

# CHM300 Advanced Biological Chemistry

School: School of Science, Technology and Engineering

2024 | Semester 1

UniSC Sunshine Coast  
UniSC Moreton Bay

**BLENDED  
LEARNING**

Most of your course is on campus but you may be able to do some components of this course online.

*Please go to [usc.edu.au](http://usc.edu.au) for up to date information on the teaching sessions and campuses where this course is usually offered.*

## 1. What is this course about?

### 1.1. Description

Advanced biological chemistry covers advanced knowledge of a number of selected topics in biochemistry that will build upon the foundations established in second-year subjects. The main themes to be explored are, aspects of cell biology, and the techniques of biochemistry and molecular biology that underpin the developments of molecular sciences and biotechnology. The practical component will aim to make the students competent in several currently used experimental and computer-based techniques of biochemistry.

### 1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
<b>BLENDED LEARNING</b>			
<b>Tutorial/Workshop 1</b> – On campus tutorial. Tutorial questions will be discussed.	1hr	Week 2	12 times
<b>Laboratory 1</b> – Four comprehensive BioChem experiments will be conducted Wk 5, 7, 9 and 11.	3hrs	Week 5	4 times
<b>Learning materials</b> – Pre-recorded learning materials will be uploaded to each week's folder.	2hrs	Week 1	12 times
<b>Seminar</b> – Oral presentation assessment, course review and discuss key topics of the course.	1hr	Week 10	3 times

### 1.3. Course Topics

1. Introduction: Cells and biomolecules
2. Amino acids and peptides: structure and chemistry of amino acids and peptides
3. Structure of proteins: chaperone as an example
4. Fatty Acids and Fatty Acid Synthesis: polymerisation, biosynthesis, players, chemistry, structure, medical interlude
5. Fatty acid catabolism
6. Chemistry of PKS and NRPS: post-translational modification, initiation, elongation, decoration, termination, fidelity
7. Biosynthesis of cholesterol, steroids, and isoprenoids
8. The chemistry of DNA and RNA
9. Transcription and RNA processing
10. Translation: from RNA to peptide
11. Physical and chemical approaches for studying translation
12. Protein function and proteomics
13. Course review

## 2. What level is this course?

300 Level (Graduate)

Demonstrating coherence and breadth or depth of knowledge and skills. Independent application of knowledge and skills in unfamiliar contexts. Meeting professional requirements and AQF descriptors for the degree. May require pre-requisites where discipline specific introductory or developing knowledge or skills is necessary. Normally undertaken in the third or fourth full-time study year of an undergraduate program.

## 3. What is the unit value of this course?

12 units

## 4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES	GRADUATE QUALITIES
On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...
<b>1</b> Plan and conduct laboratory experiments, and apply computer techniques in nucleic acid and protein chemistry, to explain the complexities of cell signalling and cell cycle control in higher organisms.	Knowledgeable Creative and critical thinker Empowered Ethical Engaged Sustainability-focussed
<b>2</b> Use biochemistry analytical and preparative instruments for experiments.	Knowledgeable Creative and critical thinker Empowered Engaged
<b>3</b> Communicate scientifically in a written and oral forms using ICT, quantitative data and literature.	Knowledgeable Creative and critical thinker Engaged
<b>4</b> Apply and explain mechanisms and processes in Biological Chemistry.	Knowledgeable Creative and critical thinker
<b>5</b> Solve specific problems and research objectives in human health, agricultural or environmental science.	Knowledgeable Creative and critical thinker Empowered Ethical Engaged Sustainability-focussed

## 5. Am I eligible to enrol in this course?

Refer to the [UniSC Glossary of terms](#) for definitions of “pre-requisites, co-requisites and anti-requisites”.

### 5.1. Pre-requisites

CHM202 or CHM210

### 5.2. Co-requisites

Not applicable

### 5.3. Anti-requisites

Not applicable

### 5.4. Specific assumed prior knowledge and skills (where applicable)

You must have an introductory knowledge of Biological Chemistry or Molecular Biology.

