape of this macromolecule, and present this in a class presentation.

On successful completion you will be able to:

- Demonstrate a chemical understanding of proteins (gene products), in vivo and in vitro
- Utilise contemporary web tools for protein analysis
- Describe protein topology forms and architectures, and recognise how these are encoded within a primary sequence
- Extract and interpret information from literature sources concerning 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

You will need a laptop.

Attendance at Laboratory and Workshop sessions is compulsory and attendance at lectures is strongly advised. Material (subject matter and organisational materials) will be delivered once and students are responsible for ensuring they have mastered it.

Off-shore students

Off-shore students **must** email the convenor as soon as possible to discuss study options.

Unit Schedule

This unit is delivered via 2 hours of lectures per week, 1 hour of SGTAs per week, and a block laboratory class in the first week of the mid-semester break.

The workshops are designed to take two hours. We will do the first hour in weeks 1,3,5,7,9,11. If you have not completed the set work there will be a second opportunity in weeks 2, 4, 6, 8, 10, 12. One workshop class will run from 11-12 and the second from 12-1 on Tuesdays.

Please plan to be in the laboratory for Tuesday and Wednesday of the first week of the mid semester break. Hold Thursday in reserve 'just in case'.

In week 13 you will present on your pet protein. ALL students must plan to be present for 4 hours to hear and assess their colleagues' presentations. Timings for this are to be confirmed.

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 since First Published

Date	Description
02/02/2022	Enabled quiz 4 to be in week 13

Date	Description
01/02/ 2022	Apologies - changes as noted above. I seem to have recalled this from submission when I went to check what I had written.
