

Course Outline

Code: MBT352

Title: Molecular Biotechnology

School of:	Science & Engineering
Teaching Session:	Semester 2
Year:	2020
Course Coordinator:	David McMillan Tel: 5456 5852 Email: david.mcmillan@usc.edu.au Bonnie Quigley Tel: 5430 2864 Email: bonnie.quigley@usc.edu.au
Course Moderator:	Scott Cummins

Please go to the USC website 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

This course has been designed to provide students with knowledge of the scientific principles and techniques that underpin molecular biotechnology, and how they are applied with the real world. You will learn about the genetic manipulation of microbes, (bacteria in particular), as well as plants and animals. You will gain extensive understanding of the mechanics of genetic engineering and how it applies to practical outcomes.

1.2 Course topics

Major themes that will be covered include:

- genetic manipulation of bacteria, plants and animals, including humans
- protein biotechnology
- medical biotechnology
- plant and animal biotechnology
- ethical and social implications of molecular biotechnology

The laboratory component of the course will equip students will technical and analytical skills used in this discipline. These will include:

- PCR, nucleotide sequencing and analysis
- Protein expression and purification
- Forensic biology
- Molecular diagnostics
- Advanced Microscopy
- Aquacultural biotechnology

2. What level is this course?

300 level Graduate - Independent application of graduate knowledge and skills. Meets AQF and professional requirements. May require pre-requisites and developing level knowledge/skills. Normally taken in the 3rd or 4th 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?

Specific Learning Outcomes On successful completion of this course you should be able to:	Assessment Tasks You will be assessed on the learning outcome in task/s:	Graduate Qualities or Professional Standards mapping Completing these tasks successfully will contribute to you becoming:
Design, describe and critically review strategies for cloning DNA, the production of genetically modified organisms, and expressing and purifying proteins	Task 1 & 3	Knowledgeable Creative and critical thinkers
Describe and analyse how molecular biotechnology is applied in different settings, using real world examples.	Task 1, 2 & 3	Knowledgeable
Synthesise and discuss and critically analyses ethical and societal issues surrounding biotechnology.	Task 1 & 3	Ethical Empowered
Demonstrate knowledge of practical skills and application of analytical skills in relation to laboratory and bioinformatical techniques.	Task 1 & 3	Creative and critical thinkers Knowledgeable

5. Am I eligible to enrol in this course?

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

5.1 Enrolment restrictions

Nil

5.2 Pre-requisites

MBT252 or LFS252

5.3 Co-requisites

Nil

5.4 Anti-requisites

Nil

5.5 Specific assumed prior knowledge and skills (where applicable)

Understanding of concepts in molecular biology and biochemistry as taught in prerequisite units

6. How am I going to be assessed?

6.1 Grading scale

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

6.2 Details of early feedback on progress

You will sit a formative multiple choice exam in week 4. The exam will cover content in lectures, tutorials and practical classes conducted up to that point. Feedback on the correct answers, with relevance to the final exam, will be provided.

6.3 Assessment tasks

Task No.	Assessment Tasks	Individual or Group	Weighting %	Duration / length	When should I submit?	Where should I submit it?
1	Seminar presentation	Individual	20%	10-15 min. The final length of the presentation will be determined by class size	Visual aids will be submitted during Week 7, oral seminar will be scheduled in class time as determined by the course coordinator.	Visual elements submitted to Safe Assign.
2	Research Proposal	Individual	40%	3000 words	End of Week 13	SafeAssign
3	Final exam	Individual	40%	2.5 hours online	Centrally scheduled exam period	Online exam
			100%			

Assessment Task 1: Oral Seminar presentation

Goal:	Describe an issue or challenge in the science, medical, industrial or other industry, and how you will apply a biotechnological technique to provide insight or to solve this issue. .
Product:	Oral Seminar presentation with visual aids
Format:	<ol style="list-style-type: none"> You are required to prepare and deliver a 10min oral presentation, followed by a 5 minute question and answer session. The seminar will have relevance to modern biotechnology, and should cover the following <ul style="list-style-type: none"> A description of the topic, issue or problem that is being addressed, including its significance How biotechnology is, or could, be used to address these issues A detailed description of one of the biotechnological processes chosen to address the issue A description of what has been achieved, or is hoped to be achieved, by the implementation of the technology A describe of potential limitations, or unexpected outcomes of the implementation of this technology Ethical, societal or other considerations <p>Note: Depending on student enrolment numbers, the oral seminars may be given in pairs, and/or in tutorial times.</p>
Criteria:	<p>You will be assessed on the following:</p> <ol style="list-style-type: none"> Mastery of the subject matter as evidenced by <ul style="list-style-type: none"> Accuracy and clarity of description of the issue being addressed Accuracy and clarity of the description of the biotechnological application used to address the issue Clear description of outcomes (or potential outcomes), limitations and ethical considerations Ability to answer questions that demonstrate a higher order understanding of key concepts covered in the seminar

