



Bachelor of Science Microbiology

Undergraduate Handbook 2009



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WELCOME

COLLEGE OF SCIENCES

Microbiology 2008

To all prospective students,

This is an exciting time to be a microbiology student. The world around us is rapidly changing. The new technologies for working with microorganisms have a major influence on how our society is changing and developing. It is important for you to learn about these technologies and the theories that underpin them so that you can play an important role in affecting a process of change in both scientific understanding and human perceptions and attitudes.

Microbiologists want to know how biological processes of microorganisms function and how they are controlled at the molecular and cellular level. This basic knowledge is critical for understanding life itself.

I am pleased to welcome you to Massey University. It is up to you to make the most of the many opportunities that we offer. A wide range of undergraduate and postgraduate papers are available to you at Massey University. The undergraduate papers offered in the Microbiology major are detailed in this booklet. They underpin a wide range of disciplines, from plant and animal physiology, biological chemistry, molecular biology, genetics, health science, human and animal nutrition, to pure microbiology itself.

A degree in Microbiology will enable you to have a career in research, teaching or the many biology-based industries as diverse as forensic science, molecular diagnostics, and biotechnology. This degree will also enable you to embark on post-graduate studies.

I welcome your interest in Microbiology and I hope that you will find your studies with the Massey University staff interesting, useful and enjoyable.



Professor Bernd Rehm
Subject Leader
Institute of Molecular BioSciences

Introduction

This handbook profiles papers that are of special interest to Microbiology students, and are taught by the College of Sciences. We have made every attempt to ensure all details are correct. However, all students should note that the 2008 Massey University Calendar is the official source of information on courses and regulations.

The discipline of Microbiology at Massey University consists of academic and technical staff members across several Institutes in the College of Sciences. Interests range from basic, applied and medical microbiology, implementing studies on gene function, enzymology, molecular genetics, molecular biology, pathogenicity, biofilms, biotechnology and evolution.

Staff in Microbiology provide postgraduate opportunities with, for example, PGDipSc, Honours, Masters and PhD programmes available. Undergraduate students are eligible to apply for summer studentships that may be offered on an annual basis.

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NEW ZEALAND

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Teaching approach

Undergraduate papers are taught via lectures (usually 3 lectures per week) and laboratory classes (usually one 3 hour class per week). Optional tutorials are offered at set times. Students are expected to spend some time in addition to the scheduled learning in reading and preparing for lectures and practical classes. Many papers are web supported. A comprehensive paper outline will be made available to enrolled students at the start of each paper.

The Bachelor of Science degree

Students have to pass 24 (15 credit) papers in total to qualify for a BSc degree. Typically, eight papers have to be passed each year from papers listed in the BSc schedule in the Calendar. Students should ensure that the essential required papers for each major are included in their programme.

In planning your total degree, you can consult the 'Enrolment Science 2009' Handbook, the 2009 Massey University Calendar, or contact Prof. Bernd Rehm (contact details p. 5).

More Information

Students who intend to take papers offered in Microbiology and who may wish for more information, should consult the major leader of Microbiology, Prof Bernd Rehm. Assoc Professor Kathy Kitson is the Programme Director for the College of Sciences at the Palmerston North Campus and will also provide information of a more general nature.

Year 1:

Year 2:

Year 3:

- 162.101 Biology of Cells S1
- 123.101 Chemistry & Living Systems S1
- 119.155 Communication S1/2
- 161.130 Biometrics S2
- 122.102 Biochemistry of Cells S2

120.101 Biology of Plants S2

Paper Pathway for BSc Microbiology

Papers that prepare you for careers in

- : Environmental Microbiology
- : Industrial&Food Microbiology
- : Molecular Microbiology
- : Medical Microbiology

162.211 Biology & Genetics of Microorganisms S1

162.212 The Microbial World S2

162.283 Medical Microbiology S2
Highly recommended

202.251 Epidemiology in Human Populations S1

122.231 Genes & Gene Expression S1

171.284 Understanding Plant Protection S1

S2 162.312 Molecular Microbiology

S1 162.305 Food Microbiology

S2 162.304 Environmental Microbiology

S2 162.307 Microbial Biotechnology

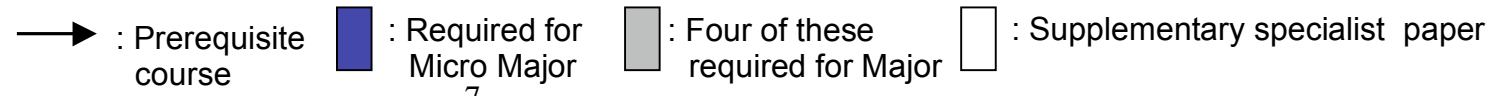
S1 162.301 Advanced Medical Microbiology

S1 162.303 Immunology

S1 203.300 DNA Technology

S2 171.387 Controlling Plant Pests & Diseases

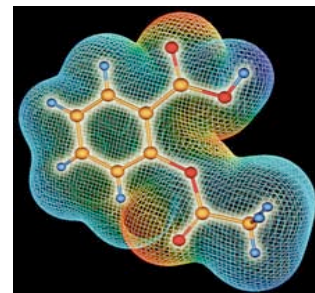
S1 138.346 Water & Wastes



YEAR ONE -Semester 1

123.101

Chemistry and Living Systems



Paper Coordinator: Associate Professor Trevor Kitson

Objective: To give an understanding of the molecular basis of the world in which we live and be able to apply organic and physical principles to a range of biological and non-biological processes.

