



Course Code:	1014BPS
Course Name:	Fundamentals of Biochemistry
Trimester:	Trimester 3, 2018
Program:	Diploma of Science
Credit Points:	10
Course Coordinator:	Brock Grant
Document modified:	26 <sup>th</sup> September, 2018

### Teaching Team

Your lecturer/tutor can be contacted via the email system on the portal.

Name	Email
Mr Brock Grant	Brock.grant@staff.griffithcollege.edu.au

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### Staff Consultation

Your lecturer/tutor is available each week for consultation outside of normal class times. Times that your lecturer/tutor will be available for consultation will be given in the first week of lectures. A list of times and rooms will be published on the Griffith College Portal under the “myTimetable” link.

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## Prerequisites

To successfully enrol in this Course, you must have completed or be enrolled the following Course:

- 1021SCG Chemistry 1A
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## Brief Course Description

1014BPS provides an introduction to biochemistry with the primary aim to examine in detail an integrated view of the molecular organisation of cells and the chemical properties of the major classes of biological molecules.

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## Rationale

Biochemistry is the chemistry of life and underpins the study of all biological sciences. Specifically, this course is necessary for further studies in the School of Biomolecular and Physical Sciences within Griffith University, namely the Bachelors of Biomedical, Biomolecular and Forensic Sciences, and the Bachelor of Science (Biochemistry and Molecular Biology, Microbiology, Biological Sciences and Clinical Sciences Majors).

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## Aims

1014BPS serves to integrate the relevance of chemistry & its importance in living systems, addressing in detail a holistic view of the molecular organisation of cells and the chemical properties of the major classes of biological molecules; the properties of water and biological acids, bases and buffers, and the chemical properties of proteins, nucleic acids, carbohydrates, lipids and their function. The 1014BPS course will then expand upon the previously taught modules, covering enzymatic reactions, membrane organisation and transport.

1014BPS is a core component of study for undergraduate students wishing to obtain a career within the science/medical fields by providing an essential introduction to the fundamentals of working within the fields of science. Throughout each student's study, they will also be provided the opportunity to develop key skills and practices that are essential in today's bioscience industries, such as the use of scientific terminology and nomenclature, positive research practices, critical analysis and problem solving and effective communication skills (oral, written and interpersonal)

1014BPS offers students the essential and foundational knowledge of biochemistry, with relation to the biological/biomedical sciences providing students the essential basis for further studies in advanced biochemistry, and related biological/biomedical sciences offered in the School of BPS Griffith University and other health and science programs offered by Griffith University and Griffith College.

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## Learning Outcomes

On completion of this Course, students will cover the structure and function of the major biological molecules found within living organisms (proteins, lipids, carbohydrates & nucleic acids). In addition, students will be provided with an integrated and holistic view of the properties of water, acids & bases, as well as membrane organisation and transport.

Students studying 1014BPS will also gain essential experience in critical analysis, interpretation and application of scientific data, required in subsequent courses and future employment associated with biomedical/biological sciences degrees.

Upon successful completion of this course students should be able to:

- 1) Describe the properties of water that make it ideal for the support of living organisms
  - 2) Solve problems and make predictions relating to pH in biological systems
  - 3) Explain the types of bonding in biological molecules
  - 4) Relate structure of biological molecules to their function
  - 5) Interpret and analyse basic experimental data relating to the analysis and function of biological molecules
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## Texts and Supporting Materials

Highly Recommended:

Lehninger Principles of Biochemistry, 6th edition (2012) by Nelson and Cox.

Fundamentals of Biochemistry: Life at the Molecular level - Voet and Pratt, 4th edition, Wiley.

Both are available from the Griffith University Bookshop.

Although either Lehninger Principles of Biochemistry, 6<sup>th</sup> edition or Fundamentals of Biochemistry: Life at the Molecular Level are highly recommended, they are not a compulsory component of this course.

Lecture notes, workshop problem sets and other activities to assist your learning of the material will be placed on the Griffith College Portal course notes. The course notes also contain resources such as self-assessment tests and links to other resources.