	<p>2. Professional presentation skills</p> <ul style="list-style-type: none"> • Logical order of presentation • Oral presentation skills • Quality and appropriateness of visual aids
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Assessment Task 2: Laboratory report

Goal:	Prepare and submit a research proposal that describes a current issue or problem and the application of biotechnological technique to solve or provide insight or to this issue.
Product:	Written Research Proposal
Format:	<p>The research proposal will be written as a cohesive 3000 word document, containing the following sections</p> <ol style="list-style-type: none"> 1. Project Title 2. Project Summary 3. Background 4. Research Aims 5. Materials and Methods 6. Expected Outcomes 7. Significance of the Research 8. Potential limitations 9. References <p>Additional details for the research proposal will be found on blackboard.</p>
Criteria:	<p>The scientific report will be assessed on the following:</p> <ol style="list-style-type: none"> 1. Mastery of the topic as evidenced by <ul style="list-style-type: none"> • Synthesis, relevance and accuracy of all material presented • Appropriateness of methodology for the achievement of the research aims. • Clear and accurate methodological section • Appropriate and correct use of references 2. Overall report presentation including <ul style="list-style-type: none"> • Organisation • Language and spelling • Grammar and formatting • Quality and appropriateness of figures

Assessment Task 3: Final Exam

Goal:	You will demonstrate and apply knowledge, analyse relationships and solve problems in molecular biotechnology
Product:	2 hour exam
Format:	Multiple choice, short answer and medium answer format
Criteria:	<p>You will be assessed on:</p> <ul style="list-style-type: none"> • Your knowledge and explanation of scientific and biotechnological principles covered in the course • Your knowledge and explanation of biotechnological applications and processes covered in the course • Your ability to apply concepts covered in the course • Your knowledge and capacity to discuss ethical and societal impacts of molecular biotechnology

7. What are the course activities?

7.1 Directed study hours

The directed study hours listed here are a portion of the workload for this course. 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. Directed study hours may vary by location. Student workload is calculated at 12.5 learning hours per one unit.

This course will be delivered via technology-enabled learning and teaching. All lectures will remain in this mode for Semester 2 2020. When government guidelines allow, students that elected on-campus study via the class selection process will be advised when on campus tutorials and practical sessions will resume.

Location: Specific Campus(es) or online:	Directed study hours for location:
USC Sunshine Coast	Lectures will delivered as a combination of pre-recorded and live online formats. Tutorials will be delivered live online. Laboratories will be delivered live online using pre-recorded video and other media.

7.2 Course content

Week # / Module #	What key concepts/content will I learn?
1	Fundamentals of Biotechnology: Introduction
2	Fundamentals of Biotechnology: Cloning DNA
3	Fundamentals of Biotechnologies: Protein Expression and Purification
4	Protein Biotechnology: Diagnostics, Vaccines and Therapeutics
5	Animal Animal Biotechnology
6	Molecular Diagnostics
7	Plant biotechnology
8	Student Presentations
9	Student Presentations
10	Aquatic Biotechnology
11	Special Topics in Biotechnology
12	Human Genomics and Gene Therapy
13	Summary Lecture

Please note that the course activities may be subject to variation.

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

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

8.1 Prescribed text(s)

Please note that you need to have regular access to the resource(s) listed below as they are required:

Author	Year	Title	Publisher
Glick and Patten	Fifth edition, 2017	Molecular Biotechnology: Principles and applications of Recombinant DNA	ASM Press Online versions are available

8.2 Specific requirements

Students are required to comply with laboratory safety rules.

9. Risk management

Health and safety risks for this course have been assessed as low.

It is your responsibility as a student to review course material, search online, discuss with lecturers and peers, and understand the health and safety risks associated with your specific course of study. It is also your responsibility to familiarise yourself with the University's general health and safety principles by reviewing the [online Health Safety and Wellbeing training module 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 Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

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 will 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 and supply the required documentation to negotiate an outcome.

10.4 Study help

In the first instance, you should contact your tutor, then the Course Coordinator. Additional assistance is provided to all students through Academic Skills Advisers. To book an appointment or find a drop-in session go to [Student Hub](#). Contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au

10.5 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
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website:

<http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

10.6 General Enquiries

In person:

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

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au