



## UNSW Course Outline

# BIOC2181 Fundamentals of Biochemistry - 2024

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## General Course Information

**Course Code :** BIOC2181

**Year :** 2024

**Term :** Term 3

**Teaching Period :** T3

**Is a multi-term course? :** No

**Faculty :** Faculty of Science

**Academic Unit :** School of Biotechnology and Biomolecular Sciences

**Delivery Mode :** In Person

**Delivery Format :** Standard

**Delivery Location :** Kensington

**Campus :** Sydney

**Study Level :** Undergraduate

**Units of Credit :** 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

Have you ever wondered why we need to eat and what happens to the food we eat once we digest it? Have you thought about what causes some people to become overweight and develop metabolic disorders and why most diets don't work in the long term? Have you considered how

long you will be able to survive without food? Or the best ways to improve your metabolism? The course aims to answer all these questions by introducing you to modern biochemistry.

The course covers fundamental aspects of the structure-function relationships of proteins and enzymes; metabolic working of cells, tissues, and organs; the interrelationships between pathways of carbohydrate, lipid, and amino acid metabolism; the vital roles of enzymes and hormones in catalysis and metabolic regulation; the energy trapping mechanisms of animals and plants; interesting variations on the central metabolic pathways in various life forms. The lecture material will be supplemented by practical classes where you will conduct experiments as a group to diagnose metabolic conditions. Both lecture and practical class material will be reinforced and assessed during the weekly tutorials. You will be expected to work in groups throughout the term in the practical class and the tutorial for learning and assessments.

This course covers essentially the same material as in BIOC2101 Principles of Biochemistry (Advanced), but in less detail and with more emphasis on the function of organisms and less emphasis on some of the underlying chemical mechanisms.

## Course Aims

This course aims to introduce students to modern biochemistry with a particular emphasis on how we, as humans, convert foods to useful energy.

This course also aims to provide a solid context for new learning material by providing clinical, medical and everyday applications that correspond to the central themes and topics.

The Practicals aim to introduce students to current laboratory techniques, biochemical assays, experimental design, and data analysis.

This course also aims to teach students how to work effectively in groups to solve real world problems.

# Course Learning Outcomes

Course Learning Outcomes
CLO1 : Compare and contrast the major metabolic pathways in humans and discuss how these pathways are controlled and regulated in humans.
CLO2 : Discuss the changes that occur in metabolic pathways under different metabolic scenarios.
CLO3 : Apply current biochemical methods and analytical techniques to design experiments, perform a range of assays and calculations.
CLO4 : Analyse and interpret data from biochemistry experiments to diagnose medical conditions.
CLO5 : Collaborate with peers to evaluate how theory and practical components of biochemistry are linked.

Course Learning Outcomes	Assessment Item
CLO1 : Compare and contrast the major metabolic pathways in humans and discuss how these pathways are controlled and regulated in humans.	<ul style="list-style-type: none"><li>Theory Tests</li></ul>
CLO2 : Discuss the changes that occur in metabolic pathways under different metabolic scenarios.	<ul style="list-style-type: none"><li>Theory Tests</li></ul>
CLO3 : Apply current biochemical methods and analytical techniques to design experiments, perform a range of assays and calculations.	<ul style="list-style-type: none"><li>Group Project</li><li>Biochemical Calculation Quiz</li></ul>
CLO4 : Analyse and interpret data from biochemistry experiments to diagnose medical conditions.	<ul style="list-style-type: none"><li>Group Project</li></ul>
CLO5 : Collaborate with peers to evaluate how theory and practical components of biochemistry are linked.	<ul style="list-style-type: none"><li>Biochemical Calculation Quiz</li><li>Group Project</li></ul>

## Learning and Teaching Technologies

Moodle - Learning Management System

## Learning and Teaching in this course

### Expectations

- Check Moodle announcements daily.
- Attend all the compulsory tutorials and labs.
- You will be added to a separate private chat on Teams with your assigned group members in Week 1. You must use this site for all your group communications. You are expected to check this chat daily.
- Follow the Moodle Course Resources Table and keep up with the course activities.

- Outside of the normal course hours, allocate 2-3 hours for extra revision + group activities each week.
- The lectures will be delivered as recordings found on Moodle. Try to keep up with weekly lectures or it will be difficult to catch up. DO NOT rely solely on lecture slides as it is not possible to get a good understanding of a topic just by reading the lecture slides.
- There is a lot of additional revision material available on Moodle. These should be completed independently in your own time.
- There are 7 online lecture reviews with different types of practice questions and extensive feedback. There are also some lecture review videos that you can watch. These provide you with the opportunity to revise course content and reflect upon your own level of comprehension of the material presented in lectures and laboratory classes.
- If you experience any difficulty in writing English for academic purposes such as reports, exam short answer or written questions, or problems comprehending multiple choice questions you should consult an advisor at "The Learning Centre" located in the foyer of the main library entrance to obtain relevant information OR you can book an appointment [HERE](#) for up to one hour a week of private consultation with a peer writing assistant.

