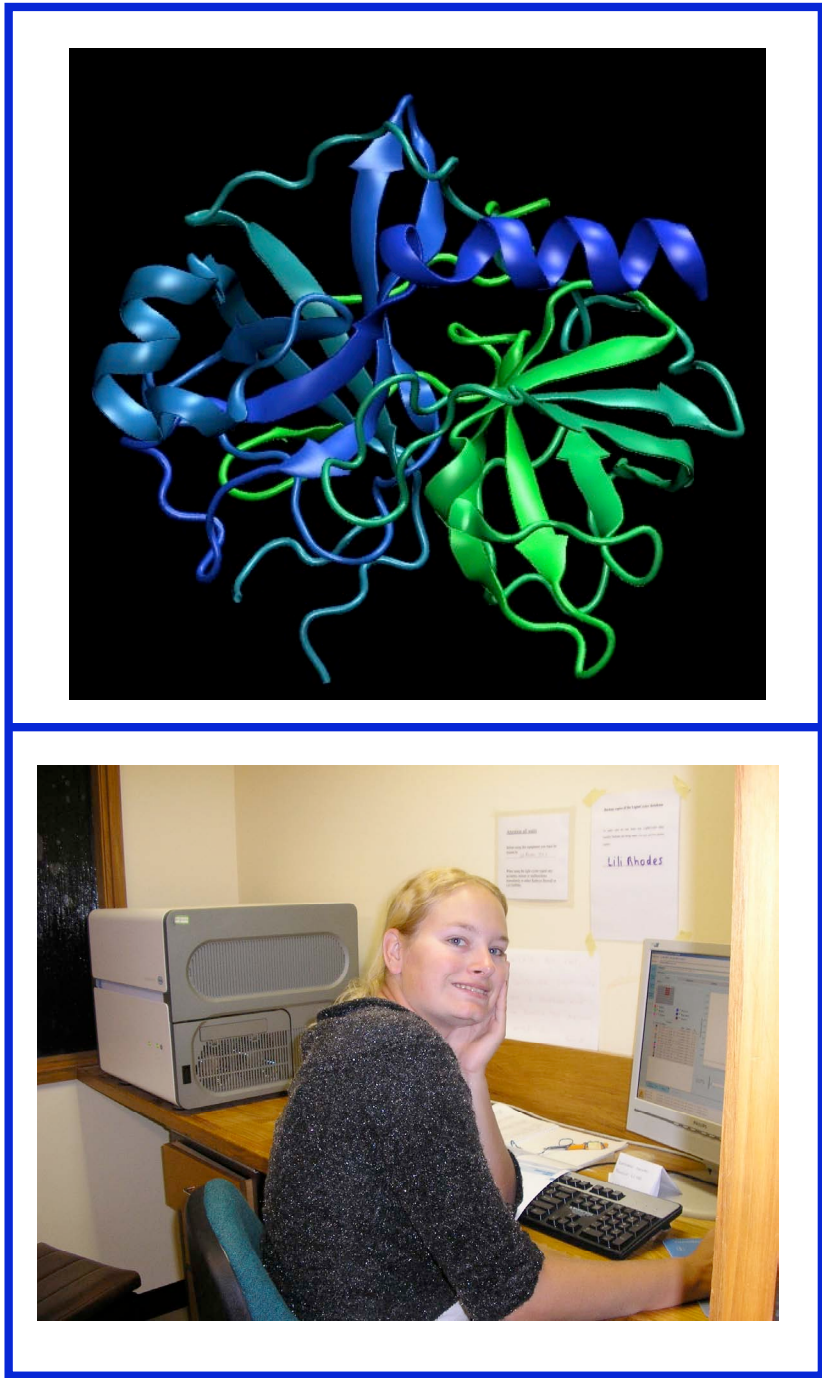


Bachelor of Science Biochemistry

Undergraduate Handbook 2009



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WELCOME

COLLEGE OF SCIENCES

Biochemistry 2009

To all prospective students,

This is an exciting time to be a biochemistry student. The world around us is rapidly changing. The new technologies for working with proteins and metabolic networks 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.

Biochemists want to know how biological processes 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 Biochemistry 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 biochemistry itself.

A degree in Biochemistry 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 Biochemistry and I hope that you will find your studies with the Massey University staff interesting, useful and enjoyable.



A handwritten signature in black ink that reads "K M Stowell".

Associate Professor Kathryn M Stowell (PhD)
Subject Leader
Institute of Molecular BioSciences

Introduction

This handbook profiles papers that are of special interest to Biochemistry 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 2009 Massey University Calendar is the official source of information on courses and regulations.

The discipline of Biochemistry at Massey University consists of six academic staff members. In addition, the group is well supported by several technical and administrative staff. Interests range from protein structure and function, zymology, molecular genetics, molecular biology, cancer genetics, biotechnology, cell biology, and biochemistry to evolution.

Staff in Biochemistry 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.

Teaching approach

Undergraduate papers are taught via lectures (usually 3 lectures per week at 100 & 200 level and 2 lectures per week at 300 level) 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 Associate Professor Kathryn Stowell (contact details p. 7).