Outline: This paper takes a wide range of examples from everyday life to illustrate concepts of organic and biological chemistry. The structure, properties and reactions of organic compounds, identification of organic compounds using spectroscopy, and the mechanisms of organic reactions are covered. It also introduces the concepts of chemical equilibrium, particularly as they are applied to acids and base, and chemical kinetics.

Pre-requisites: Students will be assumed to have studied at least 20 credits from NCEA Level 3 Chemistry and achieved at least 14, or passed Bursary Chemistry or 123.103 or an acceptable alternative.

Extramural: Available extramurally in 2008

Assessment:

Practical work	20%
Mastery Tests	10%
Semester Test	20%
Final Examination	50%

Textbook: No prescribed textbook. Recommended reading TBA

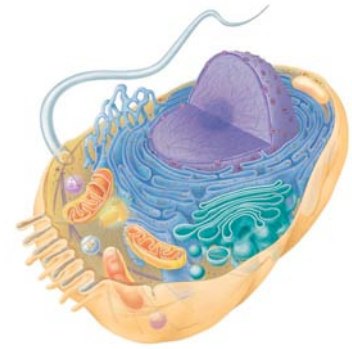
Lecturers: Associate Professor Trevor Kitson, Institute of Fundamental Sciences
Dr. Gareth Rowlands, Institute of Fundamental Sciences
Dr Viatcheslav Filitchev, Institute of Fundamental Sciences

YEAR ONE - Semester 1

162.101 **Biology of Cells**

Paper Co-ordinator: Dr Rosie Bradshaw

Objective: To give a general understanding of the structure and function, at a cellular level, of both eukaryotic and prokaryotic cells, and a broad introduction to genetics and molecular biology.



Outline: An introduction to eukaryotic and prokaryotic cell structure and function, and to the flow of information within cells. The transmission of genetic information to progeny in cell division. A description of cellular mechanisms for creating genetic diversity, leading to a discussion of biological evolution. An introduction to molecular biotechnologies for modifying the genetic information of cells.

Pre- requisites: Students will be assumed to have studied at least 20 credits from NCEA Level 3 Biology and achieved at least 14, or passed Bursary Biology or 162.103 or an acceptable alternative.

Extramural: Available extramurally in 2008.

Assessment:

Laboratory Test	20%
Semester Test	20%
5 lab-based quizzes	5%
Final Examination	55%

Textbook: Campbell NA & Reece JB. Biology. 7thEdition (2005) with Interactive Study Partner CD-ROM (ISBN 0-8053-7166-4).

Lecturers: Dr Rosie Bradshaw, Institute of Molecular BioSciences
Dr Rose Motion, Institute of Molecular BioSciences

YEAR ONE - Semester 2

120.101 **Biology of Plants**

Paper Co-ordinator: Professor Michael McManus

Objective: To provide students with a basic understanding of plant structure, function, development and diversity and how these may be manipulated by plant biotechnology.



Outline: An integrated study of the structure, function and diversity of plants. Topics include: anatomy and morphology; maintenance of the organism (nutrition, photosynthesis, respiration and transport); growth and development; co-ordination and regulation of growth; effects of environment on growth and development; reproduction; floral biology; plant systematics and plant diversity; plant breeding, biotechnology and genetic engineering.

Pre-requisites: There are no pre- and co-requisites.

Extramural: Not available extramurally in 2008

Assessment:

Laboratory tests	20%
Semester test	20%
Final examination	60%

Textbook: Campbell NA & Reece JB. Biology. 7th Edition (2005) with Interactive Study Partner CD-ROM (ISBN 0-8053-7166-4).
Recommended reading: Raven PH, Evert RF, Eichhorn SE: Biology of Plants. WH Freeman & Company, 7th ed. 2005.

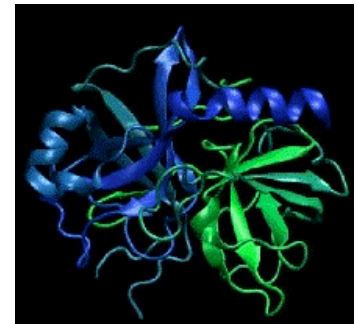
Lecturers: Dr Gabriele Schmidt-Adam, Institute of Molecular BioSciences
Professor Errol Hewett, Institute of Food, Nutrition and Human Health
Prof Michael McManus, Institute of Molecular BioSciences

YEAR ONE - Semester 2

122.102 **Biochemistry of Cells**

Paper Co-ordinator: Assoc Professor Michael Hardman

Objective: To understand at a molecular level, how organisms grow, move, store energy, reproduce, and achieve highly specialized functions such as photosynthesis and muscle contraction.



Outline: The study of cellular processes at a molecular level, applicable to plant, animal and microbial systems: proteins, including enzymes; major processes of carbohydrate metabolism; the importance of ATP and proton gradients in metabolism. Applications of Biochemistry in Medicine and Biotechnology are included.

