Welcome to the School of Applied Sciences and Engineering!

Welcome to the School of Applied Sciences and Engineering (SASE) at the Gippsland campus of Federation University Australia (FedUni). Congratulations on gaining entry to your Program. The staff of the School will be happy to help you to adjust to University life and guide you through your Program to hopefully achieve the career of your choice.

You should remember that the staff of the School have been through exactly the Programs that you are about to undertake and they are able to provide specific advice and assistance on all aspects of your University experience. That includes myself and I am happy to assist; especially if you have any trouble contacting your lecturers and tutors.

The University also has many social opportunities and you should take advantage of these to develop friendships and networks with your fellow students while always remembering the primary goal of completing your studies. Federation Gippsland has a wide range of options for study and we encourage you to use and develop your study routines using all these options and resources.

In choosing a career you might consider further studies after your degree as these can increase your chances of success and open new doors in terms of research and higher degrees.

To help you realize these possibilities we offer science and engineering Honours programs beyond the Bachelor degrees. Honours can lead to Masters and Doctoral programs allowing opportunities to study particular issues, processes and technologies anywhere in the world.

I hope you enjoy your time at Federation University Gippsland Campus and please talk to the staff about your studies at regular intervals. We like to know how you are going.

Professor Mark Sandeman

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How to get to the Gippsland Campus

Campus Map

Download campus map (pdf 853kb)

Getting here

The campus is in the township of Churchill. The 160-kilometre drive from Melbourne takes about two hours from the CBD, heading east on the Princes Highway. The campus is at Northways Road, Churchill, Victoria, Australia. Regular bus and train services link the Gippsland campus with Melbourne and regional towns.

From Melbourne
Train and coach services depart from Southern Cross and Flinders Street stations in Melbourne, running hourly on weekdays and less frequently at weekends. The closest station to Federation University Gippsland is Morwell Station on the Traralgon line.

The bus service is provided by Latrobe Valley Bus Lines. (http://www.lvbl.com.au/) Route 2 (Churchill) runs hourly on weekdays and directly links the station and the campus. The timetable is designed to meet incoming trains from Melbourne.

Visit Public Transport Victoria (http://ptv.vic.gov.au/) for more information on train and bus timetables.

From regional centres
Buses from the local towns of Morwell, Moe and Traralgon depart from the train stations in those towns.

For timetables, visit Public Transport Victoria or contact Latrobe Valley Bus Lines on +61 3 5135 4700.

To catch a bus to Churchill or the campus, get off at Morwell station and follow the directions to the bus interchange on Commercial Road. It's a short walk from the station. On campus, the bus arrives and departs from the campus bus loop.

Orientation (for on-campus students only)

An Orientation schedule for mid-year commencing students will be sent to your email accounts once it is finalised. It will typically consist of one day with the Faculty and then other campus based activities to be confirmed and advised. We'll help you settle in and provide you with information to fully prepare you for the start of classes and life at Fed Uni.

These events are designed to help you:

- get organised for your studies and learn more about your program
- provide you with essential information to succeed and have a smooth transition into university life
- become familiar with the campus and staff
- learn more about the support services available to you
- to meet other students

Timetable (for on-campus students only)

Student Allocator will be used to allocate into your lectures, tutorial, labs and computer labs.
More information relating to the use and access of student allocator will be forwarded to your student email address.

Information for undergraduate online students

Online Students

Enrolment requirements

Online students are required to enrol electronically, please refer to:
http://www.federation.edu.au/future-students/study-at-feduni/apply/domestic/accepting-your-offer

It is usual practice for on-line students to study part-time while balancing work and family life. If you wish to study part-time please contact the Student Services Hub for Science, Engineering, Nursing and Midwifery on 03 9902 6454, for an amended Program plan.

Residential Schools

Residential Schools (4 - 7 days) are held each semester (normally April and September) for the completion of the laboratory component of your programs. These sessions are compulsory sessions for your course and must be attended to pass the course. Accommodation is at the student's expense. Fed Living may have on campus residential places available. We recommend checking with them closer to the time of the residential school.

