



1. General Course Information

1.1 Course Details

Course Code:	1014BPS
Course Name:	Fundamentals of Biochemistry
Trimester:	Trimester 1, 2023
Program:	Diploma of Science
Credit Points:	10
Course Coordinator:	Dr Zarko Barjaktarovic
Document modified:	20/02/2023

Course Description

1014BPS considers the molecular organisation of cells and the biochemical properties of the major classes of biological compounds which exist in, and contribute to, the cellular environment eg amino acids, carbohydrates and lipids. It covers the properties of water, pH and buffers, the structure and function of proteins, including an introduction to enzymes, the cell membrane and membrane transport.

Assumed Knowledge

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

- 1021SCG Chemistry 1A

1.2 Teaching Team

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

Name	Email
Zarko Barjaktarovic	ZABA@portal.griffithcollege.edu.au

1.3 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 "Support and Services/Teacher Consultation Times" link.

1.4 Timetable

Your timetable is available on the Griffith College Portal at Class Timetable in Student and Services.

1.5 Technical Specifications

All students must have access to a computer or suitable mobile device.

2. Aims, Outcomes & Generic Skills

2.1 Course 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 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.



2.2 Learning Outcomes

After successfully completing this course you should be able to:

1. Evaluate & analyse the properties of non-covalent interactions, pH and buffers within biomolecules.
2. Analyse the structure-function relationship of peptides, the peptide formation, and evaluate how the amino acid composition of a protein can affect its structure.
3. Compare globular & fibrous proteins whilst evaluating the structure and function of hemoglobin, the mechanisms of O₂ & CO₂ delivery, along with showing how proteins achieve thermodynamically stable & spontaneous folding.
4. Analyse the basics of enzyme catalysis within various biochemical reactions whilst calculating substrate affinity and maximum reaction rates for single-substrate reactions.
5. Compare the structure of various saccharides & lipids with their function in living organisms.
6. Differentiate the change in membranous composition within various human cells and distinguish the means by which substances are transported into & out of the cell.



2.3 Generic Skills and Capabilities

For further details on the Generic Skills please refer to the Graduate Generic Skills and Capabilities policy.

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 and Capabilities		Taught	Practised	Assessed
Acquisition of discipline knowledge and skills with critical judgement		✓	✓	✓
Communication and collaboration		✓	✓	✓
Self-directed and active learning		✓	✓	
Creative and future thinking		✓	✓	
Social responsibility and ethical awareness		✓		
Cultural competence and awareness in a culturally diverse environment			✓	



3. Learning Resources

3.1 Required Learning Resources

Course notes, workshop booklet and other activities to assist your learning of the material will be placed on the Griffith College Portal and will be required for all timetabled classes (either purchased from the bookstore & downloaded from the 1014BPS course page) in addition to a non-programmable scientific calculator. 1014BPS course notes also contain resources such as self-assessment tests and links to other resources.

3.2 Recommended Learning Resources

1. Fundamentals of Biochemistry: Life at the Molecular level - Voet and Pratt, 4th edition, Wiley.
2. Lehninger Principles of Biochemistry, 6th edition (2012) by Nelson and Cox.

Both are available from the Griffith University Bookshop. Although both textbooks are highly recommended, they are not a compulsory component of this course.

3.3 College Support Services and Learning Resources

The College provides many facilities and support services to assist students in their studies. Links to information about College support resources that are available to students are included below for easy reference.

[Digital Library](#) – Databases to which Griffith College students have access to through the Griffith Library Databases.

MyStudy – there is a dedicated website for this course via MyStudy on the Griffith College Portal.

[Academic Integrity Tutorial](#) - this tutorial helps students to understand what academic integrity is and why it matters. You will be able to identify types of breaches of academic integrity, understand what skills you will need in order to maintain academic integrity, and learn about the processes of referencing styles.

Services and Support provides a range of services to support students throughout their studies including personal support such as Counselling; Academic support; and Welfare support.

Jobs and Employment in the [Student Hub](#) can assist students with career direction, resume and interview preparation, job search tips, and more.

[IT Support](#) provides details of accessing support, information on s numbers and internet access and computer lab rules.