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## Organisation and Teaching Strategies

1014BPS is taught by using a multimodal approach teaching and learning, with activities including interactive lectures and intensive, facilitated workshops and tutorials. Course content will be presented in six (6) modules each with a set of learning activities and problems as well as web-based resources. The textbook and web-based resources provide in-depth content for each module, which will be deconstructed and presented within lectures, allowing emphasis and focus on the fundamental concepts and key features of each module topic. The small group workshops explore the material in greater depth, providing students the opportunity to develop and test their knowledge by application to real world problems whilst supplying students with an opportunity to explore and reinforce topics causing misunderstanding or confusion. Workshops also provide the opportunity to develop core academic skills such as critical thinking, teamwork and problem solving.

Each Learning Module will be run over a two (2) week period and will consist of two (2hr) lectures, one (2hr) workshop and two (1hr) tutorials. Workshop (2hr) sessions (one per module) will be used to focus students' attention on the learning objectives for each module and as a small group activity will be conducive to the development of effective communication skills. Tutorial (1hr) sessions will allow assimilation and consolidation of module content, providing the opportunity to focus on specific topics through group discussion, worksheets and web-based tasks. Revision lectures will be held in week 12.

### ***Class Contact Summary***

Students are strongly recommended to attend **all classes**.

**Attendance at workshops is compulsory.** Students are expected to attend lectures and are advised to read the relevant sections of the course notes and textbook *before* the lecture. Lectures are crucial for obtaining an understanding of the basic concepts and how they relate to other material being learned. Participation in lectures and workshops is directly correlated with success in the course, with later modules relying upon key information and concepts emphasised in earlier sections of the course. Non-attendance of lectures can result in increased difficulty understanding the essential concepts and skills frequently emphasised and demonstrated within lectures, resulting in a significant disadvantage in subsequent courses.

Lectures and workshops are complemented by access to the Griffith College course website which provides links to extensive resources from the textbook and other sources.

It is recommended that students look over relevant module notes and access lecture slides from the **Griffith College Portal** section of the Griffith College website before the timetabled class or as directed by the lecturer.

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**Content Schedule - Weekly Teaching Schedule**

<b>Week</b>	<b>Topic</b>	<b>Activity</b>	<b>Readings</b>
1	Module 1, Water, weak interactions	Lecture	Lehninger Chapter 2 Wiley Chapter 2
	Module 1	Tutorial	
2	Module 1, pH and buffers	Lecture	Lehninger Chapter 2 Wiley Chapter 2
	Module 1	Workshop	
3	Module 2, Amino acids, peptide bonds & charge on a peptide	Lecture	Lehninger Chapter 3, 4 Wiley Chapter 3, 4
	Module 2	Tutorial	
4	Module 2, Protein structure	Lecture	Lehninger Chapter 3, 4 Wiley Chapter 3, 4
	Module 2	Workshop	
5	Module 3, Fibrous proteins, tertiary and quaternary structure	Lecture	Lehninger Chapter 5 Wiley Chapter 5
	Module 3	Tutorial	
6	Module 3, Globular Proteins, Haemoglobin and Myoglobin	Lecture	Lehninger Chapter 5 Wiley Chapter 6
	Module 3	Workshop	
7	Module 4, Enzymes as biological catalysts	Lecture	Lehninger Chapter 6 Wiley Chapter 11
	Module 4	Tutorial	
8	Module 4, Enzyme Kinetics	Lecture	Lehninger Chapter 6 Wiley Chapter 12
	Module 4	Workshop	
9	Module 5. Carbohydrates Polysaccharides	Lecture	Lehninger Chapter 7, 10 Wiley Chapter 8
	Module 5	Tutorial	
10	Module 5, Lipids	Lecture	Lehninger Chapter 7,10 Wiley Chapter 9
	Module 5	Workshop	
11	Module 6, Membranes & Membrane Proteins	Lecture	Lehninger Chapter 11 Wiley Chapter9, 10
	Module 6	Tutorial	
12	Module 6, Membrane permeability and transport	Lecture	Lehninger Chapter 11 Wiley Chapter 10
	Module 6	Workshop	
12	Revision	Lecture	

## Assessment

Student understanding of the course material will be examined and measured via the completion of key assessment items outlined below