Bachelor of Sciences – Major in Biochemistry

Programme Structure

| Year 1 | |
|--|------------------------------|
| 123.101 | Chemistry and Living Systems |
| 162.101 | Biology of Cells |
| 119.155 | Communication in Sciences |
| 122.102 | Biochemistry of Cells |
| 161.130 | Biometrics |
| PLUS two other approved papers | |
| 123.102 Chemistry and the Material World is highly recommended | |

| Year 2 | Year 2 | Year 2 |
|---|---|---|
| OPTION ONE | OPTION TWO | OPTION THREE |
| 122.231 Genes and Gene Expression | 122.231 Genes and Gene Expression | 122.231 Genes and Gene Expression |
| 122.233 Metabolic Biochemistry | 122.232 Protein Biochemistry | 122.232 Protein Biochemistry |
| 162.211 Biology and Genetics of Microorganisms | 122.233 Metabolic Biochemistry | 122.233 Metabolic Biochemistry |
| 122.232 Protein Biochemistry | 123.204 Chemical and Biochemical Analysis | |
| PLUS four other approved papers. | PLUS four other approved papers | PLUS five other approved papers |
| For a list of approved other papers, see p28 | For a list of approved other papers, see p28 | For a list of approved other papers, see p28 |

| Year 3 | Year 3 | Year 3 |
|---|---|---|
| OPTION ONE | OPTION TWO | OPTION THREE |
| 122.322 Protein Structure and Function | 122.322 Protein Structure and Function | 122.322 Protein Structure and Function |
| 203.300 DNA Technology | 122.327 Advanced Biochemistry | 122.327 Advanced Biochemistry |
| 203.303 Gene Regulation | 203.300 DNA Technology | 203.300 DNA Technology |
| 203.307 Advanced Cell Biology OR | 203.303 Gene Regulation | 203.203 Gene Regulation |
| 122.327 Advanced Biochemistry | 123.312 Advanced Organic Chemistry OR | 203.307 Advanced Cell Biology |
| | 203.307 Advanced Cell Biology | |
| PLUS three other approved papers. | PLUS three other approved papers. | PLUS three other approved papers. |
| For a list of approved other papers, see p28 | For a list of approved other papers, see p28 | For a list of approved other papers, see p28 |

Contact details:

Associate Professor Kathryn Stowell
Major Leader Biochemistry
Massey University
Private Bag 11 222
Palmerston North
NEW ZEALAND

Phone: 64 6 356 9099 ext 7517

Fax: 64 6 350 5688

Email: K.M.Stowell@massey.ac.nz

More Information

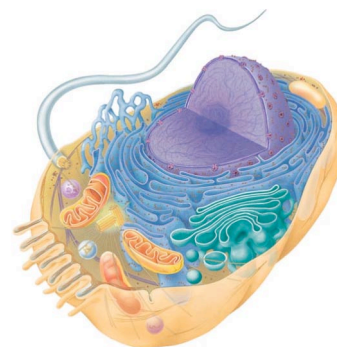
Students who intend to take papers offered in Biochemistry and who may wish for more information, should consult the major leader of Biochemistry, Associate Professor Kathryn Stowell. Assoc Professor Kathy Kitson is the Programme Director for the College of Sciences at the Manawatu Campus and can also provide information of a more general nature.

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: Not available extramurally in 2009.

| | | |
|--------------------|---------------------|-----|
| Assessment: | Laboratory Test | 20% |
| | Semester Test | 18% |
| | 5 lab-based quizzes | 7% |
| | Final Examination | 55% |

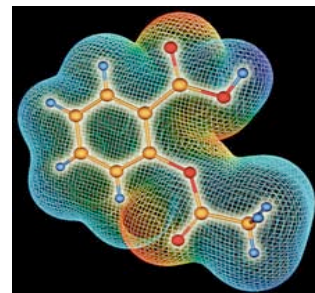
Textbook: Campbell NA & Reece JB. Biology. 8th Edition (2009) with Interactive Study Partner CD-ROM (ISBN 0-8053-6844-2). The 7th edition can also be used in 2009

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

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 2009

Assessment:

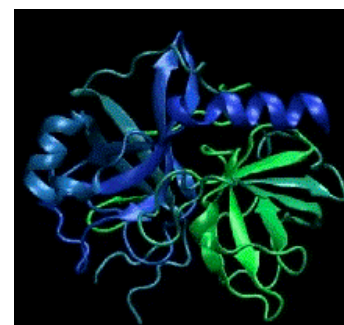
| | |
|-------------------|-----|
| Practical work | 20% |
| Mastery Tests | 10% |
| Semester Test | 20% |
| Final Examination | 50% |

Textbook: No prescribed textbook. Recommended reading TBA

Lecturers: Associate Professor Trevor Kitson, Institute of Fundamental Sciences
Dr. Gareth Rowlands, Institute of Fundamental Sciences
Dr Vyacheslav Filichev, Institute of Fundamental Sciences

YEAR ONE - Semester 2

122.102 **Biochemistry of Cells**



Paper Co-ordinator: Assoc Professor Kathryn Stowell

Objective: To understand at a molecular level of 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 in 2008

Assessment:

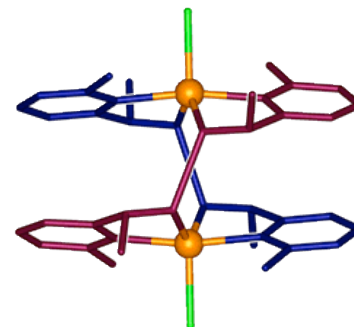
| | |
|-------------------|-----|
| Laboratory tests | 20% |
| Semester test | 20% |
| Final examination | 60% |

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

Lecturers: Dr Gill Norris, Institute of Molecular BioSciences
Assoc Prof Kathy Kitson, Institute of Food Nutrition and Human Health
Dr Rose Motion, Institute of Molecular BioSciences

YEAR ONE - Semester 2

123.102 **Chemistry and the Material World**



Paper Co-ordinator: Dr Mark Waterland

Objective: To understand the structure and chemical properties of compounds and materials.