3.4 Other Information about your Learning

Attendance

You are expected to actively engage in all learning experiences and learning activities which underpin the learning content in this course. You are expected to engage with the learning content and learning activities outside of timetabled class times. This requires you to be an active agent of your learning. You are expected to bring all necessary learning resources to class such as the required textbook and /or Workbook. In addition, you are encouraged to BYOD (bring your own device) to class such as a laptop or tablet. This is not a requirement as computer lab facilities are available on campus, however, the use of such devices in the classroom is encouraged with appropriate and considerate use principles being a priority.

Preparation and Participation in Learning

In order to enhance your learning, you need to prepare before participating in the learning experiences. Absorb the learning content and complete the learning activities that are provided online before you attend the scheduled learning experiences. Make sure you complete the learning activities set each week, they are designed to support your learning. Active participation in your learning will enhance your success. Ask questions when something is unclear or when you want to bring some issue to your lecturer or tutor's attention; respond to questions to test your knowledge and engage in discussion to help yourself and others learn.

Consultation Sessions

Teachers offer extra time each week to assist students outside the classroom. This is known as 'consultation time.' You may seek assistance from your teacher on email or in person according to how the teacher has explained this to the class. Attendance during consultation time is optional but you are encouraged to use this extra help to improve your learning outcomes.

Course Learning Materials

Learning materials are made available to you in MyStudy on the Griffith College Portal. The learning materials are arranged in Modules. In each Module you will find the learning content, learning activities and learning experiences. Actively working your way through these course learning materials together with your lecturer or tutor will prepare you to succeed when completing the evidence of learning (assessment).

Self-Directed Learning

You will be expected to learn independently. This means you must organise and engage with the course learning content even when you are not specifically asked to do so by your lecturer or tutor. The weekly guide will be helpful to organise your learning. This involves revising the weekly course learning material and completing the learning activities. It also means you will need to find additional information to evidence your learning (assessment) beyond that given to you, and to construct your own response to a question or topic. All of this requires careful planning of your time. Expect to spend, on average, at least 10 hours per week including class time for each of your courses.

Program Progression

You are reminded that satisfactory Program Progression requires that attendance in classes is maintained at equal to or greater than 80%, and that GPA is maintained at equal to or greater than 3.5 [please see Griffith College Policy Library - Program Progression Policy - for more information].






Teacher and Course Evaluation

Your feedback is respected and valued by your lecturers and tutors. You are encouraged to provide your thoughts on the course and teaching, both positive and critical, directly to your lecturer and tutor or by completing course and lecturer evaluations via Griffith College's evaluation tool whenever these are available.



4. Learning Content, Learning Activities and Learning Experiences

4.1 Modules for Learning and Weekly Learning Content, Learning Activities and Learning Experience

	Learning Content 	Learning experiences 	Learning activities 	Evidence of learning 	Learning outcome 
	Module 1 - Non-covalent interactions, pH and buffers				
Week 1 - Non-covalent interactions, pH and buffers	<ul style="list-style-type: none">• Non-covalent interactions• Calculate pH, Ka, pKa• Differentiate between a strong and weak acid/base• Buffers	<ul style="list-style-type: none">• Discussion of the course outline, course learning outcomes, module learning outcomes & assessment• Group discussions of the non-covalent interactions and a recap of the core material from 1021SCG.• Go through some worked examples/sample calculations and outline common errors.• Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience.• Various activities such as jeopardy/kahoot quizzes, question bingo etc	<ul style="list-style-type: none">• Lehninger Chapter 2/Wiley Chapter 2• 1014BPS Workbook – week 1• Viewing any supplementary material referenced on the moodle course page		1

Module 2 – Amino acids & protein structure					
Week 2 - Amino acids, peptide bonds & charge on a peptide	<ul style="list-style-type: none"> Amino acid structures, 1 letter and 3 letter codes Classes of amino acids and their unique properties Calculate the charge & pI of amino acids Calculate the charge and pI of a peptide 	<ul style="list-style-type: none"> Group discussions of the common amino acids, how pH affects both physical and chemical properties, and how amino acids form peptides. 1014BPS workbook – Week 2 Various activities such as jeopardy/kahoot quizzes, question bingo etc Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience. 	<ul style="list-style-type: none"> Lehninger Chapter 3, 4/Wiley Chapter 3, 4 1014BPS Workbook – week 2 Viewing any supplementary material referenced on the moodle course page 	Module Quiz (5%)	1, 2
Week 3 - Protein structure & function	<ul style="list-style-type: none"> Primary & secondary structure of a protein α-helix & β sheet – strengths and limitations β & γ turns 	<ul style="list-style-type: none"> Group discussions of primary and secondary structures of a protein, describing the strengths and limitations of common secondary structures. 1014BPS workbook – Week 3 Various activities such as jeopardy/kahoot quizzes, question bingo etc Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience. 	<ul style="list-style-type: none"> Lehninger Chapter 3, 4/Wiley Chapter 3, 4 1014BPS Workbook – week 3 Viewing any supplementary material referenced on the moodle course page 	Module Quiz (6%)	1, 2, 3

