MICR336: Microbial Ecology

Semester Two   18 points

Course overview

Microorganisms control the environmental processes that sustain the Earth's biosphere. From soils to the human gut, microbial communities are emerging as central drivers of the living world. This paper will introduce you to the many roles of microbes in everyday life and cover topics on microbial diversity, and how it can be studied, as well as how this diversity affects ecosystem functions. We will cover a broad range of ecosystems (from marine to human-associated) and provide you with in-depth knowledge of the microbial makeup of the world.

Learning outcome

- Be able to demonstrate and utilise knowledge of the ecology of microorganisms in natural environments, and the tools used to study them. Display the ability to integrate basic scientific knowledge and link ecosystem processes with changes in microbial ecology and macro-ecology.
- Develop an enhanced ability to communicate ideas about microbiology to a lay and specialised audience.

Paper structure

There are 25 lectures and 8 laboratory sessions. Lectures address the following issues:

- A framework for understanding microbial diversity
- Understanding microbial functional potential
- Spatial and temporal variance in microbial communities
- Environmental stressor-resistance and resilience in microbial ecology

You will gain valuable skills required for working with, analyzing, and interpreting BIG data. This includes quality control, processing of amplicon data, and statistical analysis of data using R.
This course is for students interested in ecology of microorganisms in natural environments, and the tools used to study them.

These concepts are further explored in laboratory exercises:

- Week 1. **Wet lab**: Laboratory based experimental work will include sampling, nucleic acid extraction, quality assessment and PCR amplification. Computational analysis of experimental work will be covered in weeks 2 – 4 and will be held in the computer labs (CAL).
- Week 2. **Computer lab**: Handling and quality controlling amplicon data
- Week 3. **Computer lab**: Basic data manipulation and visualization in Phyloseq
- Week 4. **Computer lab**: Statistical analysis, correlation, and metadata manipulation in R

Assessment

- Group oral presentation (10%)
- Final written report (25%)
- Laboratory notebook/R markdown files (10%)
- Final written exam (55%)

Textbook

Recommended text:
There is no recommended text for MICR 336 but you will be directed to and discuss relevant scientific papers during lectures.

Teaching staff:

- Dr Xochitl Morgan (Convenor)
- Dr Sergio Morales
- Dr Jen Robson
- Megan Hall

Workload expectations

An 18 point paper has a minimum expectation of 14 hours per week per paper (180 per semester). This is made up of formal contact times (lectures, tutorials, laboratories etc.) and independent study (studying, revision, assignments, reading etc.).

Responsibilities of students

- Students are responsible for making themselves aware of all University rules and regulations pertaining to their rights and responsibilities as students and to the degree in which they are enrolled.
- Students shall be deemed to have received any information:
  o provided in scheduled classes, regardless of attendance;
  o sent to their student email address;
  o made available via Blackboard or other University-approved learning management systems.
- Students are expected to be aware of all information related to a paper that is made available to them, and, in a timely manner, to raise with staff any questions or concerns relating to this information.
- Students are expected to be aware of, and to act in accordance with, the University's Academic Integrity Policy.

Academic integrity and academic misconduct

Academic integrity means being honest in your studying and assessments. It is the basis for ethical decision-making and behaviour in an academic context. Academic integrity is informed by the values of honesty, trust, responsibility, fairness, respect and courage. Students are expected to be aware of, and act in accordance with, the University's Academic Integrity Policy.

Academic Misconduct, such as plagiarism or cheating, is a breach of Academic Integrity and is taken very seriously by the University. Types of misconduct include plagiarism, copying, unauthorised collaboration, taking unauthorised material into a test or exam, impersonation, and assisting someone else's misconduct. A more extensive list of the types of academic misconduct and associated processes and penalties is available in the University's Student Academic Misconduct Procedures.

It is your responsibility to be aware of and use acceptable academic practices when completing your assessments. To access the information in the Academic Integrity Policy and learn more, please visit the University's Academic Integrity website at www.otago.ac.nz/study/academicintegrity or ask at the Student Learning Centre or Library. If you have any questions, ask your lecturer.

- Academic Integrity Policy (www.otago.ac.nz/administration/policies/otago116838.html)
- Student Academic Misconduct Procedures
  (http://www.otago.ac.nz/administration/policies/otago116850.html)