## 6. How am I going to be assessed?

### 6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

### 6.2. Details of early feedback on progress

In Week 2 your answers to tutorial question 1 and quiz 1, as well as the learning material will be discussed and reviewed during the Tutorial.

### 6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Practical / Laboratory Skills	Individual	30%	four times 750 words	Refer to Format	Online Assignment Submission with plagiarism check
All	2	Oral and Written Piece	Group	30%	15 min presentations + 5 min question	Refer to Format	In Class
All	3	Quiz/zes	Individual	10%	A quiz of 10 questions related to the key knowledge of each week will be provided on Canvas. Two attempts are allowed. No time limits.	Refer to Format	Online Test (Quiz)
All	4	Examination - Centrally Scheduled	Individual	30%	2 hours	Exam Period	Exam Venue

#### All - Assessment Task 1: Laboratory reports

<b>GOAL:</b>	The goal is to develop practical laboratory skills to plan and conduct experiments safely and to present findings in a scientific report.															
<b>PRODUCT:</b>	Practical / Laboratory Skills															
<b>FORMAT:</b>	Submit: Two weeks after completing the practical. Participate in 4 laboratory experiments over 12 weeks. These experiments will occur fortnightly during a 3-hour lab session. Write a standard scientific report for your experiments. The first report is a formative task to acquaint you with the required format. Each report will be 750 words submitted to Canvas Turnitin. The format of the report will be: Title, Abstract, Introduction, Materials and Methods, Results & Discussion, References. Reference list is not included in the 1,000 words.															
<b>CRITERIA:</b>	<table border="1"> <thead> <tr> <th>No.</th> <th>Learning Outcome assessed</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Communication of scientific concepts and use of the literature</td> <td>3</td> </tr> <tr> <td>2</td> <td>Application and explanation of laboratory experiments</td> <td>1 2</td> </tr> <tr> <td>3</td> <td>Use of quantitative data and mathematic calculations</td> <td>4 5</td> </tr> <tr> <td>4</td> <td>Application and explanation of processes in biological chemistry</td> <td>4 5</td> </tr> </tbody> </table>	No.	Learning Outcome assessed	1	Communication of scientific concepts and use of the literature	3	2	Application and explanation of laboratory experiments	1 2	3	Use of quantitative data and mathematic calculations	4 5	4	Application and explanation of processes in biological chemistry	4 5	
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### All - Assessment Task 2: Oral presentations

<b>GOAL:</b>	The goal is to solve a biological chemistry problem in a group and present solutions in an oral presentation	
<b>PRODUCT:</b>	Oral and Written Piece	
<b>FORMAT:</b>	Submit: During tutorials weeks 9,10,11. Work in a group to address a selected biochemical problem/question. Presentations of quantitative step-wise solutions and produce quantitative data in teams, compare it to biological chemistry literature and communicate it to peers using ICT. The presentation will be 15 minutes with 5 minutes for questions.	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1	Solutions to biochemistry problems/question 4
	2	Application and explanation of biological chemistry mechanisms 5
	3	Scientific communication of data using ICT in oral format 3

### All - Assessment Task 3: Quiz

<b>GOAL:</b>	The goal is to better understand the key knowledge of the Week.	
<b>PRODUCT:</b>	Quiz/zes	
<b>FORMAT:</b>	MCQs, or True/False, or SAQs. Submit online prior to the next Tutorial.	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1	Correctly using knowledge learnt to solve biochemical questions 4
	2	Correctly apply the biochemical knowledge in addressing practical questions. 5

### All - Assessment Task 4: Final Exam

<b>GOAL:</b>	The correct use of biochemical knowledge in the practical exam.	
<b>PRODUCT:</b>	Examination - Centrally Scheduled	
<b>FORMAT:</b>	Individual written 2-hour examination during central exam period	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1	Solutions to biochemistry problems/question 5
	2	Application and explanation of biological chemistry mechanisms 4

## 7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Student workload is calculated at 12.5 learning hours per one unit.