Pre-requisites: 123.101 (or 123.111) and 162.101.

Extramural: Not available extramurally

Assessment: Laboratory tests 20%
Semester test 20%
Final examination 60%

Textbook: Elliott, W.H. and Elliott, D.C. Biochemistry and Molecular Biology, 3rd edition (2005), , Oxford University Press, Oxford

Lecturers: Assoc Prof Michael Hardman, Institute of Molecular BioSciences
Assoc Prof Kathy Kitson, Institute of Food Nutrition and Human Health
Ms Donna Murray, Institute of Molecular BioSciences
Dr Rose Motion, Institute of Molecular BioSciences

YEAR TWO - Semester 1

122.231

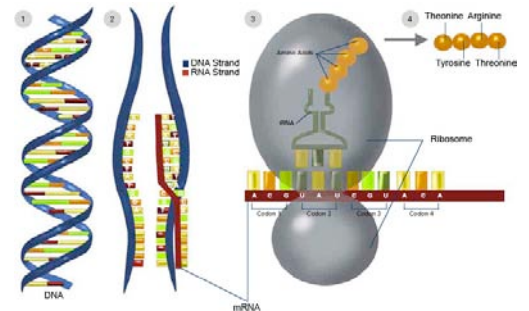
Genes and Gene Expression

Paper Co-ordinator:

Dr Kathryn Stowell

Objective:

To understand the *in vivo* functions and *in vitro* molecular manipulation of DNA for the storage and transfer of genetic information.



Outline:

Structure of DNA. Replication, DNA repair and transcription. Regulation of prokaryote gene expression. Technologies used in the study of genes and gene expression: plasmids, sequencing, restriction enzymes, libraries, PCR, Southern, northern and western analysis, expression vectors and the production of recombinant proteins. A practical course that illustrates concepts presented in the lectures.

Pre-requisites:

162.101 Biology of Cells

Extramural:

Not available extramurally.

Assessment:

Laboratory work	25%
Semester test	15%
Final examination	60%

Textbook:

Weaver, R.F. Molecular Biology. 4th edition, (2008), McGraw-Hill, New York

Lecturers:

Dr Kathryn Stowell, Institute of Molecular BioSciences
Dr Andrew Sutherland-Smith, Institute of Molecular BioSciences
Assoc Professor John Tweedie, Institute of Molecular BioSciences

YEAR TWO - Semester 1

162.211 **Biology and Genetics of Microorganisms**

Paper Co-ordinator: Dr Jan Schmid

Objective: To provide students with the core information required for their respective disciplines on (i) the biology of microorganisms and (ii) their manipulation. To provide a basic understanding of immunology.



Outline: Structure and metabolism of bacteria and their relationship to the environment. Bacterial genetics. Eukaryotic microbes – structure, physiology and genetics. Life cycle of viruses. The immune response. Practical training in the manipulation of microorganisms.

Pre-requisites: 162.101

Extramural: Not available extramurally.

Assessment: Internal Assessment 50%
Final Examination 50%

Textbook: Brock Biology of Microorganisms by Madigan & Martinko, Prentice Hall 11th Edition (2006).

Lecturers: Dr Jan Schmid, Institute of Molecular BioSciences
Dr Zoe Jordens, Institute of Molecular BioSciences (Labs only)
Professor Bernd Rehm, Institute of Molecular BioSciences
Dr Laryssa Howe, Institute of Veterinary Animal and Biomedical Sciences

YEAR TWO - Semester 1

171.284

Understanding Plant Protection



Paper Co-ordinator: Dr Terry Stewart

Objective: Grounding in fundamental principles of disciplines of plant pathology, entomology and weed science.

Outline: Importance of diseases, pests and weeds in horticultural, agricultural and forestry production. Introducing biology of organisms and understanding their management and control. Introduction to strategies available for chemical, non-chemical and integrated control methods.

Pre-requisites: 120.101 or 171.102

Extramural: Available extramurally.

Assessment:

Collection Assessment	20%
Laboratory Work	10%
Final Examination	70%

Textbook: Readings: No set textbook (CD-ROM provided)

Lecturers: Dr Terry Stewart, Institute of Natural Resources, Massey University
Dr Kerry Harrington, INR, Massey University
Professor Qiao Wang, INR, Massey University

YEAR TWO - Semester 1

205.251 Principles of Epidemiology in Human Populations

Paper Co-ordinator: Ms Jackie Benschop

Objective: Extended background to principles and methods of epidemiology.

Outline: History and scope of epidemiology; definitions of health and disease; causation; concepts of measurement of disease in populations; interpretation of diagnostic tests; observational studies and randomised clinical trials; epidemiology and public health; food-borne disease and zoonoses; epidemiology and health care planning.

Pre-requisites: Any 100-level paper from the BMLSc or BSc Schedule

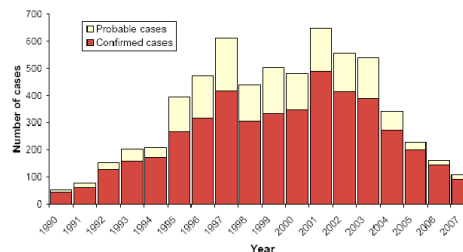
Extramural: Not available extramurally.