Module 3 – Globular proteins & protein folding					
Week 4 - Fibrous proteins, tertiary and quaternary structure	<ul style="list-style-type: none"> • Difference in structure & non-covalent interactions between secondary, tertiary and quaternary structures • Comparison of globular and fibrous proteins – structure & function • Protein denaturation • Protein folding & how spontaneous protein folding is achieved. 	<ul style="list-style-type: none"> • Group discussions comparing the non-covalent interactions between secondary, tertiary & quaternary structures, protein denaturation & protein folding. • 1014BPS workbook – Week 4 • Various activities such as jeopardy/kahoot quizzes, question bingo etc • Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience. 	<ul style="list-style-type: none"> • Lehninger Chapter 5/Wiley Chapter 5 • 1014BPS Workbook – week 4 • Viewing any supplementary material referenced on the moodle course page 		1, 2, 3
Week 5 - Globular Proteins, Haemoglobin and Myoglobin	<ul style="list-style-type: none"> • Comparison of hemoglobin & myoglobin – structure & function • Exploring allosteric regulation & cooperative binding of oxygen • Bohr & Haldane effect – O₂ & CO₂ transport. 	<ul style="list-style-type: none"> • Group discussions the mechanisms in which oxygen and carbon dioxide are transported around the body • 1014BPS workbook – Week 5 • Various activities such as jeopardy/kahoot quizzes, question bingo etc • Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience. 	<ul style="list-style-type: none"> • Lehninger Chapter 5/Wiley Chapter 6 • 1014BPS Workbook – week 5 • Viewing any supplementary material referenced on the moodle course page 	Take-home assignment (module 1-2) – 25% Module Quiz (6%)	1, 2, 3

Module 4 - Enzymes					
Week 6 - Enzymes as biological catalysts	<ul style="list-style-type: none"> • Interpretation of catalytic processes, including examples of how transition states are stabilised • Enzymes and the effect on free energy • Cofactors 	<ul style="list-style-type: none"> • Group discussions of the importance of enzymes as a catalyst in biological systems, discussing the various means in which enzymes achieve this. • 1014BPS workbook – Week 6 • Various activities such as jeopardy/kahoot quizzes, question bingo etc • Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience. 	<ul style="list-style-type: none"> • Lehninger Chapter 6/Wiley Chapter 11 • 1014BPS Workbook – week 6 • Viewing any supplementary material referenced on the moodle course page 		1, 2, 3, 4
Week 7 - Enzyme Kinetics	<ul style="list-style-type: none"> • Enzyme kinetics • Reversible & non-reversible enzyme inhibition • Lineweaver-burke plots & interpreting inhibition types from various plots 	<ul style="list-style-type: none"> • Group discussions of how enzymes are used in current medical research, calculating enzyme rates using substrate concentrations & interpreting inhibition types via lineweaver burke plots • 1014BPS workbook – Week 7 • Various activities such as jeopardy/kahoot quizzes, question bingo etc • Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience. 	<ul style="list-style-type: none"> • Lehninger Chapter 6/Wiley Chapter 12 • 1014BPS Workbook – week 7 • Viewing any supplementary material referenced on the moodle course page 	Module Quiz (6%)	1, 2, 4





