CBMS623

Biochemistry

S1 Day 2016

Dept of Chemistry & Biomolecular Sciences

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
Shoba Ranganathan
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Contact via shoba.ranganathan@mq.edu.au
F7B 121
meeting confirmed by email

Credit points
4

Prerequisites
Admission to MLabQAMgt or MRadiopharmSc or MBiotech or MBiotechMCom

Corequisites

Co-badged status
CBMS223

Unit description
This unit provides an essential background of biochemistry for the modern life scientist, building on fundamentals of organic and biological chemistry and general biology. Lecture topics include structure of biological macromolecules, enzymatic control of biological reactions, principal pathways of intermediary metabolism, flow of energy within cells, and lipid and amino acid metabolism. The unit emphasises the interpretation of quantitative data and the experimental basis for our current ideas and developments in biochemistry. Laboratory practical sessions will alternate with tutorials covering lecture and practical topics.

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:

Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
Discipline-specific knowledge: a basic understanding of key biochemical processes and

their control; a basis for the mechanisms involved in the synthesis and breakdown of important biomolecules, for growth and energy; basic laboratory skills necessary for research in biochemistry; an appreciation of biochemistry and the chemical aspects of biological systems; and a biochemical foundation for advanced units of study as well as post-graduate research in biochemistry and professional studies in the health and biomolecular sciences.
Ability to define key concepts: biochemistry and what biochemists know; the thermodynamic principles of enzyme catalysis; the major biological systems involved in metabolism and energy production pathways in the living cell.
Understanding of the protein structure-function paradigm: describe qualitatively and quantitatively the relationship between structure and function of proteins.
An insight into how sugar is our main energy source: describe qualitatively and quantitatively the factors affecting sugar metabolism in energy production.
How other essential biomolecules are made and broken down: describe qualitatively how lipids, nucleic acids and amino acids are made and turned over.
How mutations cause diseases: understand the reasons for protein mutations leading to malfunction and diseases;
Metabolic pathway mapping: have a detailed knowledge of the interactions between different metabolic pathways.
How to identify and separate biomolecules: design experiments to characterise, quantify and separate biomolecules.
Tracking enzyme reactions: apply analytical techniques to determine the molecular composition of reaction products and determine the thermodynamic parameters of enzyme reactions.
Data analysis: how to sort, graph and analyze experimental results.

Assessment Tasks

Name	Weighting	Due
Assignment 1	5%	on iLearn
Assignment 2	10%	on iLearn
In-Semester Test	15%	on iLearn
Practicals	15%	on iLearn
Tutorials	5%	on iLearn

Name	Weighting	Due
Mid-year Examination	50%	on iLearn

Assignment 1

Due: **on iLearn**
Weighting: **5%**

The **assignment** will provide early feedback on the understanding of protein structure and its relation to protein function (Lectures 2-8) and provide you an opportunity to explore and analyse the structure-function paradigm of proteins.

The assignment should be completed by submitting a Quiz on iLearn, in the first half of the semester.

On successful completion you will be able to:

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
- Discipline-specific knowledge: a basic understanding of key biochemical processes and their control; a basis for the mechanisms involved in the synthesis and breakdown of important biomolecules, for growth and energy; basic laboratory skills necessary for research in biochemistry; an appreciation of biochemistry and the chemical aspects of biological systems; and a biochemical foundation for advanced units of study as well as post-graduate research in biochemistry and professional studies in the health and biomolecular sciences.
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- Understanding of the protein structure-function paradigm: describe qualitatively and quantitatively the relationship between structure and function of proteins.
- How mutations cause diseases: understand the reasons for protein mutations leading to malfunction and diseases;

Assignment 2

Due: **on iLearn**
Weighting: **10%**

This is **specific for CBMS623 students**, to extend their understanding of the practical applications of biochemistry.

Case studies related to biochemical experiments will be presented and questions posed on the information provided. The assignment should be answered by completing an online quiz on iLearn, during the second half of the semester.

On successful completion you will be able to:

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
- Data analysis: how to sort, graph and analyze experimental results.

In-Semester Test

Due: **on iLearn**
Weighting: **15%**

The **in-semester test** (multi-choice format) will cover lecture materials (Lectures 1-10) and give you an idea of the types of questions that will be asked in the mid-year examination.

The test will be held in a number of locations in lieu of the scheduled CBMS223/623 lecture: details will be posted on iLearn.

This is a closed book test and you may use a non-programmable scientific calculator (with no text retrieval capability). Pl. bring a 2B pencil(s) and an eraser for the test. Your bags and mobile phones will need to be placed at the front of the test venue.