Outline: Explain the structure and chemical properties of compounds and materials; Use electronic properties to explain trends in the chemistry of materials from elements and compounds; Explain colour, magnetism and chemical properties; Analyse chemical reactions; Calculate the electrochemical potential of cells; Use phase diagrams;

Pre-requisites: NCEA Level 3 Chemistry, studied 20 credits achieved 14 credits minimum, or Bursary Chemistry, or 123.103.

Extramural: Available extramurally in 2009

| | | |
|--------------------|-------------------|-----|
| Assessment: | Mastery tests | 10% |
| | Semester test | 20% |
| | Practical test | 10% |
| | Lab reports | 10% |
| | Final examination | 50% |

Textbook: Highly Recommended: Chemistry, by Blackman, Bottle, Schmid, Mocerino, Wille

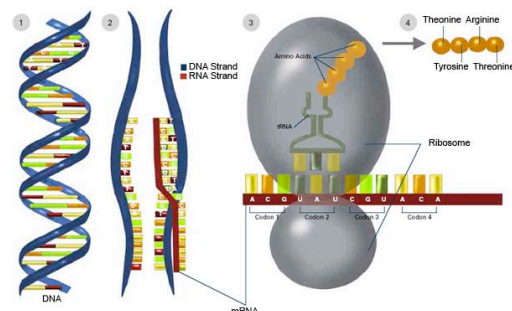
Lecturers: Dr Shane Telfer, Institute of Fundamental Sciences
Assoc Prof Ashton Partridge, Institute of Fundamental Sciences
Prof Andrew Brodie, Institute of Fundamental Sciences
Dr Mark Waterland, Institute of Fundamental Sciences
Assoc. Prof Simon Hall, Institute of Fundamental Sciences
Adrian Jull, Institute of Fundamental Sciences

YEAR TWO - Semester 1

122.231 Genes and Gene Expression

Paper Co-ordinator: Assoc Prof 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 | 30% |
| Semester test | 10% |
| Final examination | 60% |

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

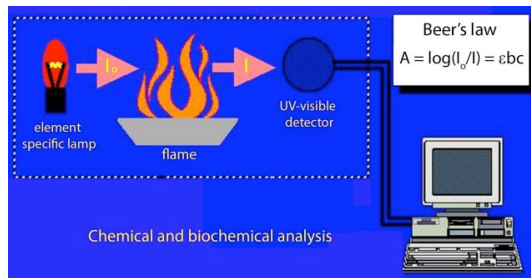
Lecturers: Assoc Professor Kathryn Stowell, Institute of Molecular BioSciences
 Dr Andrew Sutherland-Smith, Institute of Molecular BioSciences
 Professor Barry Scott, Institute of Molecular BioSciences

YEAR TWO - Semester 1

123.204 Chemical and Biochemical Analysis

Paper Co-ordinator: Dr Paul Plieger

Objective: Underlying concepts and practical methodologies used for analysis of chemical and biochemical compounds.



Analyses using a range of spectroscopic and other laboratory techniques. Methods for separating target analytes from samples to be introduced.

Outline: Gain an understanding of the fundamentals of gravimetric and titrimetric analysis and of spectroscopy. Ways in which spectroscopic and other techniques can be used in identification and measurement of elements and chemical and biochemical compounds.

Pre-requisites: 122.101 Chemistry and Living Systems or 123.102 Chemistry and the Material World. A good pass in 123.103, Introductory Chemistry, may be acceptable.

Extramural: Not available extramurally.

| | | |
|--------------------|--------------------|-----|
| Assessment: | Assignment | 10% |
| | Laboratory Reports | 20% |
| | Laboratory Test | 10% |
| | Final Examination | 60% |

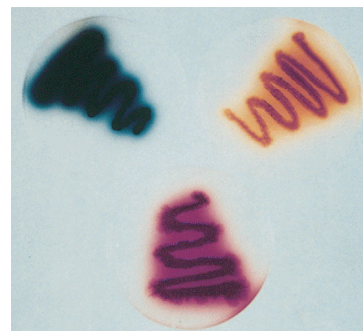
Textbook:

Lecturers: Dr Paul Plieger, Institute of Fundamental Sciences
 Assoc Prof David Harding, Institute of Fundamental Sciences
 Dr Vyacheslav Filichev, Institute of Fundamental Sciences

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: | Semester test | 19% |
| | Labs | 18% |
| | Career exercise | 2% |
| | Final Examination | 61% |

Textbook: Biology of Microorganisms by Madigan, Brock, Martinko & Parker, 12th Edition (Earlier editions are adequate for most of the material covered)

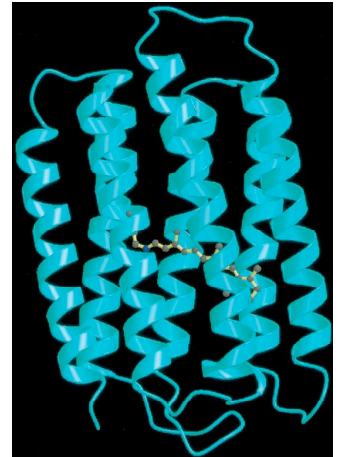
Lecturers: Dr Jan Schmid, Institute of Molecular BioSciences
Dr Zoe Jordens, Institute of Molecular BioSciences (Labs only)
Professor Bernd Rehm, Institute of Molecular BioSciences
Dr Larissa Howe, Institute of Veterinary Animal and Biomedical Sciences
Dr Lesley Collins, Institute of Molecular BioSciences

YEAR TWO - Semester 2

122.232 Protein Biochemistry

Paper Co-ordinator: Dr Gill Norris

Objective: Developing an understanding of the importance of the three dimensional conformations of proteins, that play important physiological roles such as catalysis of biochemical reactions, signal transduction, membrane structure, organisation.



