https://courseoutline.auckland.ac.nz/dco/course/BIOSCI/347/1225

# BIOSCI 347 : Environmental Microbiology and Biotechnology

#### Science

2022 Semester Two (1225) (15 POINTS)

#### **Course Prescription**

The ecology and physiology of micro-organisms in natural and engineered environments. Key themes include marine microbiology, the importance of microbial symbioses to life on Earth, and contemporary research methods in microbiology. Processes such as wastewater treatment and the production of bioactives are used to emphasise exploitation of microbial metabolism for environmental biotechnology purposes.

#### **Course Overview**

This course explores key themes in environmental microbiology, from developing a fundamental understanding of microorganisms in the environment through to exploiting their activities for human gain (i.e. environmental biotechnology). In many cases this involves microbes that are resistant to "classic" cultivation on a simple agar plate, so there is a major emphasis within the course on cutting-edge methods to better understand these enigmatic organisms. The course is well-suited to any student with an interest in microbiology, but should also appeal to those with an ecological background. With a mix of theoretical and applied aspects of microbial ecology, and a weekend-long laboratory component designed to emulate "real-life research", the course could serve as an entry point into further (postgraduate) study or jobs in diverse fields including biosecurity, biotechnology, ecosystem monitoring and medical microbiology. A remote version of the course will be provided to those students located overseas.

#### **Course Requirements**

Prerequisite: BIOSCI 204 or MEDSCI 202

#### Capabilities Developed in this Course

- Capability 1: Disciplinary Knowledge and Practice
- Capability 2: Critical Thinking
- Capability 3: Solution Seeking
- Capability 4: Communication and Engagement

Capability 6: Social and Environmental Responsibilities

Graduate Profile: <u>Bachelor of Science</u>

#### Learning Outcomes

By the end of this course, students will be able to:

- Explain the importance of microorganisms within natural and engineered environments. (Capability 1 and
  6)
- 2. Describe the strengths and limitations of contemporary techniques within microbial ecology, and when to use each approach. (Capability 1 and 3)
- 3. Describe the various ways, both positive and negative, in which microorganisms interact with each other, as well as with plant and animal (including human) "hosts". (Capability 1)
- 4. Explain using specific examples, how microbial metabolisms can be exploited for environmental biotechnology purposes. (Capability 1)
- 5. Apply basic culturing and molecular biology techniques in the study of environmental microorganisms. (Capability 1, 4 and 5)
- 6. Critically evaluate and summarise the published literature relating to environmental microbiology and biotechnology. (Capability 2 and 4)

Assessment Type	Percentage	Classification
Essay	10%	Individual Coursework
Laboratories	25%	Individual Coursework
Test	15%	Individual Test
Final Exam	50%	Individual Examination
4 types	100%	

#### Assessments

Assessment Type	Learning Outcome Addressed							
	1	2	3	4	5	6		
Essay						~		
Laboratories					~			
Test	~	~	~					
Final Exam	~	~	~	~				

# Special Requirements

Students must have a lab coat for the practical component of this course. The laboratory will take place over one weekend, with attendance compulsory for the entire weekend (9-5, Saturday and Sunday).

### Workload Expectations

This course is a standard 15 point course and students are expected to spend 10 hours per week involved in each 15 point course that they are enrolled in.

For this course, you can expect 32 hours of lectures, 18 hours of laboratories, 3 hours of tutorials, 40 hours of reading and thinking about the content and 40 hours of work on assignments and/or test preparation.

#### **Delivery Mode**

#### **Campus Experience**

Attendance is required at scheduled activities including labs to complete components of the course.

Lectures will be available as recordings. Other learning activities including tutorials will be available as recordings.

The course will not include live online events including group discussions/tutorials.

Attendance on campus is required for the test/exam.

The activities for the course are scheduled as a standard weekly timetable.

A remote version of the course can be made available to students located overseas because of border restrictions, or those with an exemption to study remotely.

#### Learning Resources

Course materials are made available in a learning and collaboration tool called Canvas which also includes reading lists and lecture recordings (where available).

Please remember that the recording of any class on a personal device requires the permission of the instructor.

There is no prescribed textbook for this course, as developments in environmental microbiology and biotechnology have been so rapid in recent years that no single textbook satisfactorily encompasses all the relevant areas. The references suggested during the course are therefore a combination of journal articles (including recent reviews wherever possible) and book chapters. Parts of Willey et al. (2017), the prescribed textbook for BIOSCI 204, may be useful.

Willey JM, Sherwood LM, and Woolverton CJ (2017) Prescott, Harley, and Klein's Microbiology. 10th Edition, McGraw-Hill, New York.

# Student Feedback

During the course Class Representatives in each class can take feedback to the staff responsible for the course and staff-student consultative committees.

At the end of the course students will be invited to give feedback on the course and teaching through a tool called SET or Qualtrics. The lecturers and course co-ordinators will consider all feedback.

Your feedback helps to improve the course and its delivery for all students.

### Academic Integrity

The University of Auckland will not tolerate cheating, or assisting others to cheat, and views cheating in coursework as a serious academic offence. The work that a student submits for grading must be the student's own work, reflecting their learning. Where work from other sources is used, it must be properly acknowledged and referenced. This requirement also applies to sources on the internet. A student's assessed work may be reviewed against online source material using computerised detection mechanisms.

# **Class Representatives**

Class representatives are students tasked with representing student issues to departments, faculties, and the wider university. If you have a complaint about this course, please contact your class rep who will know how to raise it in the right channels. See your departmental noticeboard for contact details for your class reps.

# Copyright

The content and delivery of content in this course are protected by copyright. Material belonging to others may have been used in this course and copied by and solely for the educational purposes of the University under license.

You may copy the course content for the purposes of private study or research, but you may not upload onto any third party site, make a further copy or sell, alter or further reproduce or distribute any part of the course content to another person.

#### **Inclusive Learning**

All students are asked to discuss any impairment related requirements privately, face to face and/or in written form with the course coordinator, lecturer or tutor.

Student Disability Services also provides support for students with a wide range of impairments, both visible and invisible, to succeed and excel at the University. For more information and contact details, please visit the <u>Student Disability Services' website http://disability.auckland.ac.nz</u>

# Special Circumstances

If your ability to complete assessed coursework is affected by illness or other personal circumstances outside of your control, contact a member of teaching staff as soon as possible before the assessment is due.

If your personal circumstances significantly affect your performance, or preparation, for an exam or eligible written test, refer to the University's <u>aegrotat or compassionate consideration page</u> https://www.auckland.ac.nz/en/students/academic-information/exams-and-final-results/duringexams/aegrotat-and-compassionate-consideration.html.

This should be done as soon as possible and no later than seven days after the affected test or exam date.

# Learning Continuity

In the event of an unexpected disruption, we undertake to maintain the continuity and standard of teaching and learning in all your courses throughout the year. If there are unexpected disruptions the University has contingency plans to ensure that access to your course continues and course assessment continues to meet the principles of the University's assessment policy. Some adjustments may need to be made in emergencies. You will be kept fully informed by your course co-ordinator/director, and if disruption occurs you should refer to the university website for information about how to proceed.

The delivery mode may change depending on COVID restrictions. Any changes will be communicated through Canvas.

# Student Charter and Responsibilities

The Student Charter assumes and acknowledges that students are active participants in the learning process and that they have responsibilities to the institution and the international community of scholars. The University expects that students will act at all times in a way that demonstrates respect for the rights of other students and staff so that the learning environment is both safe and productive. For further information visit <u>Student</u> Charter https://www.auckland.ac.nz/en/students/forms-policies-and-guidelines/student-policiesand-guidelines/student-charter.html.

#### Disclaimer

Elements of this outline may be subject to change. The latest information about the course will be available for enrolled students in Canvas.

In this course students may be asked to submit coursework assessments digitally. The University reserves the right to conduct scheduled tests and examinations for this course online or through the use of computers or other electronic devices. Where tests or examinations are conducted online remote invigilation arrangements may be used. In exceptional circumstances changes to elements of this course may be necessary at short notice. Students enrolled in this course will be informed of any such changes and the reasons for them, as soon as possible, through Canvas.