Assessment:	Assignment 1	20%
	Assignment 2	20%
	Final Examination	60%

Textbook: No set textbook

Lecturers: Ms Jackie Benschop, Epicentre, IVABS, Massey University
Assoc Professor Cord Heuer, Epicentre, IVABS, Massey University
Dr Naomi Cogger, Epicentre, IVABS, Massey University
Assoc Professor Mark Stevenson, Epicentre, IVABS, Massey University

Figure 22. Meningococcal disease notifications by year, 1990 - 2007



YEAR TWO - Semester 2

162.212 **The Microbial World**

Paper Co-ordinator: Dr Zoe Jordens

Objective: To discuss microbial diversity and its relationship to environment in *Bacteria* and *Archaea*.

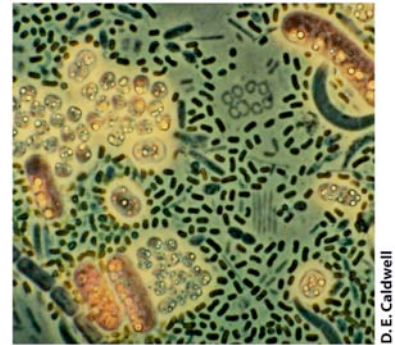


Figure 2.10a Brock Biology of Microorganisms 11/e
© 2006 Pearson Prentice Hall, Inc.

D. E. Caldwell

Outline: The study of diversity of microorganisms and microbial environments. Microbial cell structures and metabolism in relation to environmental niches and molecular mechanisms for responding to environmental change.

Pre-requisites: 162.101 Biology of Cells
162.211 Biology and Genetics of Microorganisms or
196.213 Microbial Ecology

Extramural: Not available extramurally.

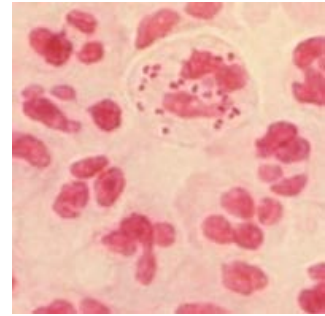
Assessment: Laboratory assessment 25%
Literature assignment 5%
Semester Test 20%
Final Examination 50%

Textbook: Recommended text: Brock, Biology of Microorganisms, Madigan & Martinko, Prentice Hall, 11th Edition 2006.
Molecular Genetics of Bacteria, Snyder & Champness, 2003.

Lecturers: Dr Zoe Jordens, Institute of Molecular BioSciences
Dr Mark Patchett, Institute of Molecular BioSciences

YEAR TWO - Semester 2

162.283 Medical Microbiology



Paper Co-ordinator: Assoc Professor Mary Nulsen

Objective: Covers the major concepts of sterilisation and disinfection, how bacteria and fungi cause disease in humans and how they can be identified in the laboratory. Pathogenesis of selected bacterial and fungal species dealt with in more details.

Outline: Introduction to general principles of host-pathogen interaction for some major groups of bacteria and fungi pathogenic for humans. Detection of pathogens in clinical specimens. Sterilisation, disinfection and control of microbial growth. Microbiological safety. Antimicrobial agents, resistance to antimicrobial agent and antimicrobial susceptibility testings

Pre-requisites: 162.211

Restrictions: 162.281

Extramural: Not available extramurally.

Assessment:	Essay	10%
	Written Practical	10%
	Oral Practical	10%
	Semester Test	10%
	Final Examination	60%

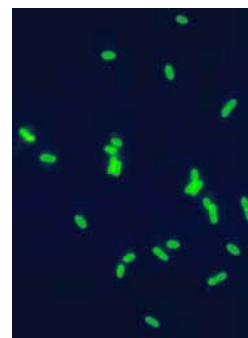
Textbook: **Recommended:** Medically Important Fungi (2002) by Larone, 4th ed
Medical Microbiology (2005) by Murray, Pfaller and Tenover.
Mim's Medical Microbiology (2007) by Goering, Dockrell, Zuckerman and Wakelin 4th ed. Mosby.
Jawetz, Melnick & Adelberg's Medical Microbiology (2007) by Brooks, Butel and Morse, 24th ed. Lange.
Manual of Clinical Microbiology (2007) by Murray et al, 9th ed. ASM.
Brock Biology of Microorganisms (2006) by Madigan et al 11th ed.

Study Guides: Mycology Lecture Notes & Bacteriology Lecture Notes

Lecturers: Assoc Professor Mary Nulsen IVABS, Massey University
Dr Eve Pleydell, IVABS, Massey University

YEAR THREE – Semester 1

162.301 **Advanced Medical Microbiology**



Paper Co-ordinator: Assoc Professor Mary Nulsen

Objective: Covers many of the major bacterial pathogens, the general properties of viruses and some of the major viral pathogen of humans. An understanding of the properties of these organisms and how they cause disease, applying this knowledge to diagnosis of infectious diseases and research into the pathogenesis.

Outline: Some major bacterial pathogens of humans in terms of the organisms, their habitats, modes of transmission, disease patterns and laboratory diagnosis. The structure, classification, propagation, assay and transmission of some of the major viruses of humans. Immunity to viruses and the laboratory diagnosis of viral infections.

