



# CBMS337

## Biochemistry and Cell Biology

S2 Day 2018

*Dept of Chemistry & Biomolecular Sciences*

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#### Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

## General Information

Unit convenor and teaching staff

Unit Convenor and Lecturer

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Credit points

3

Prerequisites

(CBMS223 OR CBMS201) and (CBMS224 OR CBMS202)

Corequisites

Co-badged status

### Unit description

Biochemistry and cell biology are central to our understanding of medicine and biotechnology. Advances in these fields are dependent on an advanced understanding of the molecular basis of diverse cellular processes. This unit links important biochemical processes to functions and properties of eukaryotic cells. We explore advanced concepts including: enzyme function, properties of membranes, signal transduction, protein trafficking and transport, and protein turnover. These are linked to whole cell behaviours such as cell division and differentiation, programmed cell death, and general responses to external stimuli. Practical work complements lecture material and provides experience with a broad range of current techniques used in research and industry. Laboratory techniques used include analysis of signalling cascades, enzyme kinetics, spectrophotometry, and fluorescence and light microscopy.

## 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:

Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.

Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.

Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.

Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.

## General Assessment Information

Please refer to the Macquarie University Assessment policy regarding submission of assignments, plagiarism, extensions, late submissions, etc.

Individual assessment criteria/marketing rubrics can be found on the CBMS337/837 iLearn site.

## Late Submissions

**Tasks 10% or less** - No extensions will be granted. Students who have not submitted the task prior to the deadline will be awarded a mark of 0 for the task. This penalty does not apply for

cases in which an application for disruption of studies is made and approved. No submission will be accepted after solutions have been posted.

**Tasks above 10%** - No extensions will be granted. There will be a deduction of 10% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 20% penalty). This penalty does not apply for cases in which an application for disruption of studies is made and approved. No submission will be accepted after solutions have been posted.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#"><u>Practical Attendance&amp;Particip.</u></a>	0%	Yes	Weeks 1 - 7
<a href="#"><u>Early Unit Exam</u></a>	10%	No	Week 3
<a href="#"><u>Enzyme Kinetics Prac Report #1</u></a>	10%	No	Week 6
<a href="#"><u>Enzyme Kinetics Prac Report #2</u></a>	5%	No	Week 7
<a href="#"><u>Protein Localisation Prac Rep.</u></a>	15%	No	Week 7
<a href="#"><u>Phosphorylation Prac Report</u></a>	10%	No	Week 10
<a href="#"><u>Video Paper Explanation</u></a>	15%	No	Week 11
<a href="#"><u>Final Exam</u></a>	35%	No	University Examination Period

### Practical Attendance&Particip.

Due: **Weeks 1 - 7**

Weighting: **0%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

At minimum, students must attend and participate in 5 of the 7 weekly practical laboratory classes to pass this unit. This is a hurdle requirement.

On successful completion you will be able to:

- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.

### Early Unit Exam

Due: **Week 3**

Weighting: **10%**

An early exam on material covered in weeks 1-3. In-class hard-copy written assessment.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.

## Enzyme Kinetics Prac Report #1

Due: **Week 6**

Weighting: **10%**

Students will graph and analyze enzyme kinetics data. They will need to identify enzymatic mechanism and determine the kinetic constants.

On successful completion you will be able to:

- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.
- Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.

## Enzyme Kinetics Prac Report #2

Due: **Week 7**

Weighting: **5%**

Students will graph and analyze enzyme kinetics data. They will need to identify enzymatic mechanism and determine the kinetic constants.

On successful completion you will be able to:

- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.
- Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.

## Protein Localisation Prac Rep.

Due: **Week 7**

Weighting: **15%**

A scientific report of the results from practicals 2 and 3. The report will be written in the form of a peer reviewed journal article. Handed in via Turnitin.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.
- Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.

## Phosphorylation Prac Report

Due: **Week 10**

Weighting: **10%**

A report analysing the results from practical 7 regarding changes to cellular protein phosphorylation patterns in response to a chemical. Handed in via iLearn.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.
- Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.

## Video Paper Explanation

Due: **Week 11**

Weighting: **15%**

Prepare a short slowmotion video explanation of a paper in a "hot topic" in cell biology and/or biochemistry.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.
- Critically analyse and communicate advanced molecular, cellular, and biochemical concepts from the primary literature in both verbal and written form.

## Final Exam

Due: **University Examination Period**

Weighting: **35%**

The exam covers material from the entire unit but with the vast majority of the marks covering material post-early assessment exam to give all lectures of the unit approximately equivalent weighting. The assessment is designed to test understanding of topics presented in all of the lectures and practicals, and to evaluate the student's ability to apply this knowledge to new problems. Hard-copy 3 hour written exam.

On successful completion you will be able to:

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.

## Delivery and Resources

### Required Text

B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter (2015) "Molecular Biology of the Cell" (6th Edition), ISBN 978-0815344322. Available at the Co-op and a few copies for reference in the library.

Your lectures will cover parts of many chapters from this text and your success in the unit will be

greatly enhanced by having this textbook.

## Unit Web Page

The web page for this unit is at Macquarie University's iLearn site accessed [here](#).