General program information

Detailed program structures and information have been included in the program structure grids attached to assist you with completing your online enrolment. We have also included below descriptions of the first year courses to give you an overview of what you will be studying in 2014.

Students Responsibilities in course planning

Responsibility of course choice

Students are advised that while the Program advisors will endeavour to give every possible assistance concerning course selection, the responsibility remains with the student to ensure that the courses selected meet the program specific regulations and requirements. The Faculty will not accept responsibility for student error in course selection.

Responsibility to satisfy pre-requisites

Students are advised upper level courses may have prerequisite requirements. The responsibility remains with the student to check the required prerequisite courses have been completed before attempting to enrol in any courses.

Major and Minor Core Requirements - 2014

Applied Microbiology

Minor

Core Requirements

BIOGC1722 Cell biology
CHMGC1011 Chemistry I
BTHGC2732 Recombinant DNA technology
MICGC2011 Introduction to microbiology and microbial biotechnology

Major

Core Requirements

BIOGC1722 Cell biology
CHMGC1011 Chemistry I
BTHGC2732 Recombinant DNA technology
MICGC2011 Introduction to microbiology and microbial biotechnology

And four of:

BTHGC3711 Food and industrial microbiology
BTHGC3722 Medical microbiology
BTHGC3732 Environmental microbiology
BTHGC3752 Molecular biology and biotechnology
SCIGC3990 Science in action research project

PLEASE NOTE: *In some instances there may be pre-requisites for some of the above courses which do not form a part of the minor/major sequence. In these cases you will need to use your electives to complete the pre-requisites in order to meet the core requirements. For example BTHGC1802 is a pre-requisite for BTHGC2732 however does not form a part of the Applied Microbiology minor/major.*

Biochemistry

Minor

Core Requirements

CHMGC1011 Chemistry I
BIOGC1722 Cell biology
BTHGC2741 Biochemistry
And one of:
BTHGC2752 Cellular metabolism or
BTHGC2732 Recombinant DNA technology

Major

Core Requirements

CHMGC1011 Chemistry I
BIOGC1722 Cell biology
BTHGC2741 Biochemistry
BTHGC2732 Recombinant DNA technology
BTHGC2752 Cellular metabolism
BTHGC3741 Medical cell biology
BTHGC3752 Molecular biology and biotechnology
And one of:
CHMGC3930 Medicinal Chemistry or
SCIGC3990 Science in action research project

PLEASE NOTE: *In some instances there may be pre-requisites for the above courses which do not form a part of the minor/major sequence. In these cases you will need to use your electives to complete the pre-requisites in order to meet the core requirements. For example BTHGC1802 is a pre-requisite for BTHGC2732 however does not form a part of the Biochemistry minor/major.*

Chemistry

Minor

Core Requirements

CHMGC1011 Chemistry I
CHMGC1022 Chemistry II
And two of:
CHMGC2752 Chemistry of the environment
CHMGC2762 Design of molecules and macromolecules
CHMGC2922 Spectroscopy and analytical chemistry
CHMGC3930 Medicinal Chemistry
CHMGC3742 Chemistry of the Environment 2

Major

Core Requirements

CHMGC1011 Chemistry I
CHMGC1022 Chemistry II
CHMGC2762 Design of molecules and macromolecules
CHMGC2922 Spectroscopy and analytical chemistry
CHMGC3930 Medicinal Chemistry
CHMGC3742 Chemistry of the Environment 2
SCIGC3990 Science in action research project
And one of:
BTHGC2741 Biochemistry or
CHMGC2752 Chemistry of the environment

Ecology and Environmental Management

Minor

Core Requirements

ENVGC1711 Ecological systems and the environment
ENVGC1722 Geophysical systems and the environment

And two of:

BIOGC3132 Biology of Australian vertebrates
BIOGC3712 Case studies in animal management
ENVGC2712 Biology and diversity
ENVGC2726 Ecosystems and bio resources
ENVGC3639 Minerals and energy
ENVGC3711 Natural area management
ENVGC3737 Tools for environmental management
ENVGC3761 Waste management and remediation
MATGC2742 Mathematical modelling of the environment
SCIGC3990 Science in action research project