Pre-requisites: 162.211, 162.212 or 162.283, 122.102

Restrictions: 162.384, 162.381, 162.302

Extramural: Not available extramurally.

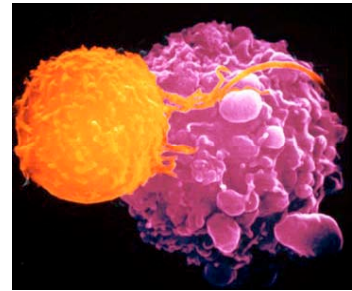
Assessment:	Bacteriology or Virology Essay	10%
	Written Practical Exam	10%
	Oral Practical Exam	10%
	Semester Test	10%
	Final Examination	60%

Textbook: **Recommended:** Medical Microbiology (2005) by Murray, Pfaller and Rosenthal.
Mim's Medical Microbiology (2007) by Goering, Dockrell, Zuckerman and Wakelin 4th ed. Mosby.
Jawetz, Melnick & Adelberg's Medical Microbiology (2007) by Brooks, Butel and Morse, 24th ed. Lange.
Medical Virology (1994) by White and Fenner 4th ed. Academic Press
Human Virology (2000) by Collier and Oxford, 2nd ed. Oxford University Press.
Viruses and Human Disease by Strauss & Straus (2002) ISBN 0-12-673050-4
Manual of Clinical Microbiology (2007) by Murray et al, 9th ed. ASM.

Lecturers: Assoc Professor Mary Nulsen, IVABS Massey University
Dr Laryssa Howe, IVABS Massey University

YEAR THREE – Semester 1

162.303 **Immunology**



Paper Co-ordinator: Assoc Professor Alan Murray

Objective: Basic understanding of the mammalian immune system in health and disease and it's role in protecting us from pathogens. Show how immunologically based tests/techniques can be used for diagnosis and research.

Outline: Principles of immunology including innate immunity, cell and antibody mediated immunity, major histocompatibility complex, hypersensitivities, immunodeficiency and autoimmunity. Introduction to vaccines, clinical immunology and immunological laboratory tests.

Pre-requisites: 162.101

Restrictions: 162.302, 162.381 & 162.389

Extramural: Not available extramurally

Assessment:

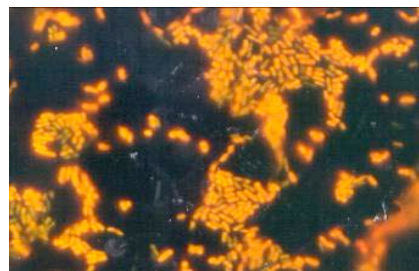
Practical Exam	10%
Mid-term Test	20%
Final Examination	70%

Textbook: Kuby Immunology 6th Edition

Lecturers: Assoc Professor Alan Murray, IVABS, Massey University

YEAR THREE – Semester 1

162.305 Food Microbiology



Paper Co-ordinator: Assoc Prof Steve Flint

Objective: To provide an understanding and practical skills in the growth, analysis and control of microorganisms of economic and public health significance in foods and food processing facilities.

Outline: Interaction of micro-organisms of spoilage and public health significance, industrial hygiene and food preservation techniques. Conventional and alternative methods for detection, identification and enumeration of microbial populations in food. Hazard analysis and formulation of a food safety programme.

Pre-requisites: 162.211, 162.212

Extramural: Not available extramurally.

Assessment:

Literature Review on specified topic	15%	
Microorganism Identification Laboratory report	15%	
Practical work logbook		10%
HACCP Group Project	15%	
Food Poisoning Report	5%	
There will be a 2-hour open book final examination on the topics of Foodborne disease and its prevention, and on Predictive Microbiology	40%	

Textbook: Modern Food Microbiology, 7th Edition (2005) by James M. Jay, Martin J. Loessner and David A. Golden, Springer Science and Business Media Inc. USA.

Lecturers: Assoc Prof Steve Flint, Institute of Food, Nutrition and Human Health
Dr Owen McCarthy, Institute of Food, Nutrition and Human Health
Dr Tony Mutukumira, Institute of Food, Nutrition and Human Health
Mr Jon Palmer, Institute of Food, Nutrition and Human Health

YEAR THREE – Semester 1

138.346 Water and Wastes

Paper Co-ordinator: Professor Andy Shilton

Objective: Understand key aspects of hydrology, describe the requirements and limitation of water supply systems and understand general processes available for water treatment and wastewater treatment.



Outline: An introduction to hydrology, water quality characteristics, drinking water treatment and pump/pipeline systems. An overview of waste management strategies. An examination of wastewater treatment technologies including physical, biological and natural treatment systems. An introduction to solid waste and hazardous waste management.

Pre-requisites: Any 200 level paper

Extramural: Available extramurally in 2008.