On successful completion you will be able to:

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
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- How mutations cause diseases: understand the reasons for protein mutations leading to malfunction and diseases;
- Metabolic pathway mapping: have a detailed knowledge of the interactions between different metabolic pathways.

Practicals

Due: **on iLearn**
Weighting: **15%**

The practical exercises will provide you the opportunity to apply experimental techniques, collate relevant experimental results and analyse them. **Practicals and tutorials are scheduled alternately in a small group environment (max. 16 students), allocated a single tutor/ demonstrator.**

The pre-lab quizzes are designed to prepare for the practicals and should be answered online at iLearn, prior to attending the scheduled laboratory practical session.

Completed practical files are due on iLearn 1 week after the date of the lab.

Lab schedules as well as lab report submission dates will be posted on iLearn.

Satisfactory completion of the practical component is essential for passing the unit.

On successful completion you will be able to:

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
- Discipline-specific knowledge: a basic understanding of key biochemical processes and their control; a basis for the mechanisms involved in the synthesis and breakdown of important biomolecules, for growth and energy; basic laboratory skills necessary for research in biochemistry; an appreciation of biochemistry and the chemical aspects of biological systems; and a biochemical foundation for advanced units of study as well as post-graduate research in biochemistry and professional studies in the health and biomolecular sciences.
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- Data analysis: how to sort, graph and analyze experimental results.

Tutorials

Due: **on iLearn**
Weighting: **5%**

Tutorials provide an opportunity to work out problems and questions complementing lectures and practicals. **Practicals and tutorials are scheduled alternately in a small group environment (max. 16 students), allocated a single tutor/demonstrator.**

Tutorial PDFs should be printed from iLearn and Part A answered before coming to the tutorial class.

The assessment is based on tutorial quiz questions, which will cover the associated practicals and are answered as online quizzes on iLearn.

Satisfactory completion of the tutorial component is essential for passing the unit.

On successful completion you will be able to:

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Mid-year Examination

Due: **on iLearn**
Weighting: **50%**

The mid-year examination will comprise a combination of multiple-choice questions, short answers and case studies, to assess your overall understanding of the subject.

The format of the exam and the exact will be posted on iLearn.

Satisfactory performance in the exam is mandatory for passing the unit.

On successful completion you will be able to:

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.

- Discipline-specific knowledge: a basic understanding of key biochemical processes and their control; a basis for the mechanisms involved in the synthesis and breakdown of important biomolecules, for growth and energy; basic laboratory skills necessary for research in biochemistry; an appreciation of biochemistry and the chemical aspects of biological systems; and a biochemical foundation for advanced units of study as well as post-graduate research in biochemistry and professional studies in the health and biomolecular sciences.
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Delivery and Resources

CLASSES

Timetable: Please check www.timetables.mq.edu.au for the official timetable of the unit.

Additional rooms for the in-semester test: will be listed on iLearn, at least two weeks before the test, with the students allocated to each test venue.

Lectures will be delivered as scheduled with eCHO recording available through iLearn. Additional learning materials (notes, animations, movies) and revision materials provide by the textbook publisher are also available from iLearn. ***Interactive learning*** **techniques will be adopted - so please bring your mobile phones, tablets or laptops to answer on-the-spot quizzes!**

Laboratory Work: labs. are scheduled with tutorials and each group of max. 16 students will be allocated a tutor. Lab/tutorial schedules of each group will be posted on iLearn. **Practicals and tutorials are scheduled alternately in a small group environment (max. 16 students), allocated a single tutor/demonstrator.**

Laboratory sessions are scheduled in the timetable. You will undertake experiments at the bench (wet-labs) in **E7A 130** (the lab with the yellow door) - please bring your **lab. coat** and **wear**

covered shoes. ***Safety glasses*** will be provided in the lab.

Before commencing a new experiment, you are **required to complete the prelab quiz**. All questions are to be answered online at iLearn, upto one hour before the commencement of the lab. A delay in starting the experimental work due to poor pre-lab preparation may have a detrimental effect on your ability to perform the laboratory work satisfactorily. You should attempt the pre-lab exercises well in advance of each practical class. You are advised to read each experiment carefully.

Students unable to attend laboratory classes due to illness or misadventure (as defined in the Handbook of Undergraduate Studies) and who are unable to catch up in another session must provide formal documentary evidence to the University as soon as possible after the absence. For one such justified absence students will receive the average mark from the sessions that they did attend. For any unjustified absences, students will receive a zero mark and may be liable to compulsory withdrawal from the unit. You will need to submit a “Special consideration form”, information on which is given below. It may be possible to rearrange your schedule if sufficient advance notice is given and if there is lab space available on another lab day. If the absence is anticipatable, such as for religious observance days and the like, it is your responsibility to discuss this with your lecturer ***in advance o***f the absence.

