

MBT361 Applied Microbiology and Biotechnology

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 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

Microbial products such as antibiotics, microbial enzymes and bio-fuels contribute to global health and development. This course provides an overview of the diversity of microorganisms and their metabolic activities such as the microbial products of major social, economic and environmental importance. Laboratory practicals in this course complement the theory through testing microbial compounds, their effects on pathogens and their hydrolytic and degradative effects. Gain of laboratory skills is an essential component of the course as well as understanding the theory behind each experiment.

1.2. How will this course be delivered?

| ACTIVITY | HOURS | BEGINNING WEEK | FREQUENCY |
|--|-------|----------------|-----------|
| BLENDED LEARNING | | | |
| Learning materials – Asynchronous learning material | 1hr | Week 1 | 13 times |
| Tutorial/Workshop 1 – Tutorial 1 (online) | 1hr | Week 1 | 13 times |
| Tutorial/Workshop 2 – Tutorial 2 (face to face) | 1hr | Week 1 | 13 times |
| Laboratory 1 – Laboratory sessions | 3hrs | Week 3 | 6 times |

1.3. Course Topics

The Big Picture; Applied and Environmental Microbiology and its place in sustainable global development

Biodiscovery of novel therapeutic agents and alternative therapies to combat superbugs

Marine biodiscovery and extremophiles and extremozymes

Bioremediation and biological control to replace environmentally hazardous chemicals

Microbial enzymes and industrial applications

Waste treatment, composting and landfills

Biofuels and bio-metallurgy

Advanced laboratory skills, ethics, communication and professionalism

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... |
| 1 Demonstrate and apply theoretical and practical knowledge of: production and large-scale applications of microbial metabolites innovative approaches & strategies for discovering products of social, economic and environment importance | Knowledgeable Empowered Sustainability-focussed |
| 2 Critically analyse data generated by isolating and testing microbial compounds to determine: their beneficial and detrimental effects their large-scale use for environmental regional and global sustainability possible implications for decision making & new biotechnologies | Knowledgeable Empowered Sustainability-focussed |
| 3 Demonstrate advanced laboratory skills and biosafety adhering to ethical codes of conduct in data collection and analysis | Knowledgeable Empowered Ethical |

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

MBT263 or LFS261

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

MBT363 or MBT364

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

Competent laboratory skills and scientific report writing

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

A formative exam will take place in week 4 covering the first 3 weeks of learning material of the course, this early assessment item will prepare students to the mid-term exam. In addition, in weeks 5-7 of the semester students will be provided additional information on the laboratory report writing.

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 | Quiz/zes | Individual | 0% | 1 hour | Week 4 | Online Test (Quiz) |
| All | 2 | Examination - not Centrally Scheduled | Individual | 20% | 2 hours | Week 7 | In Class |
| All | 3 | Practical / Laboratory Skills | Individual | 50% | a] 30 min online quiz b] 3000-word report | Throughout teaching period (refer to Format) | Online Submission |
| All | 4 | Examination - Centrally Scheduled | Individual | 30% | 2 hours | Exam Period | Online Test (Quiz) |

All - Assessment Task 1: Early Assessment Quiz

| | | | |
|------------------|---|--|----------------------------------|
| GOAL: | This is an important quiz that has been specifically designed to expose you to the key foundational theoretical knowledge you need in this course. This formative quiz directly relates and assists you to be successful for the mid-term exam. Covers the contents of the learning material from weeks 1-3 | | |
| PRODUCT: | Quiz/zes | | |
| FORMAT: | Online 40 multiple choice questions. | | |
| CRITERIA: | No. | | Learning Outcome assessed |
| | 1 | antibiotics and resistance issues and the search for new microbial bioactive metabolites | 1 |
| | 2 | alternative approaches and strategies to combat infectious diseases | 1 |
| | 3 | types of microbial metabolites and principles of fermentation | 1 |
| | 4 | Assessment criteria are mapped to the course learning outcomes. | 1 |

