



MEDI2200

Human Cell and Molecular Biology

Session 2, In person-scheduled-weekday, North Ryde 2023

Macquarie Medical School

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General Information

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Credit points

10

Prerequisites

Admission to BClinSc and (CBMS104 or BMOL1001 or CHEM1001)

Corequisites

Co-badged status

Unit description

This unit introduces concepts which are core to biochemistry, cell and molecular biology. You will learn about the nature of chemical reactions that occur within the human body and explore the functions and the relationships between the four main biomolecules (nucleic acids, proteins, carbohydrates and lipids). You will gain an understanding of the fundamental structure of the cell and how this relates to function. You will also examine the basic principles of molecular biology and how cellular processes are regulated.

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 the major features of cell structure and organisation.
- ULO2:** Examine the molecular processes controlling cell structure and function
- ULO3:** Describe the role of DNA replication and repair in producing genetic variation
- ULO4:** Apply biochemical and genetic knowledge in a practical setting

General Assessment Information

Grade descriptors and other information concerning grading are contained in the [Macquarie University Assessment Policy](#).

All final grades are determined by a grading committee, in accordance with the Macquarie University Assessment Policy, and are not the sole responsibility of the Unit Convenor.

Students will be awarded a final grade and a mark which must correspond to the grade descriptors specified in the [Assessment Procedure](#) (clause 128).

To pass this unit, you must demonstrate sufficient evidence of achievement of the learning outcomes, meet any ungraded requirements, and achieve a final mark of 50 or better.

Further details for each assessment task will be available on iLearn.

Late Submissions

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 11.55pm. A 1-hour grace period is provided to students who experience a technical concern.

For example:

| Number of days (hours) late | Total Possible Marks | Deduction | Raw mark | Final mark |
|-----------------------------|----------------------|-----------|----------|------------|
| 1 day (1-24 hours) | 100 | 5 | 75 | 70 |
| 2 days (24-48 hours) | 100 | 10 | 75 | 65 |
| 3 days (48-72 hours) | 100 | 15 | 75 | 60 |
| 7 days (144-168 hours) | 100 | 35 | 75 | 40 |
| >7 days (>168 hours) | 100 | - | 75 | 0 |

For any late submissions 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.

Special Consideration

If you are unable to complete an assessment task on or by the specified date due to circumstances that are unexpected, unavoidable, significantly disruptive and beyond your control, you may apply for special consideration in accordance with the [Special Consideration Policy](#). Applications for special consideration must be supported by appropriate evidence and submitted via ask.mq.edu.au.

Assessment Tasks

| Name | Weighting | Hurdle | Due |
|--------------------------------------|-----------|--------|----------------|
| Practical Assignment | 30% | No | Week 10 and 11 |
| Final Exam | 40% | No | Exam timetable |
| Mid-session Exam | 30% | No | Week 7 |
| Formative Quiz | 0% | No | Week 3 |

Practical Assignment

Assessment Type ¹: Problem set
 Indicative Time on Task ²: 15 hours
 Due: **Week 10 and 11**
 Weighting: **30%**

Problem-based assignment assessing content delivered in the practical modules.

On successful completion you will be able to:

- Examine the molecular processes controlling cell structure and function
- Describe the role of DNA replication and repair in producing genetic variation
- Apply biochemical and genetic knowledge in a practical setting

Final Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 30 hours

Due: **Exam timetable**

Weighting: **40%**

Formal written examination assessing content delivered across the unit. Examination will include a combination of question types: MCQ and short answer questions. This task is completed under examination conditions during the University examination period.

On successful completion you will be able to:

- Describe the major features of cell structure and organisation.
- Examine the molecular processes controlling cell structure and function
- Describe the role of DNA replication and repair in producing genetic variation
- Apply biochemical and genetic knowledge in a practical setting

Mid-session Exam

Assessment Type ¹: Examination

Indicative Time on Task ²: 20 hours

Due: **Week 7**

Weighting: **30%**

Formal written examination assessing all unit content delivered to this point and will be composed of a mixture of multiple-choice and short answer questions

On successful completion you will be able to:

- Describe the major features of cell structure and organisation.
- Examine the molecular processes controlling cell structure and function

- Describe the role of DNA replication and repair in producing genetic variation
- Apply biochemical and genetic knowledge in a practical setting

Formative Quiz

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 4 hours

Due: **Week 3**

Weighting: **0%**

Formative quiz delivered online assessing content delivered up to this point.

On successful completion you will be able to:

- Describe the major features of cell structure and organisation.
- Examine the molecular processes controlling cell structure and function
- Describe the role of DNA replication and repair in producing genetic variation

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

As a student enrolled in this unit, you will engage in a range of face to online and face-to-face learning activities, including pre-recorded lectures, online modules, and in-class tutorials. Details can be found on the iLearn site for this unit.

Recommended Readings

Molecular Cell Biology, 8th edition, Lodish, Harvey F. Freeman-Macmillan Learning, 2016

Please note that the book and the prescribed readings for each week are recommended to complement your understanding of the lecture content. The prescribed readings are not compulsory and will not be assessed unless covered in the lectures.

Technology Used

Active participation in the learning activities throughout the unit will require students to have access to a tablet, laptop or similar device. Students who do not own their own laptop computer

may borrow one from the university library.