Some practical work will be undertaken before the corresponding material has been covered in lectures. The notes have been written with this in mind and some allowance will be made in the marking of reports.

Lab Report Submission Date: Reports must be uploaded to iLearn within one week after the completion of the lab. and all questions answered, as an iLearn Quiz. **Penalties for late submission** are provided in a separate section.

Tutorial sessions are scheduled in the timetable and are held alternately with Practicals, with the same tutor/demonstrator, but in a small tutorial room. ***Interactive learning*** **techniques will be adopted - so please bring your mobile phones, tablets or laptops to answer on-the-spot quizzes!** Tutorial quizzes need to be completed after your scheduled tutorial as an online quiz on ilearn.

TEXTBOOK USED

Please see the **Textbook** section for details. To do well in this unit, we strongly recommend that you purchase the recommended textbook.

TECHNOLOGY USED

PDF viewer: To view notes on all the lecture topics, quizzes, tutorial answers and past questions, on the unit web site, you will require the free software, Adobe Acrobat Reader to be installed on your computer. Acrobat Reader can be downloaded from the Adobe website http://get.adobe.com/uk/reader/. If you are using the computers in the library, then Acrobat has already been installed.

IT and internet: General use computers are provided by the University, but it would be advantageous to have your own computer and internet access. **MS Word** and **Excel files** will be used to complete **the lab reports.**

E-mail: You are also expected to access your **Macquarie University student email account** regularly to get the latest information on the unit. If you do not use this account regularly, please set up automatic forwarding to your preferred email address.

Calculators: Hand-held calculators will be occasionally used in tutorials and practicals, for tests and in the final examination. Note that text-retrieval or programmable calculators are not permitted during the tests or the mid-year examination. Calculators on smart phones will also not be allowed.

Unit Schedule

The unit will cover three basic areas of biochemistry: the exact lecture schedule is on iLearn.

Weeks 1-4: Proteins and Enzymes Protein structure and enzyme function includeing basic Michaelis-Menton type enzyme kinetics.

- Structure and properties of amino acids found in proteins including some “non standard” amino acids, and chirality of amino acids.
- Definition and properties of a peptide bond
- Definition of primary, secondary, tertiary and quaternary structure of proteins, including protein structural domains
- Protein analysis, including stability, protein folding and denaturation, protein purification, sequencing methods such as Edman degradation and MS-MS, chromatography, solubility, spectroscopic properties, protein structure determination methods and gel electrophoresis.
- Models of enzyme activity, including catalytic site and enzyme mechanisms, enzyme classification, enzyme inhibilition and review of thermodynamics and chemical equilibria.

Weeks 5-10: Intermediary metabolism Principles of metabolism and how cell structure may influence metabolism within cells is covered as an overview before examining specific pathways.

- Types of metabolic strategies that organisms utilize: chemolithotroph, photoautotroph, photoheterotroph and heterotroph
- The link between catabolism and biosynthesis: reducing equivalents, coupling reactions for thermodynamic favourability, carbon and nitrogen sources and other nutrients.
- Compartmentalization of enzymes and pathways
- Membrane structure
- Regulation of metabolic pathways: Intra- and inter- cellular signals i.e. hormones.
- Clustering of enzyme activities
- Glycolysis and gluconeogenesis: the key regulatory steps, enzyme mechanisms and compartmentalization of parts of the gluconeogenesis pathway in mammals.
- Tricarboxyic acid cycle in mitochondria: catalytic and synthetic roles

- Glyoxalate cycle
- Pentose phosphate pathway
- Electron transport chain and oxidative phosphorylation

Weeks 10-13: Biosynthesis and utilization of biomolecules How biomolecules are made and recycled within the cell.

- Fatty acid synthesis and degradation
- Nitrogen metabolism
- Amino acid synthesis and breakdown
- Nucleotide synthesis and catabolism
- The role of vitamins and coenzymes in the functioning of the cell and diseases caused by deficiencies in these essential molecules.

Learning and Teaching Activities

Practicals

Laboratory exercises are designed to provide a concrete example of the abstract topics covered in the course work, and to give you the opportunity to discover the principles and applications for yourself. Laboratory exercises also offer the opportunity to explore the uncertainty inherent in scientific investigations and the limitations of models and theories by allowing comparison with real systems.

