



BMSC12012 Molecular Cell Biology

Term 1 - 2024

Profile information current as at 28/04/2024 04:59 pm

All details in this unit profile for BMSC12012 have been officially approved by CQU University and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

General Information

Overview

This unit focuses on developing an understanding of how genomes are organised, how they function within the cell, how molecular medical treatments can be developed, ways in which we can manipulate genomes and utilise their components for a range of medical applications. You will explore the application of molecular techniques, such as polymerase chain reaction and next generation sequencing, and their revolutionary impact on diagnostic testing.

Details

Career Level: *Undergraduate*

Unit Level: *Level 2*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

Prerequisite BMSC11002 Human Body Systems 2 AND BMSC11005 Foundations of Biochemistry OR BMSC11008 Medical Anatomy and Physiology 2 AND BMSC11005 Foundations of Biochemistry OR BMSC11011 Human Anatomy and Physiology 2 AND BMSC11005 Foundations of Biochemistry

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

Offerings For Term 1 - 2024

- Bundaberg
- Mixed Mode
- Rockhampton

Attendance Requirements

All on-campus students are expected to attend scheduled classes - in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:

Click here to see your [Residential School Timetable](#).

Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

Class and Assessment Overview

Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

Class Timetable

[Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

[Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. **Written Assessment**

Weighting: 30%

2. **Laboratory/Practical**

Weighting: Pass/Fail

3. **Practical Assessment**

Weighting: 30%

4. **Examination**

Weighting: 40%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the [CQUniversity Policy site](#).

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from Student feedback.

Feedback

Students would like a higher level of interactivity to increase engagement with the content.

Recommendation

Include interactive learning approaches suitable for all delivery modes.

Feedback from Student feedback.

Feedback

Students enjoyed the residential school to apply the knowledge learnt in classes.

Recommendation

Continue to provide a residential school with hands-on activities.

Feedback from Personal reflection.

Feedback

Peer to peer interaction and Moodle engagement was low.

Recommendation

Promote peer interaction and learning through regular Moodle forum posts.

Unit Learning Outcomes

On successful completion of this unit, you will be able to:

1. Demonstrate a clear understanding of the structure and organisation of cells at the molecular level
2. Demonstrate a clear understanding of the genome including its manipulation and sequencing
3. Accurately review and evaluate the strategies associated with the transformation of micro-organisms and animals
4. Explain the process of identifying genetic changes and their significance
5. Apply knowledge of molecular biology techniques in the laboratory.

The learning outcomes achieved are linked to the objectives of the accrediting body, Australian Institute of Medical and Clinical Scientists (AIMS).

Alignment of Learning Outcomes, Assessment and Graduate Attributes



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
1 - Written Assessment - 30%	•	•		•	
2 - Laboratory/Practical - 0%			•		•
3 - Practical Assessment - 30%		•			•
4 - Examination - 40%	•	•	•	•	

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
1 - Communication	•	•	•	•	•
2 - Problem Solving	•	•		•	•
3 - Critical Thinking	•	•	•	•	•
4 - Information Literacy	•	•		•	
5 - Team Work					•
6 - Information Technology Competence					
7 - Cross Cultural Competence					
8 - Ethical practice			•		
9 - Social Innovation					
10 - Aboriginal and Torres Strait Islander Cultures					

Textbooks and Resources

Textbooks

BMSC12012

Prescribed

Fundamental Molecular Biology (Binder Ready Version)

Edition: 3rd en (2021)

Authors: Lizabeth A. Allison

WILEY

ISBN: 978-1-119-15629-1

Binding: Hardcover

[View textbooks at the CQUniversity Bookshop](#)

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- ZOOM

Referencing Style

All submissions for this unit must use the referencing styles below:

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

For further information, see the Assessment Tasks.

Teaching Contacts

Anna Balzer Unit Coordinator
a.balzer@cqu.edu.au

Schedule

Week 1 - 04 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Molecular Biology	1	
DNA Replication	2, 6, 7	

Week 2 - 11 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
RNA	3	

Week 3 - 18 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Genome Organisation	5	

Week 4 - 25 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
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Nucleic acid isolation, characterisation, PCR and electrophoresis 8, 9

Week 5 - 01 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
DNA Cloning	8	

Vacation Week - 08 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Break Week		

Week 6 - 15 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
Epigenetics	12	Mixed Mode and Rockhampton Residential School

Week 7 - 22 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
DNA Sequencing	9	

Week 8 - 29 Apr 2024

Module/Topic	Chapter	Events and Submissions/Topic
High throughput analyses	16	Assessment 1 - Literature Review Due: Week 8 Friday (3 May 2024) 5:00 pm AEST