Outline: Synthesizing of proteins in cells and directed to carry out their various roles. Topic include protein biogenesis; targeting and post-translational modification; relationship between protein structure and function; enzymes, structural proteins; membranes and membrane proteins.

Pre-requisites: 122.102 Biochemistry of Cells

Extramural: Not available extramurally.

Assessment:

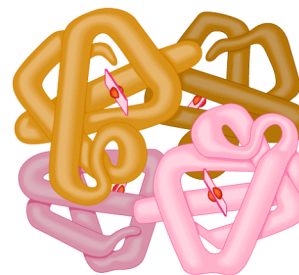
| | |
|-------------------|-----|
| Practical work | 20% |
| Mid Semester Test | 20% |
| Final Examination | 60% |

Textbook: Recommended – Biochemistry, D. Voet and J.G. Voet (2nd Edition or 3rd Edition)

Lecturers: Dr Gill Norris, Institute of Molecular BioSciences
Dr Mark Patchett, Institute of Molecular BioSciences
Dr Andrew Sutherland-Smith, Institute of Molecular BioSciences

YEAR TWO - Semester 2

122.233 Metabolic Biochemistry



Paper Co-ordinator: Dr Mark Patchett

Objective: Detailed understanding of metabolic biochemistry, integration of pathways and regulation.

Outline: Energy metabolism. Biosynthesis of carbohydrates and the metabolism of polysaccharides. Lipid metabolism. Nitrogen metabolism. integration and regulation of carbohydrate, lipid and amino acid metabolism. Cellular communication systems. The course also includes laboratory experiments and a literature-based research project.

Pre-requisites: 122.102 Biochemistry of Cells

Extramural: Not available extramurally.

| | | |
|--------------------|--------------------------|-----|
| Assessment: | Laboratory work | 10% |
| | Literature based project | 10% |
| | Semester Test | 20% |
| | Final Examination | 60% |

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

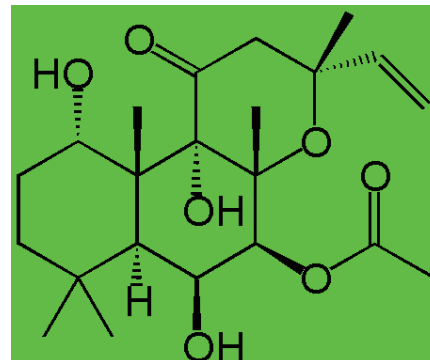
Lecturers: Dr Mark Patchett, Institute of Molecular BioSciences
Dr Jasna Rakonjac, Institute of Molecular BioSciences
Dr Evelyn Sattlegger, Institute of Molecular BioSciences (Albany Campus)

YEAR TWO - Semester 2

123.202 Organic and Biological Chemistry

Paper Co-ordinator: Assoc Prof Trevor Kitson

Objective: Principles to understand the reactions of organic and biological molecules. Provide knowledge to predict organic reactions and understand related biological processes.



Outline: Organic chemistry and reactions of new compounds. How biological molecules interact in vivo. Interpret NMR and mass spectra, Carry out organic synthesis.

Pre-requisites: 123.101 Chemistry and Living Systems

Extramural: Not available extramurally.

Assessment:

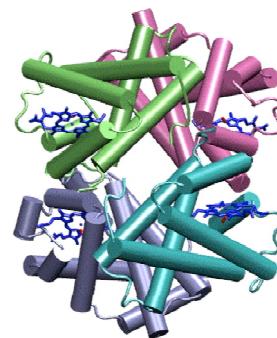
| | |
|-------------------|-----|
| Laboratorys | 20% |
| Semester Test | 20% |
| Final Examination | 60% |

Textbook: Organic Chemistry by McMurry (6th or 7th edition) is recommended.

Lecturers: Assoc Prof Trevor Kitson, Insitute of Fundamental Sciences
Dr Patrick Edwards, Institute of Fundamental Sciences
Dr Gareth Rowlands, Institute of Fundamental Sciecnes

YEAR THREE – Semester 1

122.322 Protein Structure and Function



Paper Co-ordinator: Dr Andrew Sutherland-Smith

Objective: Analysis of the relationship between structure and function of proteins and enzymes including: advanced purification techniques, determination of primary, secondary and tertiary structure, structural motifs, protein recognition, protein superfamilies, site-directed mutagenesis, protein-ligand interactions and allosterism, and kinetic analysis of enzymes.