All - Assessment Task 2: Mid-term exam

| | | | |
|------------------|--|---|----------------------------------|
| GOAL: | This exam will allow you to demonstrate your knowledge of principles and strategies related to applications of microbiology (learning materials covered in weeks 1 to 6). Key ideas here will be theoretical and practical knowledge of production and large-scale applications of microbial metabolites innovative approaches & strategies for discovering products of social, economic and environmental importance. | | |
| PRODUCT: | Examination - not Centrally Scheduled | | |
| FORMAT: | Online 80 multiple-choice questions. | | |
| CRITERIA: | No. | | Learning Outcome assessed |
| | 1 | Demonstration and application of theoretical knowledge of: i) principles of fermentation ii) strategies and current issues related to bioremediation | 1 |
| | 2 | Critical interpretation of information on: i) effectiveness of current antibiotic discovery strategies ii) large scale production and application of microbial products in industrial context | 1 |

All - Assessment Task 3: Laboratory Portfolio

| | | |
|------------------|---|---|
| GOAL: | This assessment has been designed for you to specifically develop your competencies in the laboratory - which is an essential skill for Biomed students and for many other disciplines in science, business and education. At the end of the course you should have graduate level competence in lab skills. | |
| PRODUCT: | Practical / Laboratory Skills | |
| FORMAT: | Laboratory quizzes (20%): 30 min 20 multiple choice questions online exam on the last day of the week after completion of each practical at both SD and MB Campuses. Only students who actively participated in the laboratory activity can take these quizzes. Laboratory report (30%): up to-3000 words. Individual and from practical #1 (Assessment the effectivity of Antibiotics produced by Actinomycetes) that adheres to the given report structure (rubric) to be provided by the Course-Coordinator. Submission will be online with plagiarism check report included. Submission due: Quizzes - week 5,7,9,11,13. Report - end of semester. | |
| CRITERIA: | No. | Learning Outcome assessed |
| | 1 | Demonstration and application of theoretical and practical knowledge gained in the practicals Interpretation and analysis of data and related information (e.g. actinomycetes, bacteriophages, microbial enzymes, plant pathogenic fungi) 2 3 |
| | 2 | Interpretation and analysis data and related information (e.g. actinomycete isolations from environment, cfu calculations) 2 3 |
| | 3 | Application of ethical codes of conduct to work safely while gaining laboratory skills and collecting data 2 3 |
| | 4 | Scientific communication 2 3 |

All - Assessment Task 4: Final Exam

| | | |
|------------------|--|---|
| GOAL: | This exam will allow you to demonstrate your knowledge of principles and strategies related to applications of microbiology (learning materials covered in weeks 7 to 13). Key ideas here will be theoretical and practical knowledge of: production and large-scale applications of microbial metabolites innovative approaches & strategies for discovering products of social, economic and environmental importance. | |
| PRODUCT: | Examination - Centrally Scheduled | |
| FORMAT: | Online 80 multiple choice questions | |
| CRITERIA: | No. | Learning Outcome assessed |
| | 1 | Application of theoretical and practical knowledge of: i) production of microbial metabolites ii) innovative approaches and strategies for discovering products of social, economic and environment importance (e.g. biofuels, enzymes) 1 |
| | 2 | Critical analysis of data generated by isolating and testing microbial compounds to determine: i) their effects on environmental regional and global sustainability ii) possible implications for decision making and new biotechnologies 1 |

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 | Michael J. Waites, Neil L. Morgan, John S. Rockey, Gary Higton | 0 | Industrial Microbiology | Latest edition | Wiley-Blackwell |
| Recommended | James G. Cappuccino, Chad T. Welsh | 0 | Microbiology | Latest Edition | Benjamin Cummings |
| Recommended | Ronald M. Atlas, Richard Bartha | 0 | Microbial Ecology | Latest Edition | Benjamin Cummings |
| Recommended | Ian L. Pepper, Charles P. Gerba, Terry J. Gentry | 0 | Environmental Microbiology | Latest Edition | Academic Press |

8.2. Specific requirements

Protective clothing for laboratory and strict adherence to the laboratory safety guidelines. Students fail to adhere the code or do not present a hard copy of their online laboratory safety quiz results in the first laboratory practical will not be admitted to the laboratory.

9. How are risks managed in this course?

Risk assessments have been performed for all laboratory classes and a moderate level of health and safety risk exists. Moderate risks are those associated with laboratory work such as working with chemicals and hazardous substances. You will be required to undertake laboratory induction training and it is also your responsibility 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 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 (the rates are cumulative):

- 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.

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.

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.

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 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 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