Major

Core Requirements

ENVGC1711 Ecological systems and the environment
ENVGC1722 Geophysical systems and the environment
ENVGC2712 Biology and diversity
ENVGC2726 Ecosystems and bio resources
ENVGC3711 Natural area management
ENVGC3737 Tools for environmental management

And two of:

BIOGC3712 Case studies in animal management
BIOGC3132 Biology of Australian vertebrates
ENVGC3639 Minerals and energy
ENVGC3761 Waste management and remediation
MATGC2742 Mathematical modelling of the environment
SCIGC3990 Science in action research project

Double Major

Core Requirements

ENVGC1711 Ecological systems and the environment
ENVGC1722 Geophysical systems and the environment
ENVGC2712 Biology and diversity
ENVGC2726 Ecosystems and bio resources
ENVGC3711 Natural area management
ENVGC3737 Tools for environmental management
BIOGC3712 Case studies in animal management
BIOGC3132 Biology of Australian vertebrates
ENVGC3639 Minerals and energy
ENVGC3761 Waste management and remediation
MATGC2742 Mathematical modelling of the environment
SCIGC3990 Science in action research project

PLEASE NOTE: *In some instances there may be pre-requisites for some of the above units which do not form a part of the minor/major sequence. In these cases you will need to use your electives to complete the pre-requisites in order to meet the core requirements. For example the above Biology units have pre-requisites not a part of this major.*

Human Physiology

Minor Only

Core Requirements

BIOGC1711 Vertebrate biology
BIOGC1722 Cell biology
BIOGC2731 Support and movement
BIOGC2732 Reproduction and maintenance

Medical Bioscience

Major

Core Requirements

CHMGC1011 Chemistry I
BIOGC1722 Cell biology
BTHGC2741 Biochemistry
BTHGC3741 Medical cell biology

Two of:

BIOGC2731 Support and movement
BTHGC2732 Recombinant DNA technology
BTHGC2752 Cellular metabolism
MICGC2011 Introduction to microbiology and microbial biotechnology

Two of:

BTHGC3722 Medical microbiology
BTHGC3752 Molecular biology and biotechnology
IMMGC3802 Essentials of applied immunology
CHMGC3930 Medicinal Chemistry

Double Major

Core requirements

CHMGC1011 Chemistry I
BIOGC1722 Cell biology
BIOGC2731 Support and movement
BTHGC2732 Recombinant DNA technology
BTHGC2741 Biochemistry
BTHGC3741 Medical cell biology
BTHGC3752 Molecular biology and biotechnology BTHGC3722 Medical microbiology
IMMGC3802 Essentials of applied immunology
SCIGC3716 Laboratory and workplace management
CHMGC3930 Medicinal Chemistry

And one of:

BTHGC3752 Molecular biology and biotechnology
MICGC2011 Introduction to microbiology and microbial biotechnology

PLEASE NOTE: *In some instances there may be pre-requisites for some of the above units which do not form a part of the minor/major sequence. In these cases you will need to use your electives to complete the pre-requisites in order to meet the core requirements. For example BTHGC1802 is a pre-requisite for BTHGC2732 however does not form a part of the Medical Bioscience minor/major.*

Mathematics and Modelling

Minor Only

Core Requirements

First Level

MTHGC1020 Analysis of change and

MTHGC1030 Techniques for modelling

Second Level

MATGC2731 Multivariate analysis

And one of:

MATGC2742 Mathematical modelling of the environment

STAGC2216 Data analysis for science

Psychology

****This area of study is not available on-campus at Gippsland; please discuss with Student Services staff if you wish to study Psychology.**

Minor

Core Requirements

PSY1011 Psychology 1A

PSY1022 Psychology 1B

PSY2051 Research Design and Analysis

And one of:

PSY2031 Developmental and biological psychology

PSY2042 Cognitive and Social Psychology

Major – 48 Point Non Accredited Major

Core Requirements

PSY1011 Psychology 1A

PSY1022 Psychology 1B

PSY2051 Research Design and Analysis

At least one level two PSY unit

Three or four third level PSY units

Major – 60 point Accredited Major

Core Requirements

PSY1011 Psychology 1A

PSY1022 Psychology 1B

PSY2031 Developmental and biological psychology

PSY2051 Research Design and Analysis

PSY2042 Cognitive and Social Psychology

PSY3041 Psychological testing, theories of ability and ethics

PSY3051 Perception and Personality

PSY3032 Abnormal Psychology

PSY3062 Research methods and theory

PSY elective

Veterinary Bioscience

Minor

Core Requirements

BIOGC1711 Vertebrate biology
ENVGC1711 Ecological systems and the environment
BIOGC2710 Animal management and disease
And one of:
BIOGC2731 Support and movement
ENVGC2712 Biology and diversity

Major

Core Requirements

BIOGC1711 Vertebrate biology
ENVGC1711 Ecological systems and the environment
BIOGC2710 Animal management and disease
ENVGC2712 Biology and diversity
One of:
BIOGC2731 Support and movement
MICGC2011 Introduction to microbiology and microbial biotechnology
And three of:
BIOGC3712 Case studies in animal management
BIOGC3132 Biology of Australian vertebrates
BTHGC3722 Medical microbiology
BTHGC3741 Medical cell biology

PLEASE NOTE: *In some instances there may be pre-requisites for some of the above units which do not form a part of the minor/major sequence. In these cases you will need to use your electives to complete the pre-requisites in order to meet the core requirements. For example BIOGC1722 is a pre-requisite for BIOGC2731 however does not form a part of the Veterinary Bioscience minor/major.*

Please Note: Over the years variations to the unit codes may occur. It is important to check any changes via the handbook online or check with your Student Services Hub.

Course outlines

BIOGC1711 - Vertebrate biology

This course aims to present normal physiological function of the major organ systems in vertebrates. The emphasis is on the study of discrete cell populations and organs within each system and the integration of these systems to meet the needs of the functioning organism. The relationship between structure and function is an underlying theme of the course. Laboratory and tutorial classes are divided into two streams: the human/ medical stream or the animal/ veterinary stream; students select the stream appropriate to their study program and interests.

Outcomes

On completion of this course students will be able to:

1. Recognise the major anatomical features of the vertebrate body;
2. Describe the normal physiological function of the major systems of vertebrates;
3. Describe the behaviour of individual cell populations within each of these systems;
4. Discuss the integration of the activities of individual cell population to create a functioning system;
5. Understand the control mechanisms which operate within each system and within the functioning organism;
6. Measure physiological responses under a range of experimental conditions and choose appropriate reference material to interpret these responses.

BIOGC1722 - Cell biology

This course begins with a study of the molecules making up the cell: carbohydrates, lipids, proteins and nucleic acids. This forms the basis for the consideration of cell structure and function. The principles of cellular organisation, cellular metabolism and genetics are introduced. The laboratory program illustrates fundamental aspects of the theory course.

Outcomes

On completion of this course students will be able to:

1. Sketch a representative animal and/or plant cell;
2. Recognise cell organelles and state their function;
3. Draw representative structures for each of the major classes of biological macromolecules;
4. Summarise the roles of biological macromolecules in living cells;
5. Give examples of the relationship between macromolecular structure and function;
6. Discuss the cooperative action of the biological macromolecules responsible for cell function such as membrane transport processes and cell division;
7. Recognise common features of energy transduction systems in plant and animal cells;
8. Demonstrate basic laboratory skills - e.g. measurement of mass, volume and time, recording and interpretation of experimental data, and report writing.