Outline: Biochemistry of proteins as functional biological molecules; protein purification; preparing and analysing of purified proteins

Pre-requisites: 122.232 Protein Biochemistry

Extramural: Not available extramurally

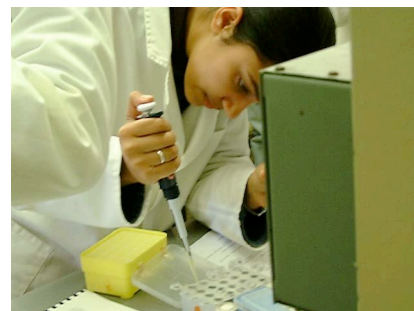
| | | |
|--------------------|--------------------|-----|
| Assessment: | Laboratory reports | 20% |
| | Assignments | 10% |
| | Semester Test | 20% |
| | Final Examination | 50% |

Textbook: Set Text: Biochemistry by Voet & Voet, 3rd Edition
Highly Recommended : Introduction to Protein Structure by Branden & Tooze, 2nd Edition
Recommended : Biochemistry by Stryer 4th or 5th Edition
Biochemistry by Mathews & van Holde, 3rd Edition

Lecturers: Dr Andrew Sutherland-Smith Institute of Molecular BioSciences
Dr Gill Norris, Institute of Molecular BioSciences
Dr Wayne Patrick, Institute of Natural Sciences, Albany

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) 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

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

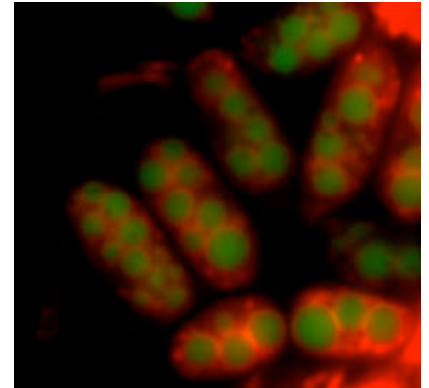
Textbook: Molecular Biology. Weaver. 2nd edition, (2002), McGraw-Hill, New York

Lecturers: Dr Jasna Rakonjac Institute of Molecular BioSciences
Assoc Prof Kathryn Stowell, Institute of Molecular BioSciences
Dr Paul Dijkwel, Institute of Molecular BioSciences
Dr Neville Honey, Institute of Molecular BioSciences
Dr Lesley Collins, Institute of Molecular BioSciences

YEAR THREE – Semester 1

203.307

Advanced Cell Biology



Paper Co-ordinator: Assoc Prof Max Scott

Objective: To provide a description of how cells are organised, communicate, divide and die. To provide practical experience in techniques that are used to study cells.

Outline: Structure and function of the cell and relationship to the whole organism. Chromosome structure and function, cell cycle, signal transduction, cytoskeleton and molecular motors, extracellular matrix, cell motility and movement and ion channels.

Pre-requisites: 162.101 Biology of Cells, 122.231 Genes and Gene Expression.

Extramural: Not available extramurally.

Assessment:

| | |
|-------------------|-----|
| Laboratory work | 30% |
| Semester Test | 15% |
| Final Examination | 55% |

Textbook: Lodish et al. (2008) Molecular Cell Biology, 6th edition, W.H.Freeman and Co
Alberts et al (2001) Molecular Biology of the Cell, fourth edition, Garland Publ.

Lecturers: Assoc Prof Max Scott, Institute of Molecular BioSciences
Assoc Prof Kathryn Stowell, Institute of Molecular BioSciences
Prof Barry Scott, Institute of Molecular BioSciences
Dr Sarah Brown, Institute of Molecular BioSciences
Dr Rosie Bradshaw, Institute of Molecular BioSciences

YEAR THREE – Semester 1

123.312 **Advanced Organic Chemistry**

Paper Co-ordinator: Dr Gareth Rowlands

Objective: Understand the concepts of organic chemistry at a level to predict and analyze the reactions of molecules of interest in biological, medicinal and materials chemistry



Outline: Plan synthesis of target molecule. Assign NMR spectrum of a molecule and propose structure for an unknown molecule on basis of NMR spectra. Perform laboratory syntheses of molecules.

Pre-requisites: 123.202 and 123.204

Extramural: Not available extramurally

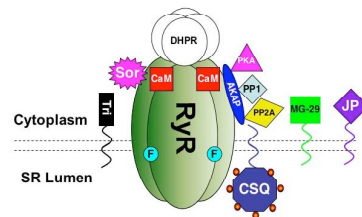
| | | |
|--------------------|-------------------|-----|
| Assessment: | Laboratory course | 20% |
| | Mid Semester Test | 20% |
| | Final Examination | 60% |

Textbook: Organic Chemistry, McMurray, Brooks-Cole, 6th or 7th edition

Lecturers: Dr Gareth Rowlands, Institute of Fundamental Sciences
Dr Pat Edwards, Institute of Fundamental Sciences
Assoc Prof Trevor Kitson, Institute of Fundamental Sciences
Assoc Prof Ashton Partridge, Institute of Fundamental Sciences

YEAR THREE – Semester 2

122.327 Advanced Biochemistry



Paper Co-ordinator: Assoc Prof Kathryn Stowell

Objective: Students will have an advanced knowledge of contemporary biochemical processes, higher level learning skills and experience in specialist experimental biochemistry.