Module 5 – Saccharides & lipids					
Week 8 - Carbohydrates Polysaccharides	<ul style="list-style-type: none"> • Various isomeric forms of 5-6 carbon sugars • Drawing both Fischer & Haworth projections of monosaccharides • Mutarotation of monosaccharides • Reducing sugars • Function & formation of polysaccharides & glycoproteins/glycolipids 	<ul style="list-style-type: none"> • Group discussions of drawing/converting structures between their Fischer & Haworth projections, identification of reducing sugars and exploring the function & relationship of saccharides to biological functions • 1014BPS workbook – Week 8 • Various activities such as jeopardy/kahoot quizzes, question bingo etc • Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience. 	<ul style="list-style-type: none"> • Lehninger Chapter 7, 10/Wiley Chapter 8 • 1014BPS Workbook – week 8 • Viewing any supplementary material referenced on the moodle course page 		1, 5
Week 9 – Lipids	<ul style="list-style-type: none"> • Structure & function of common lipids • Relationship of fatty acids & m.p/solubility • Synthesis of triacylglycerols, waxes & soap • Compare Glycerophospholipids, sphingolipids and steroids 	<ul style="list-style-type: none"> • Group discussions of the importance of lipid structure & composition in biological systems • 1014BPS workbook – Week 9 • Various activities such as jeopardy/kahoot quizzes, question bingo etc • Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience. 	<ul style="list-style-type: none"> • Lehninger Chapter 7,10/Wiley Chapter 9 • 1014BPS Workbook – week 9 • Viewing any supplementary material referenced on the moodle course page 	Module Quiz (6%)	1, 5

Module 6 – Membranous proteins & membrane transport					
Week 10 - Membranes & Membrane Proteins	<ul style="list-style-type: none"> Fluid mosaic model Control of membrane fluidity Lipid movement & distribution Water soluble vs lipid soluble hormones 	<ul style="list-style-type: none"> Group discussions of the various lipid compositions in cell membranes, the importance of the fluid mosaic model & the diversity of lipid composition within membranes. 1014BPS workbook – Week 10 Various activities such as jeopardy/kahoot quizzes, question bingo etc Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience. 	<ul style="list-style-type: none"> Lehninger Chapter 11/Wiley Chapter 9, 10 1014BPS Workbook – week 10 Viewing any supplementary material referenced on the moodle course page 		1, 2, 5, 6,
Week 11 - Membrane permeability and transport	<ul style="list-style-type: none"> Selective membrane permeability Diffusion, osmosis & 1^o, 2^o active transport Na/K-ATPase pumps function & importance in human physiology 	<ul style="list-style-type: none"> Group discussions of how various substances are able to move across a lipid membrane, and how membranous proteins control this movement. 1014BPS workbook – Week 11 Various activities such as jeopardy/kahoot quizzes, question bingo etc Both individually & in pairs, work through the 1014BPS workbook with any work not completed in class to be set as a learning experience. 	<ul style="list-style-type: none"> Lehninger Chapter 11/Wiley Chapter 10 1014BPS Workbook – week 11 Viewing any supplementary material referenced on the moodle course page 	Module Quiz (6%)	1, 2, 5, 6
Week 12 - Revision		Revision session will be structured based upon the needs of the students.	Revision of the primary topics covered in modules 1-6	None	1, 2, 3, 4, 5, 6



5. Evidence of Learning (Assessment Plan)

5.1 Evidence of Learning Summary

	 Evidence of learning	 Weighting	 Learning outcome	 Due Date
1	Modular Competency Quiz	Module Quiz 1: 5% Module Quiz 2-6: 6% Total Weighting: 35%	1, 2, 3, 4, 5, 6	1 weeks after the completion of each module respectively.
2	Take-home assignment	25%	1, 2	Week 5
3	End of Trimester Exam	40%	1, 2, 3, 4, 5, 6	Exam Week

5.2 Evidence of Learning Task Detail

1. Evidence of Learning Task 1: Modular Competency Quiz (35%)

Task Type: Quiz

Due Date: 1 week after completion of each module

Weight: 6%, Marked out of 25

Length: 25 minutes

Quiz type: Closed book

Task Description: Online Quiz involving multiple choice question for assessment of course content for each module

Criteria and Marking: Students are assessed on the learning outcomes for each module

Quiz Format: Online quiz

3. Evidence of Learning Task 2: Take-home assignment (25%)

Task Type: Written Assignment

Due Date: Week 5

Weight: 25%, Marked out of 30

Length: not applicable

Task Description: Submission of biochemistry assignment

Criteria and Marking: Students are assessed on their understanding of biochemistry topics covered in module 1 and 2

Submission: Turnitin via the course site

3. Evidence of Learning Task 3: End of Trimester Exam (40%)

Task Type: Final Exam

Due Date: Week 13

Weight: 40%, Marked out of 70

Length: 2 hours 10 minutes

Exam type: closed book, invigilated, 1 attempt.