### Summary of Assessment

Item	Assessment Task	Weighting	Relevant Learning Outcomes	Due Date
0	Diagnostic Quiz	0%	N/A	Week 1
1	Course Quiz 1 (Module 1 & 2)	8%	1,2,3,4,5	Week 4
2	Take-home Assignment 1	12.5%	1,2,3,4	Week 5
3	Course Quiz 2 (Module 3 & 4)	8%	1,2,3,4,5	Week 8
4	Take-home Assignment 2	12.5%	3,4,5	Week 11
15	Course Quiz 3 (Modules 5 and 6)	8%	1,2,3,4,5	Week 12
6	Online Weekly Quizzes	6%	1,2,3,4	Week 2 - 11
7	End of Trimester Exam  <i>- Students must achieve a passing grade of at least 40% on their end of trimester exam to pass the course.</i>	45%	1,2,3,4,5	Exam Block

## **Diagnostic Quiz**

### **Task Description:**

At the beginning of 1014BPS, a diagnostic, compulsory but non-assessed quiz is assigned to students to identify the current level of assumed knowledge required for this course. Students who experience difficulty in completing this diagnostic quiz will be offered additional support and assistance in confidence. This may include additional online support materials, tuition outside of regularly scheduled class time and more detailed feedback for assessment items, providing students with greater opportunities for achieving their learning outcomes.

### Criteria & Marking:

Each course quiz consists of selected response items for which there is only one correct answer. Mathematical type questions will be marked according to numerical accuracy.

## **Course Quiz 1 - Module 2**

### **Task Description:**

Students will sit a summative quiz examining student understanding of the content taught within module 2, measuring student understanding of

1. Water and its weak interactions within aqueous systems
2. Ionisation of water, pH and weak acids & bases
3. Chemical buffering against pH changes within biological systems
4. Structure and properties of amino acids
5. The relationship between pH and amino acids
6. Properties and the formation of peptide bonds
7. Calculation of peptide charge in varying pH environments
8. Determining the isoelectric point and calculating charge of a peptide in various pH levels
9. The structural organisation of proteins

### Criteria & Marking:

This is a selected response item for which only one response is correct

## **Take-home Assessments 1 & 2**

### **Task Description:**

Take-home assessments are compulsory. There will be two take-home assessments, each worth 12.5% of the final grade which must be submitted by the due date at the beginning of weeks 5 and 11. This method of assessment gives students practice at problem solving and application of theoretical knowledge in an open-book situation, whilst helping to consolidate the subject material from each module. Feedback on these assessments will be given during the following lecture periods.

While students are encouraged to discuss problems with each other, everyone must hand in an assignment that is entirely their own work. Any instances of collusion, copying and plagiarism, and copying and pasting from the internet will be reported to the academic integrity officer.

## **Course Quiz 2 - Module 3 & 4**

### **Task Description:**

Students will sit a summative quiz examining student understanding of the content taught within modules 3 & 4, measuring student understanding of

1. The function of proteins & the reversible binding of a ligand to a protein (with emphasis on the function of myoglobin and hemoglobin)
2. Homeostatic response to the regulation of body O<sub>2</sub> & CO<sub>2</sub> levels, with focus on how oxygen is transported around the body and how binding of ligand affects protein-ligand binding via conformational changes.
3. How enzymes function and support biological systems.
4. Enzyme kinetics with respect to an enzymes reaction rate and binding affinities

### **Criteria & Marking:**

This assessment item is a selected response for which there is only one correct answer

## **Course Quiz 3 - Module 5 & 6**

### **Task Description:**

Students will sit a summative quiz examining student understanding of the content taught within module 5, measuring student understanding of

1. Monosaccharides, disaccharides and polysaccharides
2. Glycoconjugates and their role in biological systems
3. Lipids and their role in storage, structure and cell signalling
4. The composition and function of biological membranes
5. Membrane dynamics
6. Solute transport across membranes.

### **Criteria & Marking:**

This assessment item is a selected response for which there is only one correct answer.

## **Online Weekly Quizzes**

### **Task Description:**

For week 2 - 11, students will be required to log onto the Griffith Collage portal and complete a short weekly quiz. After learning the course content in class, students will be given one week to complete the online open book quiz. The combined 10 quizzes are comprised of 100 marks total and has a final weighing of 6%

### **Criteria & Marking:**

This assessment is a select response for which there is only one correct answer.



## **End of Trimester Exam**

### **Task Description:**

The end of trimester examination will consist of a mixture of multiple choice and short answer questions measuring student understanding of course content presented in module 1 – module 6  
Total marks 120 (20 marks per module)

### Criteria & Marking:

Written answers to questions must demonstrate understanding and explain the reasoning processes used.