CHMGC1011 - Chemistry I

CHMGC1011 has been designed such that some previous understanding of chemistry is presumed, but is also underpinned by a support structure for those who are relatively new to the subject. The curriculum focuses on general and physical chemistry principles which in turn complement the synthetic chemistry topics discussed in the subsequent unit, CHMGC1022. On completion of CHMGC1011, students will have gained an understanding of how atoms and molecules interact with each other and how this affects their bonding, reactivity, 3D structure and physical properties. A number of important topics such as stoichiometry, intermolecular forces, thermodynamics, kinetics, equilibria, and electrochemistry will be developed in order to prepare students for a deeper exploration of chemistry. The concepts developed within the workshops and tutorials are complemented through a laboratory program where students will have the opportunity to develop analytical techniques and design their own experiments to solve a range of chemical problems.

Outcomes

On completion of this course students will be able to:

1. Discuss the features of atomic structure and the construction of the periodic table of elements;
2. Interpret relationships between electronic structure and bonding;
3. Explore a wide range of molecular structures and investigate aspects of stereochemistry such as isomerism and chirality;
4. Distinguish between ideal gases and real gases;

5. Recognise factors which give rise to polarity and its relationship to intermolecular bonding;
6. Define the first and second laws of thermodynamics and apply enthalpy and entropy;
7. Discuss factors which give rise to chemical kinetics;
8. Apply acid-base chemistry in the understanding of dynamic equilibria;
9. Foster the acquisition of practical skills by exploiting an inquiry-based approach to the chemistry laboratory experience;
10. Communicate chemistry, and discuss the social and environmental responsibility of chemists in the global community.

CHMGC1022 - Chemistry II

Within CHMGC1022, students will exploit their understanding of general and physical chemistry discussed in CHMGC1011 to explore the behaviour of chemicals in a number of interesting case studies incorporating a range of significant biological and synthetic molecules such as carbohydrates, proteins and polymers and pharmaceutically important drugs. Along the way, students will discuss the formation of inorganic coordination compounds and investigate their role in colour and magnetism, and metals in biological systems. The concepts developed within the workshops and tutorials are complemented through a laboratory program where students will have the opportunity to develop analytical techniques and design their own experiments to solve a range of chemical problems.

Outcomes

On completion of this course students will be able to:

1. Demonstrate a basic understanding of chemical nomenclature;
2. Describe the classification, bonding, structure, properties and reactions of a wide range of organic compounds according to the functional groups they contain;
3. Describe the nature of biological and synthetic macromolecules such as proteins, carbohydrates, and polymers;
4. Discuss the properties of transition elements;
5. Describe a wide range of coordination compounds and their structures, reactions and applications in both synthetic materials and biological systems;
6. Describe how spectroscopy can be used to investigate molecular structure;
7. Foster practical skills by exploiting an inquiry-based approach to the chemistry laboratory experience;
8. Communicate chemistry, and discuss the social and environmental responsibility of chemists in the global community.

ENVGC1711 - Ecological systems and the environment

This course introduces students to the global environment and its basic natural systems. The fundamental structure and functioning of the natural systems is explored, emphasising the processes of living systems and their relationships with physical processes, including those associated with geology and climate. Major themes include the diversity and interrelationships of the biotic and abiotic components of the environment, the nature of environmental change, and human impacts on both biotic and abiotic components of natural systems. The level of study will range from local issues to regional and global impacts. The unit is taught by internal lectures, tutorials and fieldwork, and also by distance education.

Outcomes

On completion of this course students will be able to:

1. Describe the Earth's basic natural systems;
2. Discuss the structure and functions of ecosystems, with particular emphasis on Australian systems;
3. Discuss the diversity of plants and animals, and their relationships with their habitats;
4. Discuss the processes of change of habitats, ecosystems and the global environment;
5. Explain the evolution of Australian ecosystems;
6. Discuss the impact of human activity on natural systems;
7. Discuss the origins and impacts of a selection of current environmental problems, including local and global issues.

ENVGC1722 - Geophysical systems and the environment

This course emphasises the basic physical and chemical processes involved in creating and shaping the physical environment. Relevant human impacts and management issues are discussed. Topics covered include environmental ethics; the structure of the Earth; plate tectonics; minerals, rocks and weathering; earthquakes, volcanoes and glaciation; streams and flooding; mass movement; coastal zones; energy resources; waste management; sustainable development. There is no prerequisite for this subject.