Task Description: Final exam

Criteria and Marking: Students are assessed on the learning content covered in weeks 1-11

Exam format: On Campus

Modular Competency Quiz

At the end of the module, students will sit an online quiz examining student understanding of the content taught within each respective module. Each quiz will be subdivided into two parts, Part A & Part B

Part A will consist of a 20 question MCQ test, with students having the opportunity to repeat the quiz up to a maximum of three times, within 1 weeks of completing the module.

Part B will consist of 1 long answer type question. This section of the quiz can only be attempted once, with students having 7 days to complete part B. a

Module Quiz 1 will only comprise of Part A, with Module Quiz 2-6 containing Part A & B.

Take-home assignment

This problem-solving assignment relates to analysis of the properties of amino acids and a peptide, is worth 40 marks and has a weight of 25%, with the completed assignment due by week 5.

This assignment gives practice at problem solving and application of theoretical knowledge, and helps to consolidate material from each module. Feedback on this assessment will be given during class time following the assignment due date.

End of Trimester Exam

The end of trimester examination is designed to assess the knowledge and understanding of the core concepts covered throughout the entire trimester, provided to students in the form of learning objectives presented at the beginning & end of every class measuring student understanding of course content presented in module 1 – module 6. The exam will consist of a mixture of multiple choice and short answer questions evenly distributed across each module. Students must achieve 40% on the final exam to be able to pass the course.

Requirements to pass this course:

students must:

1. **attend and attempt all assessment items; AND**
2. **obtain at least 40% on the EOT exam, AND**
3. **achieve an overall course result (sum of all assessments) of at least 50%**

5.3 Late Submission

An evidence of learning (assessment) item submitted after the due date, without an approved extension from the Course Coordinator, will be penalised. The standard penalty is the reduction of the mark allocated to the assessment item by 5% of the maximum mark applicable for the assessment item, for each working day or part working day that the item is late. Evidence of learning items submitted more than five working days after the due date are awarded zero marks.

Please refer to the Griffith College website - Policy Library > Assessment Policy for guidelines and penalties for late submission.

5.4 Other Information about Evidence of Learning

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.

Requests for extension

To apply for an extension of time for an evidence of learning item, 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 Student Medical Certificate](#)]. Please refer to the Griffith College website - Policy Library - for guidelines regarding extensions and deferred assessment.

Return of Evidence of Learning Items

1. Marks awarded for in-trimester evidence of learning items, except those being moderated externally with Griffith University, will be available on the Student Portal within fourteen [14] days of the due date. This does not apply to the final evidence of learning item in this course (marks for this item will be provided with the final course result).
2. Students will be advised of their final grade through the Student Portal. Students can review their final exam papers after student grades have been published. Review of final exam papers will not be permitted after the final date to enrol.
3. Marks for **all** evidence of learning items including the final exam (if applicable) will be recorded in the Moodle Course Site and made available to students through the Moodle Course Site.

The sum of your marks of evidence of learning items in this course does not necessarily imply your final grade for the course. Standard grade cut off scores can be varied for particular courses, so you need to wait for the official release of grades to be sure of your grade for this course.

6. Policies & Guidelines

Griffith College assessment-related policies can be found in the [Griffith College Policy Library](#) which include the following policies:

Assessment Policy, Special Consideration, Deferred Assessment, Alternate Exam Sitting, Medical Certificates, Academic Integrity, Finalisation of Results, Review of Marks, Moderation of Assessment, Turn-it-in Software Use. These policies can be accessed using the 'Document Search' feature within the [Policy Library](#)

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 an allegation of a breach of academic integrity being 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 Griffith College website - Policy Library > Academic Integrity Policy

Reasonable Adjustments for Assessment – The Disability Services policy

The Disability Services policy (accessed using the Document Search' feature with the [Policy Library](#)) outlines the principles and processes that guide the College in making reasonable adjustments to assessment for students with disabilities while maintaining academic robustness of its programs.

Risk Assessment Statement

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

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