Assessment:	Assignments (2)	40%
	Final Examination	60%

Textbook: No set textbooks

Lecturers: Professor Andy Shilton, School of Electronics and Technology, Massey University
Dr Jim Hargreaves, SEAT, Massey University
Nicola Powell, SEAT, Massey University

YEAR THREE – Semester 1

203.300 DNA Technology

Paper Co-ordinator: Dr Jasna Rakonjac



Objective: To provide students with (1) the background of the methodology for DNA manipulations, (2) the necessary skills to plan and carry out DNA technology experiments and (3) the background to critically evaluate data from experiments using DNA technology.

Outline: DNA structure, topology, replication, repair and recombination. Advanced applications of gene cloning, PCR, micro-arrays and gene targeting. Practical experience will be gained with DNA quantification, restriction mapping, hybridisation, molecular cloning, PCR, DNA sequencing and computer analysis.

Pre-requisites: 122.231 Genes and Gene expression

Extramural: Not available extramurally in 2008

Assessment:	Laboratory work	10%
	Laboratory test	15%
	Semester Test	15%
	Final Examination	60%

Textbook: Molecular Biology. Weaver. 2nd edition, (2002), McGraw-Hill, New York

Lecturers: Dr Jasna Rakonjac Institute of Molecular BioSciences
Dr Kathryn Stowell, Institute of Molecular BioSciences
Dr Rosie Bradshaw, Institute of Molecular BioSciences
Dr Neville Honey, Institute of Molecular BioSciences
Dr Lesley Collins, Institute of Molecular BioSciences

YEAR THREE – Semester 2

162.304

Environmental Microbiology
(Not being offered in 2009)



Paper Co-ordinator: TBA

Objective: Expansion of environmental microbiology encountered in 200 level. Microbiology in areas of soil, water, wastewater, wildlife management, rumen and aerobiology. Develop proficiency in analysing dynamic microbial and environmental processes.

Outline: Actions and interactions of microorganisms in water, soil, air and ruminant and consequences of colonisation processes

Pre-requisites: 162.211 or 141.222/162.213/196.213, 162.212

Extramural: Not available extramurally.

Assessment:	Laboratory Practical	Waste & Water	20%
		Air/Soil	5%
		Ruminants	5%
	Final Examination		70%

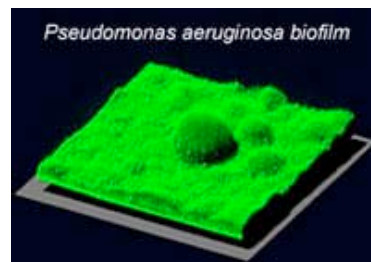
Textbook: Maier, R.M., Pepper, I.L., and Gerba, C.P. 2000 Environmental Microbiology, Academic Press. 579.175 Mai

Lecturers: Isabel Castro, INR, Massey University
Graeme Attwood, AgResearch

YEAR THREE – Semester 2

162.307

Microbial Biotechnology



Paper Co-ordinator: Professor Bernd Rehm

Objective: Molecular mechanisms in respect to application of microorganisms as cell factories for production of valuable compounds and metabolic engineering of biosynthesis. Continuation of topics, metabolism, cell structure, gene regulation and bacterial genomics. Understanding multidisciplinary approaches applied in Microbial Biotechnology and how this can be applied to produce valuable compounds.

Outline: Selected topics in applied microbiology with emphasis on established biotechnological production processes. Multidisciplinary approach required in Microbial and Molecular Biotechnology will be described. An understanding of microbial biosynthesis capacity as well as biotechnological production processes.

Pre-requisites: 122.102, 162.211 (or 141.222), 162.212

Extramural: Not available extramurally.

Assessment:

Laboratory assessment	25%
Semester Test	15%
Final Examination	60%

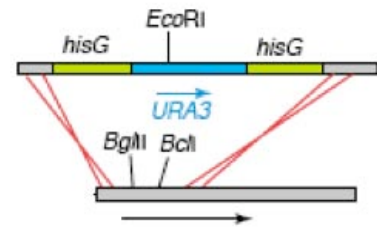
Textbook: Brock Biology of Microorganisms, 11th Edition, Prentice Hall

Lecturers: Professor Bernd Rehm, IMBS, Massey University
Dr Jan Schmid, IMBS, Massey University
Dr Zoe Jordens, IMBS, Massey University
Assoc Professor Steve Flint, IFNHH, Massey University

YEAR THREE – Semester 2

162.312 Molecular Microbiology

Paper Co-ordinator: Dr Jan Schmid



Objective: Answering research questions in microbiology using bacteria, viruses and yeasts as examples. Subject material includes cell structure, surface proteins and adhesins, protein secretion, genetic regulation, bacterial genomics, yeast morphogenesis, and molecular epidemiology. Provide students with an understanding of how molecular techniques have been used productively in these areas.

Outline: Molecular analysis of structure, function and export of bacterial surface proteins. Molecular typing and population dynamics in pathogens. Developmental signals and differentiation in microorganisms. Design, implement and evaluate molecular approaches to a problem in microbiology.

Pre-requisites: 162.211

Extramural: Not available extramurally.