Tutorials

Tutorials provide an opportunity to work out problems and questions complementing lecture and practical materials. The tutorial quiz questions will cover also the associated practicals.

Lectures

The lectures provide an overview of each topic/concept. The student is encouraged to follow up with textbook reading as well as additional reading materials provided on iLearn. Wherever possible, animations and movies are also provided on iLearn along with revision quizzes from the textbook.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of 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/support/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.

If you have missed **an assessable task** (assignment, in-semester test, practical or tutorial), please check if you are eligible for Special Consideration from:

http://ask.mq.edu.au

If yes, please complete the online form and submit required documentation (medical certificate, etc.) to the Science Centre, **within 5 working days of the absence.**

If you have missed **the mid-year exam,** please check if you are eligible for Special Consideration from:

http://ask.mq.edu.au

If yes, please complete the online form and submit required documentation (medical certificate, etc.) to the Science Centre, **within 5 working days of the absence.** If approved, you will then be considered for the the Supplementary exam, scheduled after the examination period.

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 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

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.

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

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
- Discipline-specific knowledge: a basic understanding of key biochemical processes and their control; a basis for the mechanisms involved in the synthesis and breakdown of important biomolecules, for growth and energy; basic laboratory skills necessary for research in biochemistry; an appreciation of biochemistry and the chemical aspects of biological systems; and a biochemical foundation for advanced units of study as well as post-graduate research in biochemistry and professional studies in the health and biomolecular sciences.
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- An insight into how sugar is our main energy source: describe qualitatively and quantitatively the factors affecting sugar metabolism in energy production.
- How other essential biomolecules are made and broken down: describe qualitatively how lipids, nucleic acids and amino acids are made and turned over.
- How mutations cause diseases: understand the reasons for protein mutations leading to malfunction and diseases;
- Metabolic pathway mapping: have a detailed knowledge of the interactions between different metabolic pathways.
- How to identify and separate biomolecules: design experiments to characterise, quantify and separate biomolecules.

Assessment tasks

- Assignment 1
- Assignment 2
- In-Semester Test
- Practicals
- Tutorials
- Mid-year Examination

Learning and teaching activities

- Laboratory exercises are designed to provide a concrete example of the abstract topics covered in the course work, and to give you the opportunity to discover the principles and applications for yourself. Laboratory exercises also offer the opportunity to explore the uncertainty inherent in scientific investigations and the limitations of models and theories by allowing comparison with real systems.
- Tutorials provide an opportunity to work out problems and questions complementing lecture and practical materials. The tutorial quiz questions will cover also the associated practicals.
- The lectures provide an overview of each topic/concept. The student is encouraged to follow up with textbook reading as well as additional reading materials provided on iLearn. Wherever possible, animations and movies are also provided on iLearn along with revision quizzes from the textbook.

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

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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

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
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- The lectures provide an overview of each topic/concept. The student is encouraged to follow up with textbook reading as well as additional reading materials provided on iLearn. Wherever possible, animations and movies are also provided on iLearn along with revision quizzes from the textbook.

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:

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- Data analysis: how to sort, graph and analyze experimental results.

Assessment tasks

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- Assignment 2
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- Practicals
- Tutorials
- Mid-year Examination

Learning and teaching activities

- Laboratory exercises are designed to provide a concrete example of the abstract topics covered in the course work, and to give you the opportunity to discover the principles and applications for yourself. Laboratory exercises also offer the opportunity to explore the uncertainty inherent in scientific investigations and the limitations of models and theories by allowing comparison with real systems.
- Tutorials provide an opportunity to work out problems and questions complementing lecture and practical materials. The tutorial quiz questions will cover also the associated practicals.
- The lectures provide an overview of each topic/concept. The student is encouraged to follow up with textbook reading as well as additional reading materials provided on iLearn. Wherever possible, animations and movies are also provided on iLearn along with revision quizzes from the textbook.

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

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
- Ability to define key concepts: biochemistry and what biochemists know; the thermodynamic principles of enzyme catalysis; the major biological systems involved in metabolism and energy production pathways in the living cell.
- Understanding of the protein structure-function paradigm: describe qualitatively and quantitatively the relationship between structure and function of proteins.
- An insight into how sugar is our main energy source: describe qualitatively and quantitatively the factors affecting sugar metabolism in energy production.
- How other essential biomolecules are made and broken down: describe qualitatively how lipids, nucleic acids and amino acids are made and turned over.
- How mutations cause diseases: understand the reasons for protein mutations leading to malfunction and diseases;
- Metabolic pathway mapping: have a detailed knowledge of the interactions between different metabolic pathways.
- How to identify and separate biomolecules: design experiments to characterise, quantify and separate biomolecules.
- Tracking enzyme reactions: apply analytical techniques to determine the molecular composition of reaction products and determine the thermodynamic parameters of enzyme reactions.
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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

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
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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

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
- Discipline-specific knowledge: a basic understanding of key biochemical processes and their control; a basis for the mechanisms involved in the synthesis and breakdown of

important biomolecules, for growth and energy; basic laboratory skills necessary for research in biochemistry; an appreciation of biochemistry and the chemical aspects of biological systems; and a biochemical foundation for advanced units of study as well as post-graduate research in biochemistry and professional studies in the health and biomolecular sciences.

