CBMS223

Biochemistry

S1 Day 2017

Dept of Chemistry & Biomolecular Sciences

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
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Meeting confirmed by email

Credit points
3

Prerequisites
CBMS103

Corequisites

Co-badged status
CBMS623

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 knowledge: 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 grasp 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.
Capacity 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.
Connecting protein structure with function: describe qualitatively and quantitatively the relationship between structure and function of proteins.
An insight into sugar as our main energy source: describe qualitatively and quantitatively the factors affecting sugar metabolism in energy production.
Processes by which other essential biomolecules (lipids, nucleic acids and amino acids) are made and broken down.
Relationship between mutations and diseases: analyze the normal biochemical role of a protein's functional sites and the reasons for protein mutations leading to malfunction and diseases;
Metabolic pathway mapping: have a detailed knowledge of the interactions between different proteins functioning together in a metabolic pathway and the interplay between different metabolic pathways, to provide a biochemical outcome.
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: sort, graph and analyze experimental results as well as draw conclusions from data analysis.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignment	5%	No	Monday Acad Week 6
In-Semester Test	15%	No	Acad Week 8 - details tbc
Practicals	15%	No	on iLearn
Tutorials	5%	No	on iLearn
Mid-year Examination	60%	No	on University exam timetable

Assignment

Due: **Monday Acad Week 6**
Weighting: **5%**

The **assignment** will provide early feedback on the link between protein structure and function (Lectures 2-8), provide you an opportunity to explore and analyse the structure-function paradigm of proteins as well as **give you an idea of the types of questions that will be asked in the mid-year examination.**

The assignment should be completed by submitting a quiz on iLearn.

On successful completion you will be able to:

- Overall biochemical knowledge: 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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- Connecting protein structure with function: describe qualitatively and quantitatively the

relationship between structure and function of proteins.
- Relationship between mutations and diseases: analyze the normal biochemical role of a protein's functional sites and the reasons for protein mutations leading to malfunction and diseases;

In-Semester Test

Due: **Acad Week 8 - details tbc**
Weighting: **15%**

The **in-semester test** (multi-choice format) will cover lecture materials (**Lectures 1-12**) 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:

- Discipline-specific knowledge: a basic grasp 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 sugar as our main energy source: describe qualitatively and quantitatively the factors affecting sugar metabolism in energy production.
- Relationship between mutations and diseases: analyze the normal biochemical role of a protein's functional sites and the reasons for protein mutations leading to malfunction and diseases;

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 **normally** due on iLearn via **Practical Quizzes** on the day of your next scheduled tutorial - check details on ilearn.

Questions in the pre-lab quizzes and the practical quizzes will give you an idea of the types of questions that will be asked in the mid-year examination.

Lab schedules including Practical Quiz completion dates will be posted on iLearn for each prac/ tutorial class.

On successful completion you will be able to:

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- Tracking enzyme reactions: apply analytical techniques to determine the molecular composition of reaction products and determine the thermodynamic parameters of enzyme reactions.
- Data analysis: sort, graph and analyze experimental results as well as draw conclusions from data analysis.

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.

Tutorial Quizzes are **normally** due on iLearn on the day of your **next scheduled practical** session - check details on iLearn.

Questions in the tutorials and tutorial quizzes will give you an idea of the types of questions that will be asked in the in-semester test and the mid-year examination.

Tutorial Quiz completion dates will be in the Lab Schedules on iLearn for each prac/tutorial class.

On successful completion you will be able to:

- Overall biochemical knowledge: 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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Mid-year Examination

Due: **on University exam timetable**
Weighting: **60%**

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

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

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Delivery and Resources

LEARNING AND TEACHING STRATEGY

CBMS223 will comprise **2 lectures** (or equivalent) per week, with **practical sessions (3 hours)** alternating with **tutorials (2 hours)**.

- **Students are expected to attend all lectures as there will be interactive questions that will provide them instant feedback on their comprehension.**
- **Students are expected to attend all practical and tutorial classes.**

Lectures

- Lectures will be delivered as scheduled with eCHO recording available through iLearn**. Due to the interactive lecture format being followed, we strongly recommend that you attend the lectures.**
- Additional learning materials (notes, animations, movies) and revision materials provide by the textbook publisher are also available from iLearn. ***Interactive learning*** **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 practical**, you are **required to complete the prelab quiz**. All questions are to be answered online at iLearn, upto 10 mins. 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 quizzes 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 “Disruption to studies” request via ask.mq.edu.au. It may be possible to rearrange your schedule if sufficient advance notice is given and if there is lab space available on another lab session. If the absence can be anticipated, such as for religious observance days and pre-scheduled events, it is your responsibility to discuss this with the unit coordinator ***in advance*** of the absence.
- Some practical work may 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 Dates**: **Reports are normally due on iLearn** on the day of the next tutorial - a detailed scheduled is available on llearn for each prac class. Your lab report comprises **answers to all questions** and **your completed data file**, submitted via an **iLearn Quiz**. **Penalties for late submission** are provided in a separate section.

Tutorials

- **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 the tutorial sessions**.
- **Tutorial quizzes** need to be completed **after your scheduled tutorial** as an **online quiz on ilearn**, on or before your next scheduled practical - a detailed schedule is available in iLearn for each tutorial class.