Assessment:	Laboratory Assessment	25%
	Semester Test	15%
	Final Examination	60%

Textbook: Bacterial Pathogenesis: A Molecular approach, Salyers & Whitt (2nd Edition), American Society Microbiology Press 2002

Lecturers: Dr Jan Schmid, IMBS, Massey University
Dr Jasna Rakonjac, IMBS, Massey University
Dr Mike Collett, Fonterra Research Centre

YEAR THREE – Semester 2

171.387

Controlling Plant Pests and Diseases



Paper Co-ordinator: Dr Terry Stewart

Objective: Develop the necessary skills and knowledge to evaluate and develop plant pest and disease management programs, when growing or managing plants.

Outline: Aspects of plant pest and pathogen biology to help understand how to obtain efficient and effective control. Control techniques, both chemical and non-chemical. How to diagnose problems and develop integrated pest and disease control programmes.

Pre-requisites: 171.284 or 171.202

Restrictions: 171.384

Extramural: Available extramurally.

Assessment:	Information Assignment	20%
	Diagnostic Assignment	10%
	Pest and disease Assignment	10%
	Final Examination	60%

Textbook: **Recommended:** Gullan, P.J. & Cranstron, P.S., (2004). The Insects: An Outline of Entomology (3rd Edition). London:Chapman & Hall (soft cover). This is also available online from the Massey Library
Young, S. (ed)., (2008). New Zealand novachem agrichemical manual. Agrimedia Limited, Christchurch
Roy, B., Popay, I., Champion, P., James, T. and Rahman, A. (1998). An illustrated guide to common weeds of New Zealand. NZ Plant Protection Society, Canterbury.
Strange, R.N., (2003). Introduction to Plant Pathology. John Wiley and Sons Inc.

Lecturers: Dr Terry Stewart, INR Massey University
Professor Qiao Wang, INR Massey University

Research

Massey University in Palmerston North has active research programmes carried out by staff and postgraduate students. Here we list only the main areas of interest of academic staff. Students should be aware that summer studentships are available and will be advertised each year. Check on the IMBS website: http://imbs.massey.ac.nz/Teaching/Summer_Fellowships.htm

Research Interests of Academic Staff in Microbiology and Related Disciplines

Bernd Rehm	Microbial biosynthesis of polymers and biosurfactants
Jan Schmid	Cellular and molecular biology of symbiotic and pathogenic microbe-host interactions
Jasna Rakonjac	Molecular biology of bacteriophage/bacteria; phage display
Barry Scott	Gene regulation and expression in plant-microbe interactions
Rosie Bradshaw	Fungal molecular genetics
Zoe Jordens	Molecular epidemiology, medical microbiology and adult education.
Steve Flint	Dairy foods, biofilms in industry
Mary Nulsen	Infectious disease, medical bacteriology, pathogenic bacteria, antibiotic resistance, host defences, human vaccines

General Information

Student Services

Student Services at Massey University Palmerston North provide support to particularly first-year students to successfully integrate into university life and academic study. Check the website to find more out about their role: <http://students.massey.ac.nz/>