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- The lectures provide an overview of each topic/concept. The student is encouraged to follow up with textbook reading as well as additional reading materials provided on iLearn. Wherever possible, animations and movies are also provided on iLearn along with revision quizzes from the textbook.

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:

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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:

Learning outcomes

- Overall biochemical understanding: overview of the structure and function of the most important macromolecules in the living cell, integrating them into biochemical pathways, representing essential sets of regulated reactions, involved in cell growth and survival.
- Discipline-specific knowledge: a basic understanding of key biochemical processes and their control; a basis for the mechanisms involved in the synthesis and breakdown of important biomolecules, for growth and energy; basic laboratory skills necessary for research in biochemistry; an appreciation of biochemistry and the chemical aspects of biological systems; and a biochemical foundation for advanced units of study as well as post-graduate research in biochemistry and professional studies in the health and

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Changes from Previous Offering

From 2016, the essay question in the mid-year exam has been replaced by case studies which question the student's ability to analyse the data provided and answer questions, instead of the

formal essay question.

Additionally, the two additional assignments for CBMS623 compared to CBMS223 in 2015, required too much time and these have now been combined into a single assignment (Assignment 2), scheduled in the second half of the semester.

Difference from undergraduate unit CBMS223

This graduate unit expects that the student's work will show a higher level of maturity and engagement with the subject matter than a student in the undergraduate unit, CBMS223, with which it will be co-taught. This is reflected in the learning outcomes by the expectation of a higher degree of independence and self-directed learning. Learning outcomes of the unit arising from additional practical and tutorial questions are based on CBMS623 students engaging more deeply with the process of applying scientific knowledge in a practical context, in Assignment 2.

Penalties for late submission

1. Students are to submit their **completed Assignment** on or before the due date.

    - Late assignments will receive a **10% per day penalty** and will not be marked if more than 1 week late. Extensions will only be given under extenuating circumstances (see Special Considerations policy), by the unit coordinator BEFORE the due date.

2. The completed **Practical Reports** are to be uploaded to iLearn within one week of the scheduled lab. for grading.

    - Late submissions will receive a **10% per day penalty** and will not be marked if more than 1 week late. Extensions will only be given in extenuating circumstances, by the unit coordinator either by email BEFORE the due date, or by completing the Special Consideration request at ***ask.mq.edu.au*** with documentary evidence, within 5 working days of the scheduled deadline.

Textbook

Prescribed text: ***We strongly recommend that students purchase the recommended textbook to do well in this unit.***

Fundamentals of Biochemistry: Life at the Molecular Level, 4th Edition by Donald Voet, Judith G. Voet, Charlotte W. Pratt, Wiley

Electronic access:

- **Best option for this unit: WileyPLUS:** online version of complete book plus extra adaptive learning resources: accessible from the URL: http://wileyplus.com - search for the unit code and purchase access for **$50 (after the class roster has been uploaded).**
- **eBook ($50):** from http://au.wiley.com/WileyCDA/WileyTitle/productCd-1118327039.html - limited printable eBook *but no access to student study guide* - WileyPLUS can be

purchased separately.

Hardcopy versions of the textbook (available from campus Co-Op Bookshop):

- **Hardcopy + access to WileyPLUS** (ISBN: 9781118363355): $175.95
- **Binder-ready-version (loose leaf) + access to WileyPLUS** (ISBN: 9781118363942): $123.95

A few copies of the prescribed text are available in the library in the main and reserve sections.

Unit Website

The official CBMS623 website is:

ilearn.mq.edu.au

You will be asked for a username and password. Your username is your student number.

If you have trouble logging in, please follow the help instructions given on the web page before contacting your lecturer academic staff. You may also contact the Help Desk:

Phone: 9850-HELP (4357)

Freecall: 1800 063 191

Email: http://help.mq.edu.au/

Changes since First Published

Date	Description
22/02/2016	1. Assigment 1: reset to online quiz as in 2015 worth 5% 2. Exam: updated to 55%