Part marks will be given for incorrect numerical answers, as long as correct reasoning, procedures and justification has been demonstrated.

### ***Submission and Return of Assessment Items***

Assessment marks for workshop and module quizzes will be posted on the Griffith College portal.

### Notification of Availability of Feedback on Assessment

Regular feedback, in addition to assessment and exam feedback will be provided by the lecturers during lecture and workshop sessions. More detailed and individual feedback regarding student exam and assessment results, including strategies for improvement can be offered to students upon request to the course coordinator.

Students are to submit written assignments for marking to the lecturer in class. Late assignments can be submitted at the front counter only with permission from the course coordinator.

Normally you will be able to collect your assignments in class within fourteen [14] days of the due date for submission of the assignment.

**All students are instructed to regularly access and monitor any important announcements, timetable changes and dates regarding the course on the Griffith College portal & Griffith College Email.**

## **Retention of Originals**

You must be able to produce a copy of all work submitted if so requested. Copies should be retained until after the release of final results for the course.

### *Extensions*

To apply for an extension of time for an assignment, you must submit an Application for Extension of Assignment form to your teacher at least 24 hours before the date the assignment is due. Grounds for extensions are usually: serious illness, accident, disability, bereavement or other compassionate circumstances and must be able to be substantiated with relevant documentation [e.g. Griffith College Medical Certificate]. Please refer to the Griffith College website - Policy Library - for guidelines regarding extensions and deferred assessment.

Marks awarded for assessment items will also be available on the on-line grades system on the Student Website within fourteen [14] days of the due date.

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## Academic Skills

Griffith College aims to develop graduates who have an open and critical approach to learning and a capacity for lifelong learning. Through engagement in their studies, students are provided with opportunities to begin the development of these and other generic skills.

Studies in this course will give you opportunities to begin to develop the following skills:

Generic Skills	Taught	Practised	Assessed
Written Communication	Yes	Yes	Yes
Oral Communication	Yes	Yes	Yes
Information Literacy	Yes	Yes	Yes
Secondary Research			
Critical and Innovative Thinking		Yes	
Academic Integrity	Yes	Yes	Yes
Self-Directed Learning		Yes	
Team Work	Yes	Yes	Yes
Cultural Intelligence			
English Language Proficiency			

### *Additional Course Generic Skills*

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## **Additional Course Information**

This Course will be evaluated by asking students to complete course and teaching evaluation questionnaires throughout the trimester. In addition, ongoing attention will be paid to comments and feedback made by students and staff during the duration of the course.

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## **Academic Integrity**

Griffith College is committed to maintaining high academic standards to protect the value of its qualifications. Academic integrity means acting with the values of honesty, trust, fairness, respect and responsibility in learning, teaching and research. It is important for students, teachers, researchers and all staff to act in an honest way, be responsible for their actions, and show fairness in every part of their work. Academic integrity is important for an individual's and the College's reputation.

All staff and students of the College are responsible for academic integrity. As a student, you are expected to conduct your studies honestly, ethically and in accordance with accepted standards of academic conduct. Any form of academic conduct that is contrary to these standards is considered a breach of academic integrity and is unacceptable.

Some students deliberately breach academic integrity standards with intent to deceive. This conscious, pre-meditated form of cheating is considered to be one of the most serious forms of fraudulent academic behaviour, for which the College has zero tolerance and for which penalties, including exclusion from the College, will be applied.

However, Griffith College also recognises many students breach academic integrity standards without intent to deceive. In these cases, students may be required to undertake additional educational activities to remediate their behaviour and may also be provided appropriate advice by academic staff.

As you undertake your studies at Griffith College, your lecturers, tutors and academic advisors will provide you with guidance to understand and maintain academic integrity; however, it is also your responsibility to seek out guidance if and when you are unsure about appropriate academic conduct.

In the case of any allegation of academic misconduct made against a student he or she may request the guidance and support of a Griffith College Student Learning Advisor or Student Counsellor.

Please ensure that you are familiar with the [Griffith College Academic Integrity Policy](#); this policy provides an overview of some of the behaviours that are considered breaches of academic integrity, as well as the penalties and processes involved when a breach is identified.

For further information please refer to the Academic Integrity Policy on the Griffith College website – Policy Library.

### **Risk Assessment Statement**

There are no out of the ordinary risks associated with this course.