# Assessments

## Assessment Structure

Assessment Item	Weight	Relevant Dates
Theory Tests Assessment Format: Individual	50%	Start Date: Not Applicable Due Date: Not Applicable
Group Project Assessment Format: Group	30%	Start Date: Not Applicable Due Date: Not Applicable
Biochemical Calculation Quiz Assessment Format: Individual	20%	Start Date: Not Applicable Due Date: Not Applicable

## Assessment Details

### Theory Tests

#### Assessment Overview

You will complete two theory tests during the term designed to examine the lecture content of the course. The tests will consist of different question types such as multiple choice, short answer, and long response. The test duration will vary between 1-2 hours.

- Test 1 – Week 7 – 30%
- Test 2 – Week 10 – 20%

The tests will be conducted during the in-person tutorial. The tests will be invigilated and conducted through an online quiz platform with Turnitin capabilities. Feedback will be provided

during the tutorial and via Moodle within 10 days of completing the tests.

### **Course Learning Outcomes**

- CLO1 : Compare and contrast the major metabolic pathways in humans and discuss how these pathways are controlled and regulated in humans.
- CLO2 : Discuss the changes that occur in metabolic pathways under different metabolic scenarios.

### **Detailed Assessment Description**

See the Moodle Assessment Table for further details about this assessment task.

### **Assessment Length**

Not Applicable

### **Submission notes**

Test 1 will be held during the Week 7 lab class. Test 2 will be held during the Week 8 lab class.

### **Assignment submission Turnitin type**

Not Applicable

### **Hurdle rules**

The students must attempt both Tests.

The students must get an overall pass in the theory component.

### **Generative AI Permission Level**

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see [here](#).

## **Group Project**

### **Assessment Overview**

You will conduct experiments throughout the term to diagnose an individual with a specific metabolic condition. You will also be required to design an experiment and present your experimental plan to your lab group. You will be allocated to a group of 4 within your lab group for this project. This group project will be scaffolded across multiple weeks.

## **Group Components**

- Week 9 – Final Diagnosis Report (15%)

Based on the results from the experiments conducted in Weeks 2-8 you will write a 4-page report to diagnose an individual with a metabolic condition.

- Week 9 - Experimental Desgin (10%)

You will design an experiment and present your experiment plan to your lab group during your Week 9 lab.

You will be given opportunities to receive feedback on drafts in Weeks 3 and 7 before the final submissions in Week 9. Feedback will be provided via Moodle using a rubric, video, or written comments.

### **Individual Component**

- Ongoing – Reflection and Evaluation (5%)

You will answer 1-2 questions regarding teamwork every week and evaluate your group members.

You will be given feedback on your reflections via the Moodle gradebook at the end of the Term.

### **Course Learning Outcomes**

- CLO3 : Apply current biochemical methods and analytical techniques to design experiments, perform a range of assays and calculations.
- CLO4 : Analyse and interpret data from biochemistry experiments to diagnose medical conditions.
- CLO5 : Collaborate with peers to evaluate how theory and practical components of biochemistry are linked.

### **Detailed Assessment Description**

Check the Moodle Assessment Table for detailed instructions for this Assessment task.

### **Assessment Length**

Varied

### **Submission notes**

This assessment task has multiple deadlines. please see the Moodle Assessment table for more details.

### **Assessment information**

As the group project is an ongoing assessment, no extensions will be granted for the different components. Any issues you may have should be discussed with your course coordinator as they arise.

### Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

### Hurdle rules

Students must attempt and pass the group assessment.

### Generative AI Permission Level

#### **Assistance with Attribution**

This assessment requires you to write/create a first iteration of your submission yourself. You are then permitted to use generative AI tools, software or services to improve your submission in the ways set out below.

Any output of generative AI tools, software or services that is used within your assessment must be attributed with full referencing.

If outputs of generative AI tools, software or services form part of your submission and are not appropriately attributed, your Convenor will determine whether the omission is significant. If so, you may be asked to explain your submission. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct & Integrity Office for investigation for academic misconduct and possible penalties.

For more information on Generative AI and permitted use please see [here](#).

More information is provided in the assessment instructions found on Moodle.