Outline: Biological energy transduction, animal and plant biochemistry and advanced biochemical techniques

Pre-requisites: 122.233 Metabolic Biochemistry, 122.232 Protein Biochemistry

Extramural: Not available extramurally

Assessment:

| | |
|--------------------|-----|
| Laboratory Reports | 20% |
| Assignment | 10% |
| Semester Test | 15% |
| Final Examination | 55% |

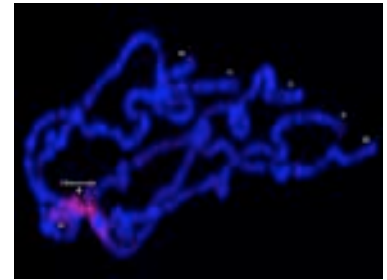
Textbook: Molecular Cell Biology. Lodish et al, 6th Edition, (2008), W .H. Freeman & Co
 Biochemistry, Voet and Voet, 3rd Edition, (2003). Wiley.
 Immunobiology: The Immune System in Health & Disease, Janeway et al, 7th Edition, (2008), Garland Science Publishing
 Molecular Biology of the Cell, Alberts et. al., 4th Edition, Wiley
 Biochemistry and Molecular Biology of Plants, Edited by Bob B Buchanan, Wilhelm Gruissem, Russell L. Jones, (2000), American Society of Plant Physiologists.

Lecturers: Assoc Prof Kathryn Stowell, Institute of Molecular BioSciences
 Dr Mark Patchett, Institute of Molecular BioSciences
 Dr Jasna Rakonjac, Institute of Molecular BioSciences
 Dr Gill Norris, Institute of Molecular BioSciences
 Dr Evelyn Sattlegger, Institute of Molecular BioSciences (Albany)

YEAR THREE – Semester 2

203.303

Gene Regulation



Paper Co-ordinator: Assoc Prof Max Scott

Objective: A student having completed this paper will have an understanding of how genes are regulated in prokaryotes and eukaryotes.

Outline: Methods and experimental strategies for studying gene promoters and associated transcription factors, transcription initiation, transcription activation, role of chromatin structure in gene regulation, RNA processing and cytoplasmic control.

Pre-requisites: 122.231 Genes and Gene expression

Extramural: Not available extramurally.

| | | |
|--------------------|--------------------|-----------|
| Assessment: | Problem sheets (2) | 7.5% each |
| | Oral presentation | 10% |
| | Semester Test | 15% |
| | Final Examination | 60% |

Textbook: Molecular Biology. Weaver. 4th edition, McGraw-Hill, New York

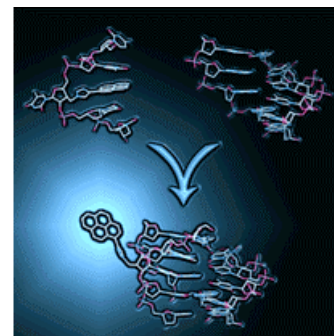
Lecturers: Assoc Prof Max Scott, Institute of Molecular BioSciences
Assoc Prof Kathryn Stowell, Institute of Molecular BioSciences

YEAR THREE – Semester 2

123.326 **Advanced Chemical Biology**

Paper Co-ordinator: Dr Vyacheslav Filichev

Objective: Basics of biological catalysis, drug-protein and drug-RNA/DNA interactions, modern methods in chemical biology (ie mass spectrometry). Selected interacting biological systems, including bionanomachines



Outline: Understanding of protein and DNA/RNA architecture, organic reaction mechanisms of hydrogel gel formation and key classes of ribozymes. Modern applications of mass spectrometry to Chemical Biology. Study of metal trafficking and bio-nanomachines. Understanding of component assembling for complex processes, including drug-protein and drug-RNA/DNA delivery.