## 8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Canvas site– Please log in as soon as possible.

## 8.1. Prescribed text(s) or course reader

Please note that you need to have regular access to the resource(s) listed below. Resources may be required or recommended.

REQUIRED?	AUTHOR	YEAR	TITLE	EDITION	PUBLISHER
Required	Alison Snape, Despo Papachristodoulou, William H. Elliott, Daphne C. Elliott	2014	Biochemistry and Molecular Biology	n/a	Oxford University Press

## 8.2. Specific requirements

Personal Protective Equipment

## 9. How are risks managed in this course?

Risk assessments have been performed for all studio and laboratory classes and a low level of health and safety risk exists. Some risk concerns may include equipment, instruments, and tools; as well as manual handling items within the laboratory. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the [online induction training for students](#), and following the instructions of the University staff.

## 10. What administrative information is relevant to this course?

### 10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

### 10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

The final mark is in the percentage range 47% to 49.4%

The course is graded using the Standard Grading scale

You have not failed an assessment task in the course due to academic misconduct

### 10.3. Assessment: Submission penalties

Late submission of assessment tasks may be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.

- 10% (of the assessment task's identified value) for the third day - 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.

- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task. Weekdays and weekends are included in the calculation of days late. To request an extension you must contact your course coordinator to negotiate an outcome.

### 10.4. SafeUniSC

UniSC is committed to a culture of respect and providing a safe and supportive environment for all members of our community. For immediate assistance on campus contact SafeUniSC by phone: [07 5430 1168](tel:0754301168) or using the [SafeZone](#) app. For general enquires contact the SafeUniSC team by phone [07 5456 3864](tel:0754563864) or email [safe@usc.edu.au](mailto:safe@usc.edu.au).

The SafeUniSC Specialist Service is a Student Wellbeing service that provides free and confidential support to students who may have experienced or observed behaviour that could cause fear, offence or trauma. To contact the service call [07 5430 1226](tel:0754301226) or email [studentwellbeing@usc.edu.au](mailto:studentwellbeing@usc.edu.au).

## 10.5. Study help

For help with course-specific advice, for example what information to include in your assessment, you should first contact your tutor, then your course coordinator, if needed.

If you require additional assistance, the Learning Advisers are trained professionals who are ready to help you develop a wide range of academic skills. Visit the [Learning Advisers](#) web page for more information, or contact Student Central for further assistance: +61 7 5430 2890 or [studentcentral@usc.edu.au](mailto:studentcentral@usc.edu.au).

## 10.6. Wellbeing Services

Student Wellbeing provide free and confidential counselling on a wide range of personal, academic, social and psychological matters, to foster positive mental health and wellbeing for your academic success.

To book a confidential appointment go to [Student Hub](#), email [studentwellbeing@usc.edu.au](mailto:studentwellbeing@usc.edu.au) or call 07 5430 1226.

## 10.7. AccessAbility Services

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, learning disorder mental health issue, injury or illness, or you are a primary carer for someone with a disability or who is considered frail and aged, [AccessAbility Services](#) can provide access to appropriate reasonable adjustments and practical advice about the support and facilities available to you throughout the University.

To book a confidential appointment go to [Student Hub](#), email [AccessAbility@usc.edu.au](mailto:AccessAbility@usc.edu.au) or call 07 5430 2890.

## 10.8. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit <https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

## 10.9. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The [Student Charter](#) sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

## 10.10. General Enquiries

### In person:

- **UniSC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **UniSC Moreton Bay** - Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **UniSC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **UniSC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **UniSC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **UniSC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

**Tel:** +61 7 5430 2890

**Email:** [studentcentral@usc.edu.au](mailto:studentcentral@usc.edu.au)