Week 9 - 06 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Genetically Modified Organisms	15	

Week 10 - 13 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Gene Therapy	17	

Week 11 - 20 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Revision		Bundaberg Residential School

Week 12 - 27 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Revision		Assessment 3 - Laboratory Workbook Due: Week 12 Friday (31 May 2024) 5:00 pm AEST

Review/Exam Week - 03 Jun 2024

Module/Topic	Chapter	Events and Submissions/Topic
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Exam Week - 10 Jun 2024

Module/Topic	Chapter	Events and Submissions/Topic
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Term Specific Information

Each week students will be expected to complete the following:

2 hour lecture (online, face to face, or recorded)

1 hour tutorial (online, face to face, or recorded)

3-5 hours of self-directed study

3-5 hours preparing assessments

Online sessions will be facilitated via Zoom and meeting links will be provided on the Moodle site. Recordings of lectures and tutorials will be made available on the unit Moodle site.

This unit contains a mandatory 3 day residential school (Assessment 2) Please check the timetable for dates and complete class registration in MyCQU.

The forum for this unit is continuously monitored and you can expect a response within 24 working hours of posting your question. We strongly encourage you to post questions and discussions to facilitate peer to peer learning. Alternatively enquiries can be directed to the unit coordinator and you will receive a response within 24 working hours.

Assessment Tasks

1 Assessment 1 - Literature Review

Assessment Type

Written Assessment

Task Description

The understanding of the role of genomic and epigenomic changes in the development of a number of diseases and disorders has increased rapidly. New techniques have allowed analysis of chromosomal rearrangements, gene sequences, methylation patterns, open chromatin features, and many more. This has allowed previously unknown mechanisms of disease and disorder development to be increasingly understood.

You will choose a disorder, disease or condition and present a literature review on one of the following topics:

- The role of epigenetic modification of the genome in your chosen disorder/disease.
- The role of transposable elements in the development of your chosen disorder/disease.

In this assessment, you will review the current status of the literature on your topic, making use of scientific journal articles and case reports. References should be mostly primary and current (from the past 7 years), to make your work as up-to-date as possible. A tutorial on the assessment item will be provided to guide you through the assessment task.

Please note the following details:

The length of the main body of your essay is 2500 words, excluding references - making the best use of the word allocation is always better than being off-message.

Text should be word-processed, with appropriate layout and use of headings/sub-headings. Please use 1.5pt line spacing and easy to read text no smaller than 12pt.

Diagrams can be used to illustrate specific aspects - (please ensure that you correctly cite/reference all sources of diagrams used, unless they are original and composed by you, since this is an important aspect of academic integrity). Please avoid images with very large file sizes, as this will make your essay too large to upload/download (save any images as lower resolution, to decrease the file size).

Referencing should be in a consistent style - Harvard or APA format is required.

Please save/upload your file in either a Word or PDF format.

Students are permitted to use Generative AI for this assessment in the following ways:

- developing literature search strategies
- compiling suitable literature sources and locating data
- guidance for structuring the assignment

If Generative AI is used in any way, it must be cited as per the CQU Guidelines (Academic Learning Centre).

If students choose to use generative AI, the following statement must be completed and included on the front page of the uploaded assessment: "I have used (insert technology) to (insert how you used this) in accordance with the

requirements of this unit. The reason I used this was to (explain why you used it). The details of how I used it as (insert how). I hereby declare that the submission is an appropriate representation of my individual skills and abilities to meet the requirements of the task/s."

As per academic writing requirements and assessment criteria; citations of information should be of the primary source (i.e statistics returned by AI must be fact-checked and referenced from their original source as well as the AI source). Failure to cite primary sources as well as AI sources could be considered breach of academic integrity.

Your use of Generative AI must be clearly outlined in an appendix as a separate file which includes the prompt used and Generative AI response (in line with marking rubric). Failure to include an appendix may result in academic integrity investigation.

Assessment Due Date

Week 8 Friday (3 May 2024) 5:00 pm AEST

Upload to the assessment submission portal in Moodle in ,pdf or .doc(x) format.

Return Date to Students

Week 10 Friday (17 May 2024)

Weighting

30%

Minimum mark or grade

50%

Assessment Criteria

You will be marked on the following criteria:

Title: Write a specific, descriptive, and scientific title.

Introduction: This should include relevant background information, the importance of the review, and any main concepts which will be addressed. A clear molecular and cellular focus is required.

