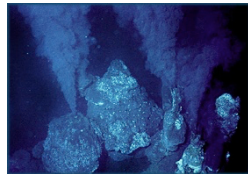


# COURSE MANUAL

## ENVIRONMENTAL MICROBIOLOGY (MICR3071)

## MARINE MICROBIOLOGY (MICR9071)

2022



SCHOOL OF BIOTECHNOLOGY AND BIOMOLECULAR SCIENCES



**School of Biotechnology and Biomolecular Sciences**

MICR3071

**Environmental Microbiology**

MICR9071

**Marine Microbiology**

Term 1 2022

MICR3071/MICRO9071 Term 1 2022

I certify that:

- I have read and understood the University Rules in respect to Student Academic Misconduct and plagiarism.
- I have read and understood the assessment requirements for the course
- I have read and understood the laboratory safety procedures as set out in the laboratory protocol book

Signature: .....

Date: .....

# Welcome to Environmental Microbiology (MICR3071)/Marine Microbiology (MICR9071)

## Course staff:

- Convenor: Associate Professor Brendan Burns ([brendan.burns@unsw.edu.au](mailto:brendan.burns@unsw.edu.au))
- Technical Staff: Tim Nguyen, Agnee Amarnath, Zakia Begum
- Demonstrators: Fraser MacLeod, Stephanie-Jane Nobs

## Course information:

**This course is worth 6 units of credit**

Environmental Microbiology MICRO3071 provides a comprehensive introduction to microbial ecology, fundamental aspects of microbial physiology and diversity, and selected themes that are essential features of applied and environmental microbiology. The course is designed to give you an up-to-date understanding of modern research in this field and the link between laboratory-based research and application in the field. As a higher-level subject, students gain an insight into the contemporary theory and practice of microbial ecology, which overcomes the significant limitations of classical microbiology.

The structure of the laboratory sessions is designed to give you training in the practical skills necessary for the workplace, and is applicable whether you plan to continue your career in academic research, industry or any work that requires contact with science and research. There is an emphasis on planning and carrying out practical tasks as members of a group, as this is a realistic parallel to “life after University“, however the writing of scientific reports on the results you obtain in the laboratory is an individual responsibility.

## **Learning outcomes**

When you successfully complete this course\* you will be able to:

- 1) Discuss microbial ecology concepts including:
  - a) Factors that limit microbial growth in natural habitats
  - b) Methods for studying microbial populations and their function in the natural environment
  - c) Ecological principles and mechanisms of microbial interactions within mixed microbial communities and between microorganisms and higher organisms
  - d) The effect of microorganisms on the global environment and vice-versa eg: their role in cycling of elements, climate change impacts
  - e) The application of microbial ecological principles for industrial, environmental or public health benefits
- 2) Test scientific hypotheses via experimental design, analyse results and discuss outcomes in the light of the current body of knowledge (e.g. literature)
- 3) Critically evaluate scientific output. This includes self-generated, peer generated and published literature
- 4) Demonstrate effective written and verbal scientific communication skills

\*This course is also badged as Marine Microbiology (MICR9071), a postgraduate course listing. The content, outcomes, and running of the course is exactly the same as for MICR3071.

## **DIVERSITY AND INCLUSION:**

In an ideal world, science would be objective. However, the reality is much of science is subjective and is historically built on a small subset of voices. In this course, I will make an effort to expose you to literature from a diverse group of scientists, despite limits still existing on this diversity. I acknowledge that it is possible that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. Please contact me (in person or electronically) or submit anonymous feedback if you have any suggestions to improve the quality (or diversity) of the course materials.

There are challenges inherent in communicating between people from other cultures, but I will strive to ensure my passion for science is appreciated through different eyes. I have a genuine desire to experience new cultures, expand my own horizons, and transcend any barriers that interacting with diverse groups could impose. I am acutely aware of the importance of diversity and inclusion in all aspects of life and want to uphold these values as an educator.

The Faculty of Science is dedicated to creating a positive, inclusive educational environment that embraces diversity in all forms and rejects any form of hostile workplace, discrimination, or bullying. We have a clear statement of behavioural expectations (as well as definitions of discrimination, (sexual) harassment and bullying, which can be found here: <https://student.unsw.edu.au/harassment>). On this website, you can also find resources and contacts for reporting issues. In addition, the Science Equity, Diversity and Inclusion Working Group of the Faculty of Science have recently launched a set of Classroom Inclusivity Guidelines that all staff and students are striving to work under. They can be found here:

<https://www.science.unsw.edu.au/our-faculty/classroom-inclusivity-guidelines>

Beyond the University and Faculty protocols, it is my goal as course convenor to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honours your identities (including race, gender, class, sexuality, religion, ability). To help accomplish this:

- If you choose, please let me and the class know your chosen name and pronouns.
- Your classmates and demonstrators (like many people) are still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it.
- As a participant in course discussions, you should also strive to honor the diversity of your classmates (e.g., use appropriate pronouns and names, make sure all voices are being heard, etc.).
- If you feel like your performance in the class is being impacted by your experiences outside of class, please do not hesitate to come and talk with me.

## SUSTAINABILITY AND INDIGENOUS KNOWLEDGE:

The United Nations Sustainable Development Goals (SDGs) or Global Goals are a collection of 17 interlinked global goals designed to be a "blueprint to achieve a better and more sustainable future for all". This course actively addresses key UN SDGs, including SDG13 (Climate Action), SD14 (Life Below Water), SDG15 (Life on Land), and SDG10 (Reduced Inequalities). As course convenor I am keen to transfer my passion for the environment and the need to build a sustainable future to the next generation, and I hope this course will inspire and be a vehicle to enable changes in thinking and everyday practice.



This course also engages, values, and incorporates Indigenous Knowledge into learning outcomes. The goal is that this course can help bridge gaps in recognising the significance of Indigenous knowledge in science teachings. Indigenous engagement on Country is critical to help protect Australia's biodiversity and utilise their extensive knowledge in caring for the land. Sharing of Indigenous knowledge in undergraduate teaching can ensure students are better equipped to be part of a catalyst of change in increasing opportunities for First Nations people.



## **COVID-19 and effects on teaching and learning experience**

We have obviously lived through an extraordinary time in the last two years. As students you had to cope with massive changes with remote learning, from changes in the way material is delivered, to types of assessments, challenges with engaging with academics and other students. And of all this while navigating around severe public health concerns to individual, family, and society in general.

This has been an enormous challenge to university educators such as myself in my capacity as course coordinator, but I will endeavour to deliver the best possible course for you, and only ask for your flexibility and understanding in this very different teaching landscape.

In terms of course logistics in 2022 these are the following changes and details in the way MICR3071/MICR9071 will be run:

- **Lectures:** all lectures will be **online and asynchronous (i.e not 'live')**. I will aim to still follow the rough lecture schedule overleaf, and upload between 2-3 lectures a week in as timely fashion as possible (likely Monday, Wednesday, Fridays). I have chosen to not to lectures live and online to avoid issues that can arise with network failure and such, and also so you can view the lecture in your own time. The platform for viewing will be Teams and further details will be provided through Moodle.
- **Lab:** the aim at this stage is for the lab to be face-to-face while still following appropriate social distancing protocols and public health guidelines that are in place
- **Tutorials:** tutorials will likely also be a mix of face-to-face, online, and sometimes left as free time for students depending on the week and activity. More details will follow in Week 1.

## **COVID and you**

Obviously, the biggest potential impact COVID can have if you are affected directly. This can be either if you contract the virus yourself or if you are a close contact. In either scenario you would need to self-isolate according to NSW Health guidelines that are in place at the time. First and foremost, your health is a priority and looking after yourself and/or family is for me the most important thing.

If you need to self-isolate or have more serious impacts that are affecting you, please let myself as Course Coordinator know so I can stay on top of it and help in any way possible, and also your lab members if it affects your ability to attend a lab.

**MICR3071: Environmental Microbiology T1 2022**  
**Lecture schedule (note: lectures online and asynchronous)**

<b>Week</b>		<b>Date/Time</b>	<b>Topic</b>	<b>Lecturer</b>
1	Mon	14/2	Introduction to course and project	BB
	Wed	16/2	Microbial communities and interactions 1	SE
	Fri	18/2	Microbial communities and interactions 2	SE
2	Mon	21/2	Microbial communities and interactions 3	SE
	Wed	23/2	Biofilms in the environment	BB
	Fri	25/2	Biofilm formation and regulation	BB
3	Mon	28/2	Microbes and the tree of life	BB
	Wed	02/3	Methods to detect microbes	BF
	Fri	04/3	Environmental genomics	TT
4	Mon	07/3	Metaproteomics	TW
	Wed	09/3	Microbial ecology	BB
	Fri	11/3	Sensing trouble and adapting	BB
5	Mon	14/3	Sensing trouble and adapting	BB
	Wed	16/3	Microbes on the move	BB
	Fri	18/3	Microbes transforming the Earth – C	BB
6	<b>Flexi week</b>		<b>NO LECTURES</b>	
7	Mon	28/3	Microbes transforming the Earth – N	BB
	Wed	30/3	Microbes transforming the Earth - S	BB
	Fri	01/4	Ancient archaea and rise of complex life	BB
8	Mon	04/4	The future of studying the past: micro mats	BB
	Wed	06/4	Human microbiome	SL
	Fri	08/4	Waste and drinking water micro	MS
9	Mon	11/4	Microbial diversity and drug discovery	BB
	Wed	13/4	Indigenous medicine and microbiology	BB
	Fri	15/4	<b>GOOD FRIDAY</b>	
10	Mon	18/4	<b>EASTER MONDAY</b>	BB
	Wed	20/4	TBA	
	Fri	22/4	Course summary	

Note: as all lectures are online and asynchronous due to pandemic restrictions, these dates can potentially change for a given lecture as we navigate through the course. Students will be notified when a given lecture is posted in Teams for viewing and/or if there changes to the schedule.

Brendan Burns (BB); Suhelen Egan (SE); Torsten Thomas (TT); Belinda Ferrari (BF); Michael Storey (MS); Timothy Williams (TW); Steven Leach (SL)



**MICR3071: Environmental Microbiology T1 2022**  
**Tutorial, lab, assessment schedule**

<b>Week</b>	<b>Date</b>	<b>Task</b>	<b>Time</b>	<b>Details/Topic</b>
1	Tues 15/2 Thur 17/2	NA NA	NA NA	No lab No tutorial
2	Tues 22/2 Thur 24/2	Lab Tutorial	2-5 5-6	Lab intro talk, planning Continue lab planning
3	Tues 01/3 Thur 03/3	Lab Tutorial	2-5 5-6	<b>Start work on Research Project</b> Biosensors tutorial
4	Tues 08/3 <b>Thur 10/3</b>	Lab <b>Assess</b>	2-5 <b>5-6</b>	<b>Work on research project</b> <b>Mid-session quiz (10%)</b>
5	Tue 15/3 Thur 17/3	Lab Tutorial	2-5 5-6	<b>Work on research project</b> Review topic prep
6	<b>Tues 22/3</b> <b>Thur 24/3</b>	<b>NA</b> <b>NA</b>	<b>NA</b> <b>NA</b>	<b>Flexi week (NO LAB)</b> <b>Flexi week (NO TUTORIAL)</b>
7	Tues 29/3 Thur 31/3 <b>Tues 29/3</b>	Lab Tutorial <b>Assess</b>	2-5 5-6	<b>Work on research project</b> Marine isolates ID - BLAST <b>Draft research project report due (10%)</b>
8	Tues 05/4 Thur 07/4	Lab Tutorial	2-5 5-6	<b>Work on Research Project/report feedback</b> Report feedback
9	<b>Tues 12/4</b> Thur 14/4	<b>Assess</b> Tutorial	<b>2-5</b> 5-6	<b>Review topic presentations (15%)</b> TBA
<b>EASTER</b>				
10	<b>Tues 19/4</b> Thur 21/4	<b>Assess</b> Tutorial	<b>2-5</b> 5-6	<b>Review topic presentations (continued)</b> TBA
11	<b>Wed 27/4</b>	<b>Assess</b>		<b>Final Research project report due (25%)</b>

Tutorial location: To be advised depending on task (Thurs 5-6)

Lab location: Teaching Lab 11 (E26) (Tues 2-5)

## **Assessment information:**

The mark for the course will be allocated as follows:

<b>Continuous assessment</b>	<b>60%</b>
<b>Final examination</b>	<b>40%</b>

In order to pass this subject, students must:

- i. Satisfactorily complete all parts of the continuous assessment.
- ii. Attend at least **eighty percent** of prescribed practical classes and tutorials.

**Note:** The practical classes are of **3h** duration.

A 1-hour tutorial will be held most weeks, it is expected that you will participate in tutorial discussions, as this is an integral part of the learning process through engaging with teaching staff and other students.

### **Components of the continuous assessment (60% total):**

Assessment during session will consist of the following:

1. Quiz	10%
2. Major research project paper	35%
3. Presentation of review topic	15%

### **Quiz (10%):**

The purpose of this quiz is to provide students with the opportunity to assess their progress and understanding during the term. The quiz will be held in the tutorial time slot in week 4 and will consist of short answer questions, which will cover material from the lecture, tutorial and practical session and aim to assess learning outcomes 1 and 2 (see page 1).

Under current UNSW COVID requirements this task will be held online through Moodle.

## **Major research project- scientific paper (total 35%):**

This is a report on the research project that you and your group will be planning and carrying out during weeks 2-8. The assessment for this project is in two parts:

- 1) The submission of a draft report in week 7 (worth 10%)
- 2) The final report submission in week 11 (worth 25%)

The final report will be in the format of a scientific paper and aims to assess learning outcomes 2, 3, and 4 (see page 1). Although the lab work will be done as a group, your report on that work must be done individually. You will be given detailed information on this project during the first lecture in week 1 and tutorial & laboratory sessions in week 2 and 3. You will be given guidance on scientific report writing during both the laboratory and tutorial sessions. This is a major assignment and so should not be left to the last minute to complete. Therefore, as part of the learning process you will be required to submit a draft report in week 7.

More details on the requirements for your reports will be given throughout the course. You will be provided with feedback on your draft report that can be incorporated into your final report.

## **Presentation of review topic (total 15%):**

This is intended as an exercise in information literacy and presentation skills and thus will be assessing learning outcomes 3 and 4 (see page 4). In a small group (of say 3-4), you will be asked to choose a topic of interest to you related to environmental microbiology. You will be given guidance in this during the laboratory and tutorial sessions. The assessment for this project is as follows:

- 1) As a group, you will present your findings in this area as a short group talk during the final 2 laboratory sessions (weeks 9 and 10).
- 2) Marking will be a combination of course coordinator and peer reviews (10% coordinator mark plus 5% peer assessment).

**Note: Although this is a group task, individual marks of the talk component can be moderated by the course coordinator dependent on how each student performs/presents.**

It is planned to hold these talks if possible in person if current health guidelines allow, as this will provide students with important skills in presentation. If situations change, we can revert to online presentations as needed.

**Final examination (40% total):****Final examination:**

Due to COVID-19 restrictions, the final exam will be held online and ran through Moodle.

The two-hour paper will consist of four (4) essay-type questions worth equal marks (10% each). Students will have eight (8) question options and will need to choose four (4) questions to answer.

Topics will be broad with the opportunity to incorporate different aspects of course content into your answers to demonstrate your understanding.

More details on the final exam will be given toward the end of the term.

## **Academic honesty and plagiarism:**

Plagiarism is the presentation of the thoughts or work of another as one's own.\*

Examples include:

- direct duplication of the thoughts or work of another, including by copying work, or knowingly permitting it to be copied. This includes copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and,
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.

Submitting an assessment item that has already been submitted for academic credit elsewhere may also be considered plagiarism.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

Students are reminded of their Rights and Responsibilities in respect of plagiarism, as set out in the University Undergraduate and Postgraduate Handbooks, and are encouraged to seek advice from academic staff whenever necessary to ensure they avoid plagiarism in all its forms.

The Learning Centre website is the central University online resource for staff and student information on plagiarism and academic honesty. It can be located at:

<https://student.unsw.edu.au/plagiarism>

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

\* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle.

† Adapted with kind permission from the University of Melbourne.

**UNSW has strict rules regarding plagiarism. Plagiarism of any kind is not acceptable in this course.**

**If you are in any doubt about whether something constitutes plagiarism, always ask your tutor before handing in your assignment.**

### **Resources for students:**

There is no set text assigned to this course and you will receive recent articles on relevant topics throughout the course. However, for those students wishing to have a text book Atlas and Bartha Microbial Ecology: fundamentals and applications, Benjamin/Cummings Publishing Company Inc, is recommended.

### **Recommended journals for extra reading**

The ISME journal	Microbial Biotechnology
Aquatic Microbial Ecology	Microbial Ecology
Advances in Microbial Ecology	Microbiology
Current Opinions in Microbiology	Biofouling
Applied and Environmental Microbiology	Trends in Biotechnology
Trends in Microbiology	Extremophiles
Environmental Microbiology	Journal of Bacteriology
FEMS Microbiology Ecology	Molecular Microbiology
Marine Ecology Progress Series	PNAS

### **Equity and diversity**

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or <https://student.unsw.edu.au/disability>). Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

### **Continual course improvement**

At the end of the course student evaluative feedback on the course may be gathered, using UNSW's myExperience Process. Student feedback is taken seriously, and continual improvements are made to the course based in part on such feedback. Significant changes to the course will be communicated to subsequent cohorts of students taking the course. If you would like to make suggestions at any time during the course please feel free to discuss this with the course convener.

## SPECIAL CONSIDERATION AND FURTHER ASSESSMENT TERM 1 2022

Students who believe that their performance, either during the session or in the end of session exams, may have been affected by illness or other circumstances may apply for special consideration. Applications can be made for compulsory class absences such as (laboratories and tutorials), in-session assessments tasks, and final examinations.

**Students must make a formal application for Special Consideration** for the course/s affected as soon as practicable after the problem occurs and **within three working days of the assessment to which it refers.**

Students should consult the “Special Consideration” section of Moodle for specific instructions related to each BABS course they are studying. Further general information on special consideration can also be found at <https://student.unsw.edu.au/special-consideration>.

### HOW TO APPLY FOR SPECIAL CONSIDERATION

Applications must be made via Online Services in myUNSW. **You must obtain and attach Third Party documentation before submitting the application. Failure to do so will result in the application being rejected.** Log into myUNSW and go to My Student Profile tab > My Student Services channel > Online Services > Special Consideration.

After applying online, students must also verify supporting their documentation by submitting to [UNSW Student Central](#):

- Originals or certified copies of your [supporting documentation](#) (Student Central can certify your original documents), and
- A completed [Professional Authority form \(pdf - download here\)](#).

**The supporting documentation must be submitted to Student Central for verification within three working days of the assessment or the period covered by the supporting documentation. Applications which are not verified will be rejected.**

**Students will be contacted via the online special consideration system as to the outcome of their application. Students will be notified via their official university email once an outcome has been recorded.**

### SUPPLEMENTARY EXAMINATIONS:

The University does not give deferred examinations. However, further assessment exams may be given to those students who were absent from the final exams through illness or misadventure. Special Consideration applications for final examinations and in-session tests will only be considered after the final examination period when lists of students sitting supplementary exams/ tests for each course are determined at School Assessment Review Group Meetings. Students will be notified via the online special consideration system as to the outcome of their application. **It is the responsibility of all students to regularly consult their official student email accounts and myUNSW in order to ascertain whether or not they have been granted further assessment.**

**For Term 1 2022, BABS Supplementary Exams will be scheduled:**

23 May – 27 May

**Further assessment exams will be offered on this day ONLY and failure to sit for the appropriate exam may result in an overall failure for the course. Further assessment will NOT be offered on any alternative dates.**