Pre-requisites: 123.202

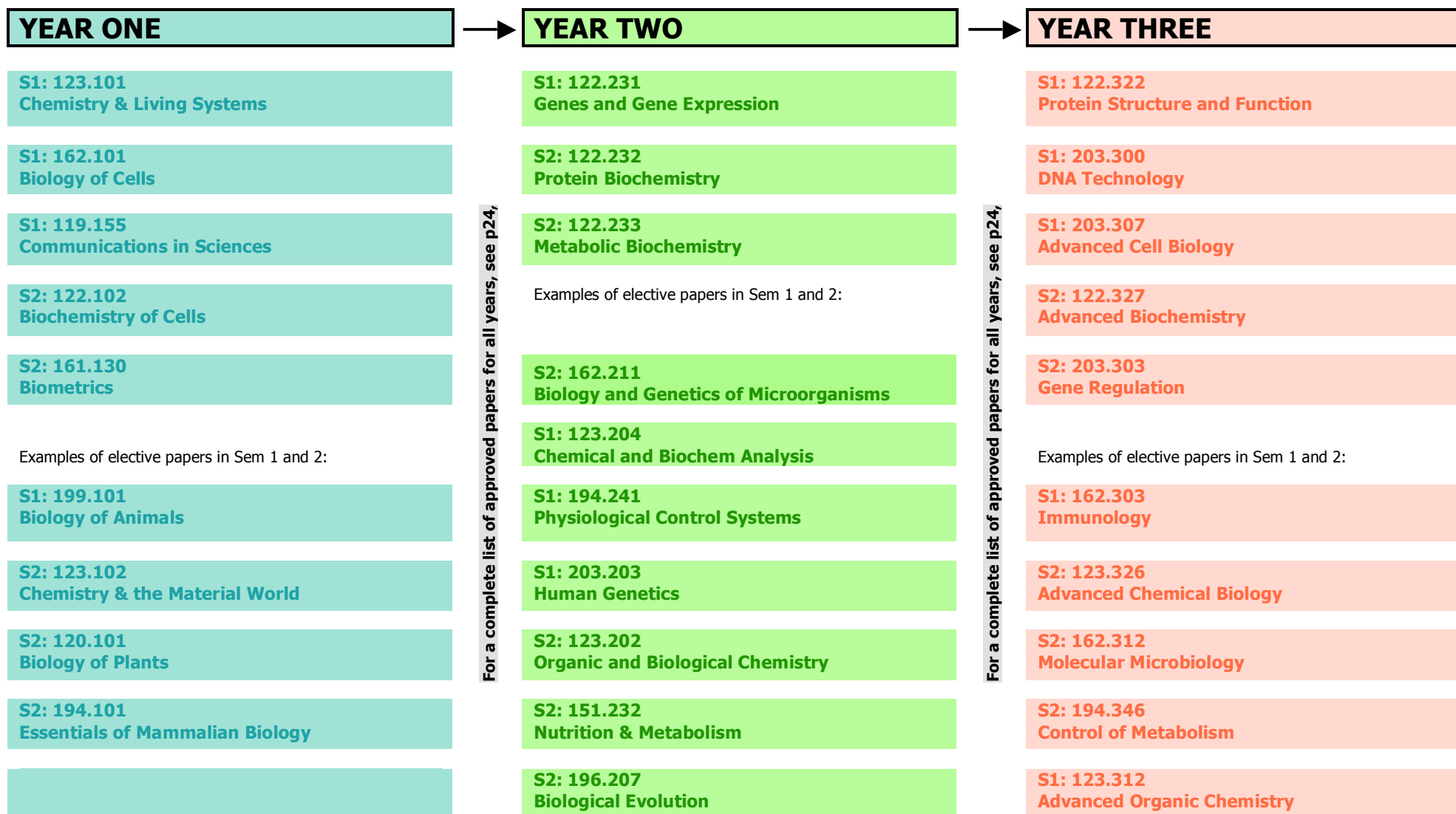
Extramural: Not available extramurally

| | | |
|--------------------|-------------------|-----|
| Assessment: | Laboratory | 10% |
| | Oral presentation | 15% |
| | Mid Semester Test | 15% |
| | Final Examination | 60% |

Textbook:

Lecturers: Dr Vyacheslav Filichev, Institute of Fundamental Sciences
Prof Geoff Jameson, Institute of Fundamental Sciences
Assoc Prof David Harding, Institute of Fundamental Sciences

BSc Biochemistry



For a complete list of approved papers for all years, see p24,

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Research

The Institute of Molecular BioSciences at 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 in October/November each year. Check on the Massey website: http://imbs.massey.ac.nz/Teaching/Summer_Fellowships.htm

Research Interests of Academic Staff in Biochemistry and Related Disciplines

| | |
|--------------------------------|--|
| Kathryn Stowell | Biochemistry, genetics and pathophysiology of human disorders |
| Mark Patchett | Molecular enzymology |
| Gill Norris | Protein structure, x-ray crystallography, glycobiology |
| Andrew Sutherland-Smith | Structural and functional studies on proteins implicated in human diseases |
| Jasna Rakonjac | Molecular biology of bacteriophage/bacteria; phage display |
| Barry Scott | Gene regulation and expression in plant-microbe interactions |
| Max Scott | Chromatin and epigenetics. Insect functional genomics |
| Rosie Bradshaw | Fungal molecular genetics |
| Evelyn Sattlegger* | Stress, nutrient starvation and mechanisms of signal transduction |
| Wayne Patrick* | Evolution of proteins and proteomes |
| Justin O'Sullivan* | DNA, chromatin and gene expression |
| * Albany Campus | |
| Jeong Park | from August 2009 |
| Tracy Hale | from August 2009 |

General Information

Student Services

Student Services at Massey University Manawatu 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/>