Unit Schedule

| Week | Lecture and Tutorial | Learning objectives | Practical | Assessment |
|------|--|--|--|--------------------|
| 1 | Cell organisation | <p>Describe the general principles that apply to all living cells.</p> <p>Describe the primary differences between eukaryotes and prokaryotes.</p> <p>Discuss the major components of eukaryotic cells.</p> | <p>Module 1: Introduction to Laboratory and Foundational skills</p> <p>Independent learning activity. Recommend completion by Monday of Week 4</p> | |
| 2 | Protein structure and function | <p>Outline how the amino acid sequence of a protein determines 3-D protein structure.</p> <p>Discuss the levels of protein structure and how this related to protein function.</p> <p>Describe the properties of an enzyme and they are regulated.</p> <p>Recognise different enzyme groups and the reactions they catalyse.</p> | | |
| 3 | Introduction to cell cycle and DNA replication | <p>Describe the phases of the mitotic cell cycle.</p> <p>Describe the process of DNA replication.</p> <p>Describe the role of different enzymes and proteins involved in DNA replication.</p> | | AT1 Formative quiz |
| 4 | Gene structure and regulation | <p>Describe the key components of a gene.</p> <p>Explain the steps involved in gene transcription – the generation of an RNA transcript.</p> <p>Describe the role of RNA splicing, capping and polyadenylation.</p> <p>Explain the steps involved in translating an mRNA transcript into a protein sequence.</p> | <p>Module 2: Nucleic acids and Restriction enzymes</p> <p>Independent learning activity. Recommend completion by Monday of Week 7</p> | |
| 5 | Cell cycle regulation | <p>Explain how the mitotic cell cycle is regulated.</p> <p>Explain the processes that take place during meiosis.</p> | | |
| 6 | Mutation and genetic variation | <p>Describe types of DNA mutations and their effects on protein function.</p> <p>Explain how meiosis can contribute to genetic variation.</p> <p>Describe major DNA repair pathways.</p> | | |

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|----|--|--|--|--|
| 7 | | Assessment week – no lecture or tutorial | Module 3: Protein Quantification | AT2: Midsession exam Friday |
| 8 | Intracellular trafficking and membrane transport | Describe the mechanisms of membrane transport. Discuss the different classes of proteins responsible for membrane transport. Describe the role of the endomembrane system in protein synthesis and modification. Explain the principles and functions of endocytosis and exocytosis. | Independent learning activity. Recommend completion by Friday of Week 9 | |
| 9 | Cell structure and interactions | List the major structural components of the cell cytoskeleton. Describe the role of the cytoskeleton in cell structure and movement. Explain the general features and function of the extracellular matrix. Describe the components and mechanisms of cell–cell and cell–matrix interactions. | | |
| 10 | | Assessment week – no lecture content | | AT3 Practical Assignment Part A in class during tutorial time |
| 11 | Cell signalling | Describe the components and the steps involved in signal transduction. Explain how signalling pathways are regulated including secondary messengers, effectors, and phosphorylation. Give examples of types of signalling pathways. | | AT3 Practical Assignment Part B due Tuesday 11:59PM |
| 12 | Glucose oxidation | Describe the major pathways of glucose oxidation. | | |
| 13 | No lecture or tutorial | | | |

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 Advocacy](#) provides independent advice on MQ policies, procedures, and processes

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.

Inclusion and Diversity

Social inclusion at Macquarie University is about giving everyone who has the potential to benefit from higher education the opportunity to study at university, participate in campus life and flourish in their chosen field. The University has made significant moves to promote an equitable, diverse and exciting campus community for the benefit of staff and students. It is your responsibility to contribute towards the development of an inclusive culture and practice in the areas of learning and teaching, research, and service orientation and delivery. As a member of the Macquarie University community, you must not discriminate against or harass others based on their sex, gender, race, marital status, carers' responsibilities, disability, sexual orientation, age, political conviction or religious belief. All staff and students are expected to display appropriate behaviour that is conducive to a healthy learning environment for everyone.

Professionalism

In the Faculty of Medicine, Health and Human Sciences, professionalism is a key capability

embedded in all our courses.

As part of developing professionalism, **students are expected to attend all small group interactive sessions**, including clinical, practical, laboratory, work-integrated learning (e.g., PACE placements), and team-based learning activities. Some learning activities are recorded (e.g., face-to-face lectures), however you are encouraged to avoid relying upon such material as they do not recreate the whole learning experience and technical issues can and do occur. As an adult learner, we respect your decision to choose how you engage with your learning, but we would remind you that the learning opportunities we create for you have been done so to enable your success, and that by not engaging you may impact your ability to successfully complete this unit. We equally expect that you show respect for the academic staff who have worked hard to develop meaningful activities and prioritise your learning by communicating with them in advance if you are unable to attend a small group interactive session.

Another dimension of professionalism is having respect for your peers. It is the right of every student to learn in an environment that is free of disruption and distraction. Please arrive to all learning activities on time, and if you are unavoidably detained, please join the activity as quietly as possible to minimise disruption. Phones and other electronic devices that produce noise and other distractions must be turned off prior to entering class. Where your own device (e.g., laptop) is being used for class-related activities, you are asked to close down all other applications to avoid distraction to you and others. Please treat your fellow students with the utmost respect. If you are uncomfortable participating in any specific activity, please let the relevant academic know.