## **Biochemical Calculation Quiz**

### Assessment Overview

The biochemical calculations quiz will be conducted in the practical class in Week 4 of the term. You are required to analyse data, draw graphs, and perform biochemical calculations similar to the ones from the practical class.

You will complete the quiz individually first. Immediately after submission, you will get together with your project group and complete a similar quiz. This allows you to learn from each other and get immediate feedback on your performance during peer discussion. The total duration of the quiz is between 40 minutes – 2 hours.

- Individual component – 15%
- Group component – 5%

The quiz will be conducted in person in Week 4 practical class. The quiz will be invigilated and completed on the Moodle Quiz. Other than the immediate feedback you receive during the group component, further feedback will be provided via Moodle with 10 days of completing the quiz.

#### **Course Learning Outcomes**

- CLO3 : Apply current biochemical methods and analytical techniques to design experiments, perform a range of assays and calculations.
- CLO5 : Collaborate with peers to evaluate how theory and practical components of biochemistry are linked.

#### **Detailed Assessment Description**

See the Moodle Assessment Table for detailed instructions about this Assessment task.

#### **Assessment Length**

Not Applicable

#### **Submission notes**

This quiz will be conducted using Moodle quizzes during the Week 4 labs.

#### **Assignment submission Turnitin type**

Not Applicable

#### **Hurdle rules**

The students must pass the biochemical calculations quiz.

#### **Generative AI Permission Level**

#### **No Assistance**

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see [here](#).

## **General Assessment Information**

To help you complete these assessments successfully, we have a few general resources that you should complete at the start of the Term.

- **General Resource 1: [Plagiarism Lesson](#)**

We take plagiarism very seriously in this course. All the work you submit in this course must be completed individually and be written in your own words. This lesson explains how to paraphrase and summarise information properly to avoid plagiarism.

- **General Resource 2: [Vancouver Referencing](#)**

This course requires you to use Vancouver referencing for all the assessments. This lesson is a step-by-step guide on how to write in-text references and reference lists in Vancouver style.

- **General Resource 3: [How to Locate Scientific Studies in Databases](#)**

You will be using scientific journal articles as evidence to support claims made in assessments. This lesson will teach you how to use scientific databases to find relevant studies.

#### Grading Basis

Standard

#### Requirements to pass course

A pass in BIOC2181 is conditional upon satisfactory performance in the practical program AND the theory component. This means that you must satisfactorily pass the assessments related to the practical program and assessments that test the theory component. The theory component refers to the theory tests and the practical component consists of the group assessment and the biochemical calculations quiz.

Even if you get 50% overall in the course, if you do not pass the practical and theory components individually, you will receive an unsatisfactory failure grade in the course.

# Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 9 September - 15 September	Lecture	Introduction to the course - Nirmani Wijenayake Lecture 1: Amino Acids - Anne Galea Lecture 2: Proteins - Anne Galea
	Laboratory	Biochemical Calculations + Introduction to Pipetting
	Tutorial	Introduction to the Group Assessment
Week 2 : 16 September - 22 September	Lecture	Lecture 3: Enzymes - Anne Galea Lecture 4: Enzyme Kinetics - Anne Galea Lecture 5: Carbohydrates - Vladimir Sytnyk
	Laboratory	Measuring Haemoglobin
	Tutorial	Revision
Week 3 : 23 September - 29 September	Lecture	Lecture 6: Glycolysis - Vladimir Sytnyk Lecture 7: TCA Cycle - Vladimir Sytnyk Lecture 8: Regulation - Vladimir Sytnyk
	Laboratory	Measuring Glucose
	Tutorial	Biochemical Calculations Revision
Week 4 : 30 September - 6 October	Lecture	Lecture 9: Introduction to Oxidative Phosphorylation - Nirmani Wijenayake Lecture 10: The Electron Transport Chain - Nirmani Wijenayake Lecture 11: ATP Synthesis - Nirmani Wijenayake
	Laboratory	Biochemical Calculations Quiz
	Tutorial	Revision
Week 5 : 7 October - 13 October	Laboratory	Measuring Insulin
	Tutorial	Revision
	Lecture	Lecture 12: Glycogen Metabolism - Nirmani Wijenayake Lecture 13: Gluconeogenesis - Nirmani Wijenayake Lecture 14: Introduction to Fats - Nirmani Wijenayake
Week 7 : 21 October - 27 October	Lecture	Lecture 15: Lipoproteins - Nirmani Wijenayake Lecture 16: Fat Oxidation - Nirmani Wijenayake Lecture 17: Fat Synthesis - Nirmani Wijenayake
	Laboratory	Test 1
	Tutorial	Revision
Week 8 : 28 October - 3 November	Lecture	Lecture 18: Ketone bodies - Nirmani Wijenayake Lecture 19: Amino Acid Catabolism - Rebecca LeBard Lecture 20: Protein Catabolism - Rebecca LeBard
	Laboratory	Measuring Triglycerides
	Tutorial	Revision
Week 9 : 4 November - 10 November	Lecture	Lecture 21: Hormonal Control of Metabolism - Rebecca LeBard Lecture 22: Fuel Supply in Exercise - Rebecca LeBard Lecture 23: Metabolic Specialisation of Tissues - Kyle Hoehn
	Laboratory	Group Presentations + Diagnosis Report Submission
	Tutorial	Revision
Week 10 : 11 November - 17 November	Lecture	Lecture 24: Fuel Supply in Fasting - Kyle Hoehn
	Laboratory	Test 2