TIMETABLE

- Please check www.timetables.mq.edu.au for the official timetable of the unit. **Please note** that **practical and tutorial sessions** in the Timetable **will be made available for enrollment, in a phased manner,** in order to optimise lab/tutorial room usage and technical/tutorial staff time.
    - **It is possible that students may be moved to an equivalent set of practical and tutorial classes if enrollment numbers in specific classes are very small.**
    - **Some practical and tutorial classes listed in the timetable may not be scheduled due to low enrollments.**
- **Additional rooms for the in-semester test**: will be listed on iLearn, at least two weeks before the test, with students allocated to each test venue, based on their lastname.

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

- **SOCRATIVE Student Apps:** for interactive student engagement during lectures and tutorials. Your understanding of concepts will be gauged via online quizzes. You are encouraged to respond so that we can understand how best to deliver the unit content and to assist you further. Apps can be downloaded from https://www.socrative.com/apps.html and choose the Students apps available for your phone/platform. For laptops, you can directly use the Socrative student website.
- **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** on eStudent.
- **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

Lectures

The lectures provide an overview of each topic/concept. Students will be given questions duering the lectures to test their understanding of key concepts. 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, accessible via a personal eBook license.

Practicals

Laboratory exercises are designed to provide a concrete hands-on example of the lecture 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. Questions covered in the practical quizzes will prepare students for the in-semester test and the mid-year exam.

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. Tutorial questions and tutorial quizzes will prepare students for the in-semester test and the mid-year exam.

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

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.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 (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration

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 knowledge: 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 grasp 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.

- Connecting protein structure with function: describe qualitatively and quantitatively the relationship between structure and function of proteins.
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- Identify and separate biomolecules: design experiments to characterise, quantify and separate biomolecules.

Assessment tasks

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

Learning and teaching activities

- The lectures provide an overview of each topic/concept. Students will be given questions duering the lectures to test their understanding of key concepts. 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, accessible via a personal eBook license.
- Laboratory exercises are designed to provide a concrete hands-on example of the lecture 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. Questions covered in the practical quizzes will prepare students for the in-semester test and the mid-year exam.

- 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. Tutorial questions and tutorial quizzes will prepare students for the in-semester test and the mid-year exam.

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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- 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. Tutorial questions and tutorial quizzes will prepare students for the in-semester test and the mid-year exam.

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.

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- Mid-year Examination

Learning and teaching activities

- The lectures provide an overview of each topic/concept. Students will be given questions duering the lectures to test their understanding of key concepts. 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, accessible via a personal eBook license.
- Laboratory exercises are designed to provide a concrete hands-on example of the lecture 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. Questions covered in the practical quizzes will prepare students for the in-semester test and the mid-year exam.
- 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. Tutorial questions and tutorial quizzes will prepare students for the in-semester test and the mid-year exam.

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

- Overall biochemical knowledge: 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 grasp 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.
- Capacity 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.
- Connecting protein structure with function: describe qualitatively and quantitatively the relationship between structure and function of proteins.
- An insight into sugar as our main energy source: describe qualitatively and quantitatively the factors affecting sugar metabolism in energy production.
- Processes by which other essential biomolecules (lipids, nucleic acids and amino acids) are made and broken down.
- Relationship between mutations and diseases: analyze the normal biochemical role of a protein's functional sites and the reasons for protein mutations leading to malfunction and diseases;
- Metabolic pathway mapping: have a detailed knowledge of the interactions between different proteins functioning together in a metabolic pathway and the interplay between different metabolic pathways, to provide a biochemical outcome.
- 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: sort, graph and analyze experimental results as well as draw conclusions from data analysis.

Assessment tasks

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- Practicals
- Tutorials
- Mid-year Examination

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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.

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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.

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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 knowledge: 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 grasp 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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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.

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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.

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Changes from Previous Offering

Rephrasing of **Learning Outcomes, Assessment Tasks** and **Delivery and Resources**.

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 if the request is received BEFORE the due date.

2. **Practical Quizzes along with completed practical files** are to be uploaded to iLearn via the corresponding **Practical Quiz** for grading, with specific due dates for each prac class available on iLearn. Normally, your Prac Quiz marks should be available at the time of your next scheduled practical session.

- 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.
- **No extensions are possible for the pre-lab quiz if the student has attended the scheduled practical class.**

3. **Tutorial Quizzes** are to be completed on iLearn via the corresponding Tutorial Quiz, for automatic grading, with specific dates for each tutorial class available in the Lab & Tutorial Schedule on iLearn. Extensions will not be given after closure of the quiz, when answers will be

automatically available.

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,** 5th Edition by Donald Voet, Judith G. Voet, Charlotte W. Pratt, Wiley

Electronic access:

- **eBook ($60):** from http://www.wileydirect.com.au/buy/fundamentals-of-biochemistry-5th-edition/ - *case studies and exercises are on* WileyPLUS.

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

- **Hardcopy + access to WileyPLUS**
- **Binder-ready-version (loose leaf) + access to WileyPLUS**

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

Unit Website

The official CBMS223 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/