

BIOL1001: Molecules, Cells and Organisms

Callaghan and Ourimbah
Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description

Introduces the basic principles and concepts of cell and molecular biology to explore the nature of life's molecular building blocks and systems and how these interact to form functional cells and ultimately organisms. Students will discover some of the principles behind how cells work and explore ideas about how biological complexity and life itself may have originated. This knowledge underpins our ability to combat disease, to harness solar energy to feed the world, to sustainably power human industry and to recycle our waste efficiently using microbial systems.

The production of new cells is vital to the survival of species and there will be an introduction to basic genetic concepts to explain how organisms can pass on their traits which convey selective advantages for survival in a fiercely competitive world. Cells must also communicate with other cells and be able to detect and respond to external stimuli from its environment.

Students that have completed this course will be well placed to further their studies in cell and molecular biology, biochemistry, microbial biology, molecular genetics and animal & plant physiology courses at 2000 and 3000 level.

Academic Progress Requirements

Nil

Requisites

This course has similarities to BIOL1040 and BIOL1050. If you have successfully completed either of these courses you cannot enrol in this course.

Assumed Knowledge

HSC Chemistry
HSC Mathematics Advanced or HSC Mathematics Standard

Contact Hours

Lecture

Face to Face On Campus
52 hour(s) per term
Contact hours are for a semester term. For a summer/winter term the lectures may be delivered either face to face compressed to the shorter term or as a blended course consisting of online lectures combined with workshops for students or as online only.

Unit Weighting Workload

10
Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

COURSE OUTLINE

CONTACTS

Course Coordinator **Callaghan**
A/Pr Geoffry De Iuliis
Geoffry.Deiuliis@newcastle.edu.au
(02) 4921 7295
Consultation: Please contact via email to set up meetings as required

Teaching Staff Other teaching staff will be advised on the course Canvas site.

School Office **School of Environmental and Life Sciences**
Room C228 Chemistry Building
Callaghan
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9am-5pm (Mon-Fri)

SYLLABUS

Course Content Introduction to Molecules, Cells and Organisms: This course aims to introduce students to the underlying principles and concepts of biology at the level of the molecule and cell. These fundamental units form the building blocks of complex multicellular organisms. Cell Structure & Energetics:

- Molecular basis of life
- Introduction to cell structure & function
- Relationship of biomolecular structure to cellular function
- Components of prokaryotic and eukaryotic cells
- Origin of Life
- Molecular genetics & protein synthesis
- Enzyme function
- Cellular metabolism
- Photosynthesis
- Glycolysis, fermentation, respiration

Cell Division & Regulation:

- Molecular and cell biology of cell division
- Regulation of gene expression
- Inter and intra cellular communication
- Cell differentiation/specialisation

Sex, Inheritance & Multicellular Organisms:

- Meiosis & sexual reproduction
- Genetics & mechanisms of inheritance
- From cells to multicellular organisms

Course Learning Outcomes **On successful completion of this course, students will be able to:**

1. Demonstrate understanding of biological terminology and concepts in relation to molecules and cells
2. Define the hierarchy of structure within cells
3. Explain the processes which regulate and integrate cell function
4. Interpret the origin and evolution of biological complexity at the cellular level
5. Summarise the mechanisms and characteristics of reproduction and inheritance
6. Retrieve, collect and interpret biological information
7. Apply critical thinking and the scientific approach

Course Materials **Lecture Materials:**

- All assessable content will be provided in the lecture material

Recommended Text:

- Biological science, Freeman, Scott, 2017, 6th Edition
Available from the Library and online [Via Canvas]

SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	26 Feb	Unit – 1. Molecules, cells and evolution	Read Chapters 1 and 2. Practice Quiz 1. Assessment Quiz 1.	None
2	4 Mar	Unit – 1. Nucleic acids and proteins	Read Chapters 4 and 3. Practice Quiz 2. Assessment Quiz 2.	Complete Assessment Quiz 1 by 11:59 pm Friday 8th March 2024
3	11 Mar	Unit – 1. Enzymes and carbohydrates	Read Chapters 8 and 5. Assessment Quiz 3.	Complete Assessment Quiz 2 by 11:59 pm Friday 15th March 2024
4	18 Mar	Unit – 1. Lipids, membranes and cells	Read Chapter 6. Assessment Quiz 4.	Complete Assessment Quiz 3 by 11:59 pm Friday 22nd March 2024
5	25 Mar	Unit – 2. Cells and cell-cell interactions	Read Chapters 7 and 11. Assessment Quiz 5.	Complete Assessment Quiz 4 (Unit 1) by 11:59 pm Thursday 28th March 2024
6	1 Apr	Unit – 2. Cellular respiration and fermentation	Read Chapter 9. Assessment Quiz 6.	Complete Assessment Quiz 5 by 11:59 pm Friday 5th April 2024
7	8 Apr	Unit – 2. Photosynthesis	Read Chapter 10. Assessment Quiz 7.	Complete Assessment Quiz 6 by 11:59 pm Friday 12th April 2024
Mid-Semester Recess				
Mid-Semester Recess				
8	29 Apr	Unit – 2. The cell cycle	Read Chapter 12. Assessment Quiz 8.	Complete Assessment Quiz 7 by 11:59 pm Friday 3rd May 2024
9	6 May	Unit – 3. Meiosis and sexual reproduction	Read Chapter 13. Assessment Quiz 9.	Complete Assessment Quiz 8 (Unit 2) by 11:59 pm Friday 10th May 2024
10	13 May	Unit – 3. The chromosome theory of inheritance	Read Chapter 14. Assessment Quiz 10.	Complete Assessment Quiz 9 by 11:59 pm Friday 17th May 2024
11	20 May	Unit – 3. DNA synthesis and how genes work	Read Chapters 15 and 16. Assessment Quiz 11.	Complete Assessment Quiz 10 by 11:59 pm Friday 24th May 2024
12	27 May	Unit – 3. Transcription and translation as part of gene expression	Read Chapters 17 and 20. Assessment Quiz 12.	Complete Assessment Quiz 11 by 11:59 pm Friday 31st May 2024
13	3 Jun	Units 1, 2 and 3. Revision Lectures 1 and 2	Revision for Final Examination Assessment Quiz 12.	Complete Assessment Quiz 12 by 11:59 pm Friday 7th June 2024
Examination Period				Formal Exam
Examination Period				Formal Exam

ASSESSMENTS

This course has 2 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Exam	Formal Examination Period	Individual	50%	1, 2, 3, 4, 5, 6, 7
2	Quiz - Online	Online quizzes due each Friday 11:59pm, weeks 2-13 (exception in week 5 - due 11:59pm Thursday 28th March). In class quizzes completed in selected Friday virtual lectures. Details to be provided in lectures in advance of any in class quiz.	Individual	50%	1, 2, 3, 4, 5, 6

Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Late submissions for quiz assessments will not be accepted without approval from the course coordinator. Because of the nature of the course and integration of quiz answers into the learning program, quiz extensions can not be provided beyond 1 week from the original due date.

Assessment 1 - Exam

Assessment Type	Formal Examination
Purpose	This examination is designed to test the individual student's knowledge of the course material and their ability to describe, analyse and hypothesise from this material.
Description	The examination consists of multiple-choice style questions covering the course material
Weighting	50%
Length	2 hours
Due Date	Formal Examination Period
Submission Method	Formal Exam Formal examination is a multiple choice style question examination. This must be sat on campus and is delivered via the Course's Canvas site. The examination will be unavailable for any user off-campus. Further details will be announced on Canvas closer to the exam date.
Assessment Criteria	The structure of the exam will be provided during lectures. The given answers must match the correct answers.
Return Method	Not Returned
Feedback Provided	No Feedback
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Quiz - Online

Assessment Type	Quiz
Purpose	(1) Online and (2) in class quizzes will support your knowledge and progression through the course material
Description	Weekly (multiple choice style) online quizzes will be completed through the course's canvas site, at your own chosen time within the period provided. The marks from these quizzes will constitute the vast majority of the weighting for this Assessment 2 course mark. In class quizzes will take place in the Friday virtual lecture sessions for selected weeks. Details will be provided in lectures. In class quizzes will constitute a minor portion of the overall Assessment 2 course mark.
Weighting	50%

Due Date	Online quizzes due each Friday 11:59pm, weeks 2-13 (exception in week 5 - due 11:59pm Thursday 28th March). In class quizzes completed in selected Friday virtual lectures. Details to be provided in lectures in advance of any in class quiz.
Submission Method	In Class Online
Assessment Criteria	The given answers must match the correct answers.
Return Method	Ongoing Assessment
Feedback Provided	In Class - The answers to each completed quiz will be discussed in the respective tutorial session each week.
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

To contact your course coordinator or lecturer, please use email in the first instance. F2F meetings can be arranged if required.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the [Oral Examination \(viva\) Procedure](#). In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the [Student Conduct Rule](#).

Academic Misconduct	All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35 .
Adverse Circumstances	<p>The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:</p> <ol style="list-style-type: none">1. the assessment item is a major assessment item; or2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;3. you are requesting a change of placement; or4. the course has a compulsory attendance requirement. <p>Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at: https://policies.newcastle.edu.au/document/view-current.php?id=236</p>
Important Policy Information	The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.
Other Information	If you are registered with AccessAbility and have been provided with a Reasonable Adjustment Plan (RAP), please ensure that you provide your Course Coordinator with a copy as soon as you can, or let your Course Coordinator know that you are still waiting for your RAP.

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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