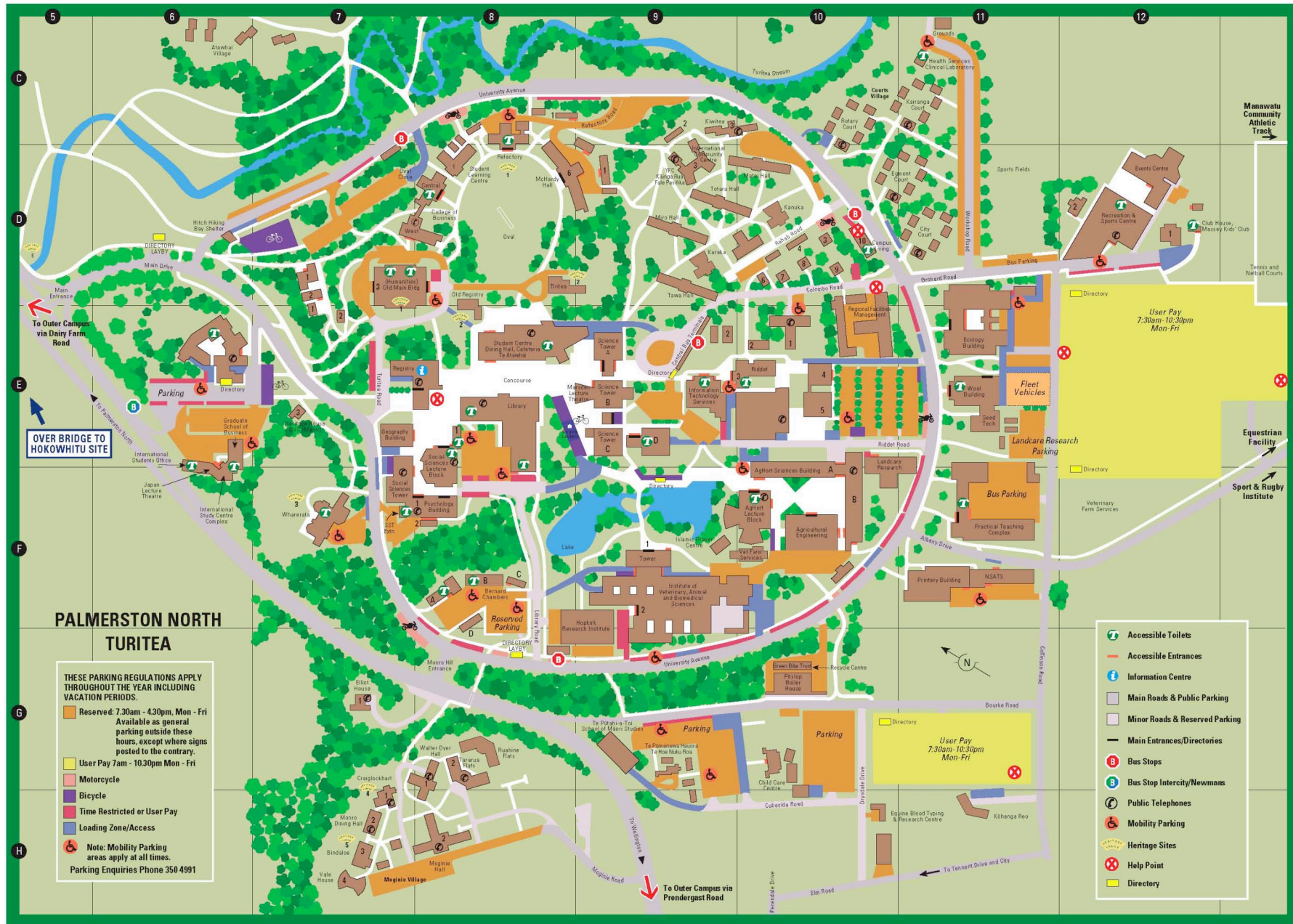
Student Learning Centre

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 2009' 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
- 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 Biochemistry and papers offered, the following information is provided on the Massey University website:



Bachelor of Science (BSc)

Bachelor of Science (Biochemistry)

Entry Requirements

All students must have a university entrance qualification. Students beginning their study of Biochemistry 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 Semester One of their first year students intending to major in Biochemistry should take 123.101 and 162.101 as these are both majoring requirements. In addition, Biochemistry students are strongly recommended to take 123.102 Chemistry and the Material World in their second semester and also take papers in other biological sciences.

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

Bachelor of Science (Biochemistry) Structure

Biochemistry is the study of the molecular basis (or chemistry) of life. Biochemistry is based on chemistry and concerns the chemical components, chemical reactions and physiological processes that occur in living systems and which are essential for life. Although it overlaps other disciplines, including cell biology, genetics, immunology, microbiology, pharmacology and physiology, Biochemistry focuses on the following issues: the chemical and three-dimensional structures of biological molecules; how these biological molecules interact with one another; how the cell synthesizes and degrades biological molecules; how energy is conserved and used by the cell; how biological molecules are organised and their activities are coordinated; how genetic information is stored, transmitted and expressed. Biochemistry is a discipline that appeals to people who like to look into how things happen.

Majoring Requirements

123.101 Chemistry and Living Systems,
122.102 Biochemistry of Cells,
162.101 Biology of Cells,
122.231 Genes and Gene Expression,
122.232 Protein Biochemistry,

122.233 Metabolic Biochemistry,
122.322 Protein Structure and Function,
203.300 DNA Technology,
203.303 Gene Regulation,

plus two of

162.211 Biology and Genetics of Microorganisms,
122.327 Advanced Biochemistry,
203.307 Advanced Cell Biology.

Biochemistry majors are strongly advised to take either 162.211 Biology and Genetics of Microorganisms and/or 123.204 Chemical and Biochemical Analysis.

Papers

Manawatu

120.101 Biology of Plants
122.102 Biochemistry of Cells
123.101 Chemistry and Living Systems
123.102 Chemistry and the Material World
123.103 Introductory Chemistry
162.101 Biology of Cells
194.101 Essentials of Mammalian Biology
199.101 Biology of Animals
122.231 Genes and Gene Expression
122.232 Protein Biochemistry
122.233 Metabolic Biochemistry
123.202 Organic and Biological Chemistry
123.204 Chemical and Biochemical Analysis
151.232 Nutrition and Metabolism
162.211 Biology and Genetics of Microorganisms
194.241 Physiological Control Systems
196.207 Biological Evolution
203.203 Human Genetics
123.312 Advanced Organic Chemistry
123.326 Advanced Chemical Biology
122.322 Protein Structure and Function
122.327 Advanced Biochemistry
162.312 Molecular Microbiology
194.346 Control of Metabolism
203.300 DNA Technology
203.303 Gene Regulation
203.307 Advanced Cell Biology

Extramural

120.101 Biology of Plants
162.101 Biology of Cells
162.103 Introductory Biology
123.101 Chemistry and Living Systems
123.102 Chemistry and the Material World
123.103 Introductory Chemistry
196.207 Biological Evolution
203.203 Human Genetics