

MICR 461: Molecular Microbiology

Semester One

20 points



Course overview

The paper consists of four modules, with each module comprised of three tutorials. In the first tutorial an overview of the topic is considered. In the other tutorials the students take the major role, e.g. presentation of papers pertinent to the topic, etc.

Tutorials will cover the following topics;

Module 1: CRISPR-Cas: adaptive immunity in bacteria

Professor Peter Fineran and Dr Sean Meaden

We will examine the CRISPR-Cas (clustered regularly interspaced short palindromic repeats-CRISPR associated) systems. These systems are widespread in bacteria and archaea and provide a small RNA-based resistance mechanism against foreign genetic elements..

Module 2: Molecular mechanisms of bacterial pathogenesis

Associate Professor Keith Ireton and Dr Daniel Pletzer

We will critically analyse primary research papers dealing with molecular mechanisms of virulence of several key bacterial pathogens, such as *Listeria*, *Salmonella*, *Shigella*, and nosocomial ESKAPE (Enterococcus, Staphylococcus, Klebsiella, Acinetobacter, Pseudomonas, and Enterobacter spp).

Module 3: Whole-genome sequencing of bacterial pathogens

Professor Greg Cook and Dr Htin Aung

Whole genome sequencing (WGS) is an important technique to investigate the epidemiology and evolution of bacterial pathogens. In this module we will discuss the application of this technology in understanding the evolutionary history, global spread and antimicrobial resistance of *M. tuberculosis*.

Module 4: Phylodynamics of viral disease?

Dr Jemma Geoghegan and Professor Vernon Ward

Phylodynamic analyses can track the epidemiological and evolutionary processes of pathogens, both within and between populations, through time and space. We will discuss the application of phylodynamics to a range of key viral diseases and its use in real-time surveillance.

Learning outcomes

- Be able to demonstrate an in-depth understanding of topical issues in molecular microbiology
- Develop skills in critically evaluating the scientific literature and in experimental design
- Develop communication and teamwork skills

Assessment

1. A 10-minute oral exam (25%), held in the last week of the first semester
2. A 3-hour final exam (75%), comprising 4 essay questions, of which students do 3

Teaching staff

- [Professor Vernon Ward \(Convenor\)](#)
- [Associate Professor Keith Ireton](#)
- [Dr Daniel Pletzer](#)

- [Professor Greg Cook](#)
- [Dr Htin Aung](#)
- [Dr Jemma Geoghegan](#)

Workload expectations

An 20 point paper has a minimum expectation of 15 hours per week per paper (200 hours 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:
 - provided in scheduled classes, regardless of attendance;
 - sent to their student email address;
 - 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/otago/16838.html)
- Student Academic Misconduct Procedures (<http://www.otago.ac.nz/administration/policies/otago/16850.html>)