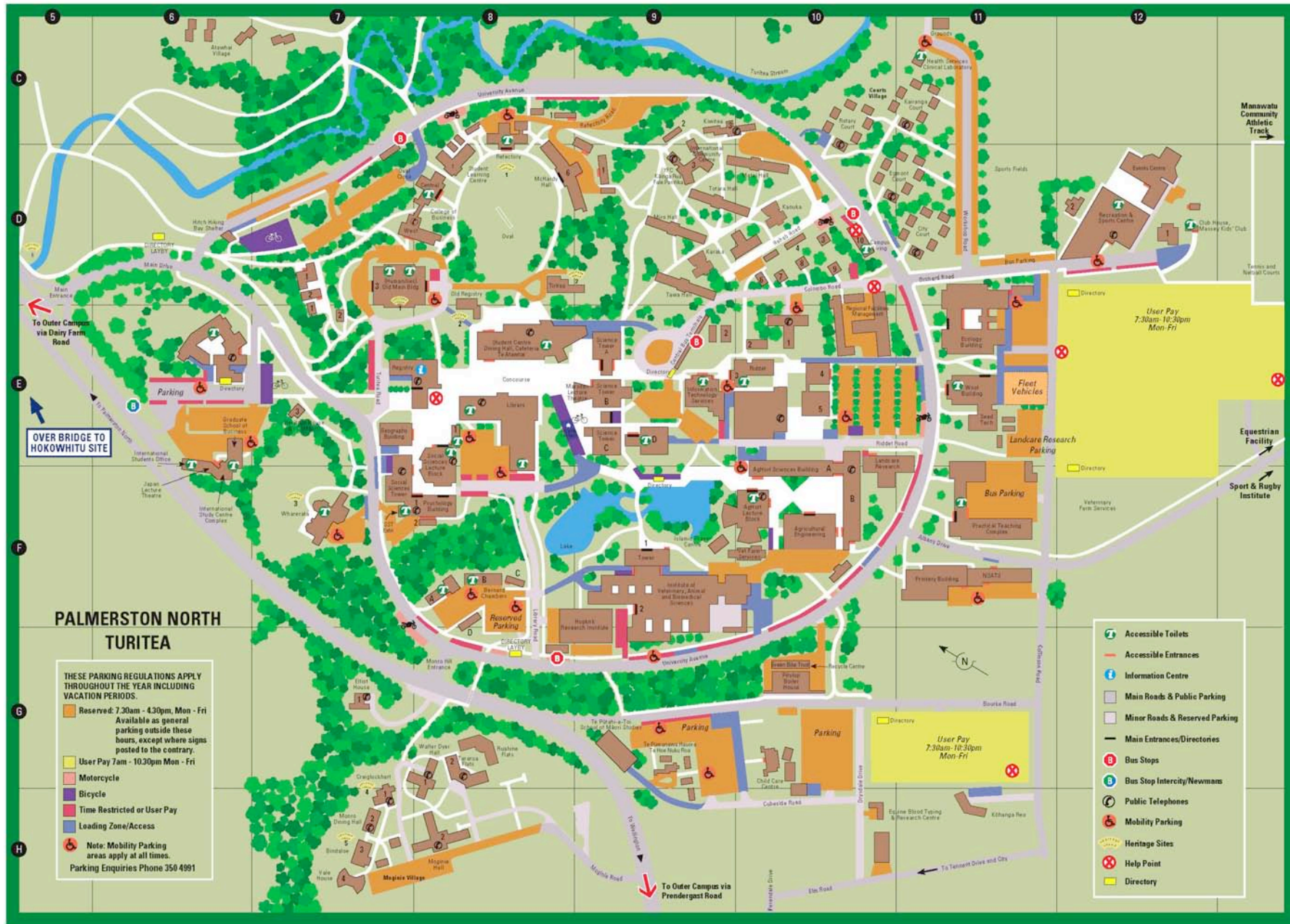
Student Learning Centre

The Student learning Centre offers a whole range of support classes for undergraduate, postgraduate, internal, extramural or international students. For details, please see: <http://learning.massey.ac.nz/>. Students with poor English language skills are advised to include 192.102 (Academic writing for speakers of other languages) in to their degree programme.

Extramural Study

At present it is not possible for students to complete an extramural BSc with a major in Biological Sciences. However, some papers of relevance to Biological Sciences students are offered from time to time. For details, check the 'Enrolment Science 2008' Handbook.

Notes



**PALMERSTON NORTH
TURITEA**

THESE PARKING REGULATIONS APPLY THROUGHOUT THE YEAR INCLUDING VACATION PERIODS.

- Reserved: 7.30am - 4.30pm, Mon - Fri
Available as general parking outside these hours, except where signs posted to the contrary.
- User Pay 7am - 10.30pm Mon - Fri
- Motorcycle
- Bicycle
- Time Restricted or User Pay
- Loading Zone/Access
- Ⓜ Note: Mobility Parking areas apply at all times.
Parking Enquiries Phone 350 4991

- ♿ Accessible Toilets
- Accessible Entrances
- i Information Centre
- Main Roads & Public Parking
- Minor Roads & Reserved Parking
- Main Entrances/Directories
- Bus Stops
- Bus Stop Intercity/Newmans
- ☎ Public Telephones
- ♿ Mobility Parking
- 🏡 Heritage Sites
- Ⓧ Help Point
- Directory

To find information about the BSc programme, majoring requirements for Microbiology and papers offered, the following information is provided on the Massey University website:



Bachelor of Science (BSc)

Bachelor of Science (Microbiology)

Entry Requirements

All students must have a university entrance qualification. Students beginning their study of Microbiology should have a sound background in Chemistry and Biology at NCEA Level 3.

However, if you do not have a background of chemistry at the Year 13 level then you can take [123.103](#) Introductory Chemistry extramurally through Massey University over the summer before your first year of full-time study. This paper will introduce you to basic chemical vocabulary and provides training in the important chemical principles. You do need to already have a university entrance qualification or to expect to obtain one by sitting NCEA Level 3 at the end of this year. If you are interested in this suggestion get in touch with one of the contact people. Similarly, if you have not done NCEA Level 3 Biology you can take [162.103](#) Introductory Biology over the summer.

In their first year students intending to major in Microbiology should take [123.101](#) and [162.101](#) in Semester One and [122.102](#) in Semester Two. In addition students should also take papers in other biological sciences.

For general Massey University entry requirements see [Am I Eligible to Study at Massey?](#)

Bachelor of Science (Microbiology) Structure

Microorganisms are by far the most abundant and widely distributed forms of life on this planet. They are indispensable parts of the global and local ecosystems. Without their continuing support, all animal and plant life on the planet would be rapidly driven to extinction. Microorganisms also play crucial roles not only in human health but also in many New Zealand key industries such as agriculture, horticulture and biotechnology. The microbiology curriculum will equip students with the expertise necessary to investigate and control microbial activities.

Majoring Requirements

[123.101](#) Chemistry and Living Systems,
[162.101](#) Biology of Cells,
[122.102](#) Biochemistry of Cells;
[162.211](#) Biology and Genetics of Microorganisms,
[162.212](#) The Microbial World,
[122.231](#) Genes and Gene Expression;
[203.300](#) DNA Technology

plus four of

[162.301](#) Advanced Medical Microbiology,
[162.303](#) Immunology,
[162.304](#) Environmental Microbiology,
[162.305](#) Food Microbiology,
[162.307](#) Microbial Biotechnology,
[162.312](#) Molecular Microbiology.

Microbiology majors are strongly advised to take 162.283 Medical Microbiology