## Attendance Requirements

### Labs

- 100% lab attendance is required and is compulsory.
- A medical certificate or other forms of evidence are required from students who are absent from the practical sessions due to illness or other misadventure. Submit these at this [LINK](#) within two days of the absence.
- If you miss more than one lab, even if you have proper documentation, you could fail the course as a Term long assessment task is associated with the labs.

- Separate “Catch-Up” lab sessions are not conducted but if you can attend an alternative lab during the week of your absence, you may contact the course coordinator to ask for permission. If you cannot attend an alternative lab session, you need to catch up on missed work by speaking to your demonstrator/tutor or class colleagues.

## Tutorials

- The 2-hour tutorial is in person. Your attendance at tutorials is compulsory.
- If you miss a tutorial due to illness or some other unavoidable circumstance that can be verified via professional documentation, submit this proof at this [LINK](#) within two days of the absence.
- The tutorials will have revision activities and class discussions on lecture content.
- Tutorials are not recorded. If you miss one, it will be up to you to catch up using resources on Moodle.
- In some weeks, tutorial time will be dedicated to group work activities.

## General Schedule Information

A printable Course Schedule can be found at [THIS LINK](#).

## Course Resources

### Recommended Resources

#### Recommended Texts

- [\*Biochemistry - A Short Course\*](#) (4th edition), by Tymoczko J.L., Berg J.M. & Stryer L. (W H Freeman and Company), 2019.

OR

- [\*Biochemistry and Molecular Biology\*](#) (6th Edition), by Elliot W.H. & Elliot D.C. (Oxford University Press), 2018.

#### Additional Biochemistry Reference Texts

- [\*Essential Biochemistry\*](#), by Pratt, C.W. & Cornely, K.
- [\*Concepts in Biochemistry\*](#) by Boyer, R.
- [\*Biochemistry\*](#) by Berg J.M., Tymoczko J.L. & Stryer L.
- [\*Fundamentals of Biochemistry\*](#) Voet, Voet and Pratt.

## Additional Costs

# Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Nirmani Wijenayake		Room 220A, Biological Sciences Building (D26)	+61 2 9065 1163	By appointment	Yes	Yes
Lecturer	Anne Galea		Room 220AB, Biological Sciences Building (D26)		By appointment	No	No
	Vladimir Sytnyk		Room: 3101, Level 3 West, Bioscience South E26	+61 2 9385 1108	By appointment	No	No
	Rebecca Le Bard		Room 220D, Biological Sciences Building (D26)	+61 2 9385 2026	By appointment	No	No
	Kyle Hoehn			+61 2 9385 9399	By appointment	No	No

## Other Useful Information

### Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the [UNSW Student Code of Conduct Website](#).

### Academic Honesty and Plagiarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Further information about referencing styles can be located at <https://student.unsw.edu.au/referencing>

**Academic integrity** is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage. At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity, plagiarism and the use of AI in assessments can be located at:

- The [Current Students site](#),
- The [ELISE training site](#), and
- The [Use of AI for assessments](#) site.

The Student Conduct and Integrity Unit provides further resources to assist you to understand your conduct obligations as a student: <https://student.unsw.edu.au/conduct>

## Submission of Assessment Tasks

### Penalty for Late Submissions

UNSW has a standard late submission penalty of:

- 5% per day,
- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

*Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.*

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

### Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: <https://>

**Important note:** UNSW has a “fit to sit/submit” rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

## Faculty-specific Information

### Additional support for students

- [The Current Students Gateway](#)
- [Student Support](#)
- [Academic Skills and Support](#)
- [Student Wellbeing, Health and Safety](#)
- [Equitable Learning Services](#)
- [UNSW IT Service Centre](#)
- Science EDI Student [Initiatives](#), [Offerings](#) and [Guidelines](#)