The iLearn site for CBMS337/837 will be used to deliver lecture and laboratory notes and will feature a discussion forum, digital lecture recordings and other learning resources. To view the lecture notes and other PDF files on the website, you will require a PDF viewer. Free PDF viewers can be found online (e.g. Adobe Reader).

## Active Learning Platform

Some lectures will feature interactive lecture presentations using a technology called the Echo360 Active Learning Platform. This is a new system, different from Lecture Tools which you may be more familiar with. Additionally, this technology is **different** from the Echo360 **Lecture Recordings** you may be more familiar with.

**To participate in the Active Learning Platform the student will need to bring their laptop, tablet, or smart phone to class, or participate while live-streaming the class (if this service is available).**

Guides and videos on how to use the Active Learning Platform can be found [here](#).

### Echo360 Lecture Recordings

All lectures (but not pracs) will be recorded using the Echo360 Lecture Recording technology. A guide to this technology is available [here](#). The Echo360 recordings can be accessed from the Echo360 Active Learning Platform block on the right side of the CBMS337/837 iLearn page.

## Learning and Teaching Activities

### Lectures

Lectures from staff in CBMS summarising a wide range of advanced topics in eukaryotic cell biology and biochemistry. You are highly encouraged to attend lectures in person. Past experience has shown that students who attend lectures tend to receive higher marks in the unit.

### Practicals

Practicals give you an opportunity to put into practice your knowledge of biochemistry and cell biology and to develop real laboratory skills that are valued in academic and industry professions.

### Self-Study

To succeed in this unit you are expected to spend time outside formal instruction reading assigned sections of the textbook, reviewing notes taken in class, and exploring other sources of information on advanced biochemistry and cell biology. To self-assess your degree of understanding and to practice problem solving skills you are expected to attempt problems from



the text and other resources.

## 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) (<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) (<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) (<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 shown in *iLearn*, 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](https://ask.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](https://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](http://ask.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/](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

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
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### Assessment tasks

- Early Unit Exam

- Enzyme Kinetics Prac Report #1
- Enzyme Kinetics Prac Report #2
- Protein Localisation Prac Rep.
- Phosphorylation Prac Report
- Video Paper Explanation
- Final Exam

## **Learning and teaching activities**

- Lectures from staff in CBMS summarising a wide range of advanced topics in eukaryotic cell biology and biochemistry. You are highly encouraged to attend lectures in person. Past experience has shown that students who attend lectures tend to receive higher marks in the unit.
- Practicals give you an opportunity to put into practice your knowledge of biochemistry and cell biology and to develop real laboratory skills that are valued in academic and industry professions.
- To succeed in this unit you are expected to spend time outside formal instruction reading assigned sections of the textbook, reviewing notes taken in class, and exploring other sources of information on advanced biochemistry and cell biology. To self-assess your degree of understanding and to practice problem solving skills you are expected to attempt problems from the text and other resources.

## **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 outcomes**

- Design and execute laboratory experiments to characterise, quantitate and measure a range of fundamental cell processes.
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## 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

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## 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

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## **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**

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## 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 outcomes

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
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- To succeed in this unit you are expected to spend time outside formal instruction reading assigned sections of the textbook, reviewing notes taken in class, and exploring other sources of information on advanced biochemistry and cell biology. To self-assess your degree of understanding and to practice problem solving skills you are expected to attempt problems from the text and other resources.

## 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

- Demonstrate an understanding of how eukaryotic cells are studied and summarise current knowledge of internal cell organisation, membrane trafficking, intracellular compartments, biochemical pathways, and intra- and extra-cellular signalling.
- Summarise the major eukaryotic cell regulation control points and how disturbances in these processes are involved in human disease.
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### Learning and teaching activities

- Practicals give you an opportunity to put into practice your knowledge of biochemistry and cell biology and to develop real laboratory skills that are valued in academic and

industry professions.

## Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

### Assessment tasks

- Practical Attendance&Particip.
- Video Paper Explanation

## Learning and teaching activities

- Lectures from staff in CBMS summarising a wide range of advanced topics in eukaryotic cell biology and biochemistry. You are highly encouraged to attend lectures in person. Past experience has shown that students who attend lectures tend to receive higher marks in the unit.
- Practicals give you an opportunity to put into practice your knowledge of biochemistry and cell biology and to develop real laboratory skills that are valued in academic and industry professions.
- To succeed in this unit you are expected to spend time outside formal instruction reading assigned sections of the textbook, reviewing notes taken in class, and exploring other sources of information on advanced biochemistry and cell biology. To self-assess your degree of understanding and to practice problem solving skills you are expected to attempt problems from the text and other resources.

## Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

### Assessment tasks

- Practical Attendance&Particip.
- Video Paper Explanation

## **Learning and teaching activities**

- Practicals give you an opportunity to put into practice your knowledge of biochemistry and cell biology and to develop real laboratory skills that are valued in academic and industry professions.
- To succeed in this unit you are expected to spend time outside formal instruction reading assigned sections of the textbook, reviewing notes taken in class, and exploring other sources of information on advanced biochemistry and cell biology. To self-assess your degree of understanding and to practice problem solving skills you are expected to attempt problems from the text and other resources.

## **Changes from Previous Offering**

The 2018 offering of this unit will feature several changes from the 2017 offering. These changes include: modified assessment tasks and changes to the content of several of the practical labs.