Review: A thorough review of literature on your chosen topic area written using recent scientific references, mostly primary research articles. The review should be organised around the scientific development in your chosen topic and highlighting 'landmark' discoveries and effectively explaining the current status of knowledge. Provide an up to date review on the status and understanding of the molecular mechanisms of the disease / disorder with respect to the chosen topic. Use of subheading is acceptable.

Conclusions: In one paragraph summarise the status of the research you have reviewed in this area and any future research directions. Reiterate the key ideas.

References: Cite (in-text) and list all references in your essay. Marks will be awarded for reference quality, citing within the review and listing references correctly at the end of the report, reference format. Inclusion and accuracy of AI appendix if utilised.

Grammar, style, accuracy: Spelling, grammar, style, accuracy, within word count.

A detailed marking rubric will be available on the Moodle site at the commencement of term.

Referencing Style

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Learning Outcomes Assessed

- Demonstrate a clear understanding of the structure and organisation of cells at the molecular level
- Demonstrate a clear understanding of the genome including its manipulation and sequencing
- Explain the process of identifying genetic changes and their significance

2 Assessment 2 - Laboratory/Practical

Assessment Type

Laboratory/Practical

Task Description

Students must attend and pass the residential school to pass the unit. Please see the timetable for dates and times. Register via MyCQU.

Students will be assessed on safe and competent operation in a molecular laboratory.

Assessment Due Date

Please see the timetable for dates and times. Register via MyCQU.

Return Date to Students

Weighting

Pass/Fail

Minimum mark or grade

PASS

Assessment Criteria

You will be assessed on the following:

- safe operation in a laboratory
- correct use of PPE
- safe handling of biological samples
- correct management of laboratory waste

A full list of competencies will be included in the laboratory manual (available via the Moodle site).

Referencing Style

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Offline

Learning Outcomes Assessed

- Accurately review and evaluate the strategies associated with the transformation of micro-organisms and animals
- Apply knowledge of molecular biology techniques in the laboratory.

3 Assessment 3 - Laboratory Workbook

Assessment Type

Practical Assessment

Task Description

During the residential school you will be required to perform experimental protocols involving, for example, transformation of bacteria with plasmid DNA, restriction endonuclease digestion of DNA and amplification of DNA using polymerase chain reaction (PCR). In your residential school you will be expected to complete a workbook and perform experimental calculations, report experimental results, answer questions about experimental procedures and interpret results. Clearly label the workbook with student name and student number. The laboratory workbook can be scanned, or completed digitally and the workbook can be uploaded onto the Moodle site. The workbook will be available in Moodle as a digital file.

Students are permitted to use Generative AI for this assessment in the following ways:

- Searches and support to increase or verify understanding of concepts.

If Generative AI is used in any way, as with all sources, it must be cited as per the CQU Guidelines (Academic Learning Centre).

If students choose to use generative AI, the following statement must be completed and included on the front page of the uploaded assessment: "I have used (insert technology) to (insert how you used this) in accordance with the requirements of this unit. The reason I used this was to (explain why you used it). The details of how I used it as (insert how). I hereby declare that the submission is an appropriate representation of my individual skills and abilities to meet the requirements of the task/s."

As per academic writing requirements and assessment criteria; citations of information should be of the primary source (i.e. statistics returned by AI must be fact-checked and referenced from their original source as well as the AI source). Failure to cite primary sources as well as AI sources could be considered breach of academic integrity.

Your use of Generative AI must be clearly outlined in an appendix as a separate file which includes the prompt used and Generative AI response. Failure to include an appendix may result in academic integrity investigation.

Assessment Due Date

Week 12 Friday (31 May 2024) 5:00 pm AEST

Upload to the assessment submission portal in Moodle in .pdf or .doc(x) format.

Return Date to Students

Exam Week Friday (14 June 2024)

Weighting

30%

Minimum mark or grade

50%

Assessment Criteria

Marks will be allocated based on the accuracy of calculations and correctness of answers to questions.

Referencing Style

- [Harvard \(author-date\)](#)
- [American Psychological Association 7th Edition \(APA 7th edition\)](#)

Submission

Online

Learning Outcomes Assessed

- Demonstrate a clear understanding of the genome including its manipulation and sequencing
- Apply knowledge of molecular biology techniques in the laboratory.

Examination

Outline

Complete an invigilated examination.

Date

During the examination period at a CQUniversity examination centre.

Weighting

40%

Length

180 minutes

Minimum mark or grade

50%

Exam Conditions

Closed Book.

Materials

Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).

Calculator - non-programmable, no text retrieval, silent only

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?



Be Honest

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own



Seek Help

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)



Produce Original Work

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem