

School of Biotechnology and Biomolecular Sciences

MICR3071

Environmental Microbiology

MICR9071

Marine Microbiology

Course outline

Term 1

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

Course staff:

- Convenor: Ass Prof Brendan Burns (brendan.burns@unsw.edu.au)
- Technical Staff: Tim Nguyen
- Demonstrators: Fraser MacLeod

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 skills¹

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

We have obviously lived through an extraordinary year in 2020. 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 2021 these are the following changes and details in the way MICR3071/MICR9071 will be run:

- **Lectures:** all lectures will be **online and asynchronous**. 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. The platform for viewing will either be Echo360 or 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 face-to-face and sometimes left as free time for students depending on the week and activity. More details will follow in Week 1.

MICR3071: Environmental Microbiology T1 2021
Lecture schedule (note lectures online and asynchronous)

Week		Date/Time	Topic	Lecturer
1	Mon	15/2	Introduction to course and project	BB
	Wed	17/2	Microbial communities and interactions 1	SE
	Fri	19/2	Microbial communities and interactions 2	SE
2	Mon	22/2	Microbial communities and interactions 3	SE
	Wed	24/2	Biofilms in the environment	BB
	Fri	26/2	Biofilm formation and regulation	BB
3	Mon	01/3	Microbes and the tree of life	BB
	Wed	03/3	Methods to detect microbes	BF
	Fri	05/3	Environmental genomics	TT
4	Mon	08/3	Metaproteomics	TW
	Wed	10/3	Microbial ecology	BB
	Fri	12/3	Sensing trouble.....and adapting	BB
5	Mon	15/3	Sensing trouble.....and adapting	BB
	Wed	17/3	Microbial dark matter	BB
	Fri	19/3	Microbes transforming the Earth – C	BB
6	Flexi week		NO LECTURES	
7	Mon	29/3	Microbes transforming the Earth – N	BB
	Wed	31/3	Microbes in extreme environments	BB
	Fri	02/4	Good Friday	
8	Mon	05/4	Easter Monday	
	Wed	07/4	Microbes transforming the Earth - S	BB
	Fri	09/4	Microbes on the move	MB
9	Mon	12/4	The future of studying the past: micro mats	BB
	Wed	14/4	Human microbiome	SL
	Fri	16/4	Waste and drinking water micro	MS
10	Mon	19/4	Microbial diversity and drug discovery	BB
	Wed	21/4	Indigenous medicine and microbiology	BB
	Fri	23/4	Course summary	BB

Note: as all lectures are online and asynchronous due to pandemic restrictions, these dates are not necessarily binding for a given lecture. Students will be notified when a given lecture is posted in Teams for viewing.

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

MICR3071: Environmental Microbiology T1 2021

Tutorial, lab, assessment schedule

Week	Date	Task	Time	Details/Topic
1	Tues 16/2	NA	NA	No lab
	Thur 18/2	NA	NA	No tutorial
2	Tues 23/2	Lab	2-5	Lab intro talk
	Thur 25/2	Tutorial	4-5	Lab intro, OHS, research plans
3	Tues 02/3	Lab	2-5	Start work on Research Project
	Thur 04/3	Tutorial	4-5	Biosensors tutorial
4	Tues 09/3	Lab	2-5	Work on research project
	Thur 11/3	Tutorial	4-5	Mid-session quiz (10%)
5	Tue 16/3	Lab	2-5	Work on research project
	Thur 18/3	Tutorial	4-5	Review topic prep
6	Tues 23/3	NA	NA	Flexi week (NO LAB)
	Thur 25/3	NA	NA	Flexi week (NO TUTORIAL)
7	Tues 30/3	Lab	2-5	Work on research project
	Thur 01/4	Tutorial	4-5	BLAST sequences
	Tues 01/4	Assess		Draft research project report due (10%)
8	Tues 06/4	Lab	2-5	Work on Research Project/report feedback
	Thur 08/4	Tutorial	4-5	TBA
9	Tues 13/4	Lab	2-5	Review topic presentations (15%)
	Thur 15/4	Tutorial	4-5	TBA
10	Tues 20/4	Lab	2-5	Review topic presentations (continued)
	Thur 22/4	Tutorial	4-5	TBA
11	Wed 28/4	Assess		Final Research project report due (25%)

Tutorial location: To be advised depending on task (Thurs 4-5)

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

Assessment information:

The mark for the course will be allocated as follows:

Continuous assessment	60%
Final examination	40%

In order to pass this subject, students must satisfactorily complete all parts of the continuous assessment.

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 likely 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).

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 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 seven (7) question options and will need to choose four (4) questions to answer.

The essay options will include a question worded as follows:

Select an area in environmental microbiology. Clearly and in detail:

- a. Define why this area is of interest.
- b. Review current knowledge of the area and discuss continuing research approaches.

This question is designed to allow students the opportunity of in-depth study of areas they find particularly interesting. Those wishing to attempt it are advised to prepare by reading recent scientific literature, as successful candidates will need to demonstrate a knowledge of the area which is more extensive than can be provided in lectures. According to past experience, anyone attempting this question without prior preparation is likely to do very poorly. If you have not specifically prepared you would be best advised to choose from the set essay topics.

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 2021

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 2021, BABS Supplementary Exams will be scheduled:

24-28 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.