Outcomes

On completion of this course students will be able to:

1. Describe the physical processes involved in creating and shaping the physical environment - those changes in the environment over which humans have no control, and those which we are able to control and manage;
2. Discuss some of the ethical and economic factors that influence our approach to resource management;
3. Describe the basic geological processes and structures occurring within the environmental systems of the Earth;
4. Use basic terminology to describe geological and hydrological systems;
5. Discuss the various resources used by plants and animals (including humans) for their existence, and ways in which these can be adequately managed and maintained;
6. Identify a range of representative rocks and minerals;
7. Discuss the role that humans can take in managing the physical environment;
8. Assess the human impacts on selected environmental resources, critically comment on the existing management of those resources and propose an effective resource management plan.

MTHGC1020 - Analysis of change

Properties of real and complex numbers; algebraic functions and common transcendental functions; modelling change using elementary functions; limits and continuity; rate of change, derivatives, local and global extrema; sums and integrals, anti-derivatives, calculus applications: optimization, area and volume, introduction to differential equations; Vectors in two- and three- dimensional space.

Outcomes

On completion of this course students will be able to:

1. Demonstrate basic knowledge of complex numbers, including algebraic manipulations and their various representations;
2. Demonstrate basic knowledge of vectors in two and three-dimensional space, their properties, and geometric applications;
3. Calculate simple limits to describe continuity and behaviour of one-variable real functions near a point and at infinity;
4. Explain how differentiation and integration arise as limits of functions;
5. Calculate derivatives and integrals using a variety of methods;
6. Use calculus methods to analyse function characteristics such as local and global extrema, concavity and points of inflection;
7. Solve differential equations of the separable variables type;
8. Use calculus techniques to solve a variety of problems that can be modelled with functions or with first order differential equations;
9. Demonstrate proficiency in mathematical writing and communication.

MTHGC1030 - Techniques for modelling

Solution of systems of linear equations using Gaussian elimination; matrices, determinants, eigenvalues and eigenvectors; introduction to vectors; methods of integration - substitutions and integration by parts; solution of first-order ordinary differential equations - separable, use of integrating factor; solution of second-order linear ordinary differential equations with constant coefficients and applications; Taylor series and series convergence; the remainder term.

Outcomes
On completion of this course students will be able to:

1. Understand the basic concepts of linear algebra, recognise and manipulate elements of vector spaces;
2. Formulate and solve equations involving vectors and matrices, including for three-dimensional geometry;
3. Identify and evaluate improper integrals;
4. Solve simple first and second order differential equations, and formulate them for applications to physical systems;
5. Compute Taylor series expansions, with remainder, for functions of one variable;
6. Apply Taylor series and l'Hopital's rule to compute limits;
7. Understand and compute the convergence properties of infinite series;
8. Provide written reports that contain complete mathematical arguments.

PHSGC1711 - Applied physics

PHSGC1711 assumes a mathematical background of VCE maths methods 3 and 4 or equivalent. It is designed for students that have an interest in physical computations and the practical applications of physical principles. Topics covered in this unit include: description of linear motion, statics and equilibrium, force system, kinematics of motion in two dimensions, work, energy and energy conversion, momentum, rotational motion, stress and strain, engineering properties of materials with applications, basic concepts of waves and their role in the transport of energy and information, acoustics, introduction to fluid statics and dynamics, principles of electricity, electrical measurement and monitoring.

Outcomes
On completion of this course students should be able to: apply linear kinematic relationships, involving scalars and vectors to analyse typical situations encountered in engineering applications; apply the linear and rotational requirements for equilibrium to examine static mechanical structures; apply the concepts of stress and strain to a material under load; use the principles of rotational dynamics to determine and predict the behaviour of fixed-axis rotating systems, including flywheels and turbines; apply Archimedes' and Pascal's principles and Bernoulli's theorem to analyse streamline fluid flow; apply the principles of harmonic motion to vibrating systems and predict the features of damped and forced oscillations; analyse and predict the behaviour of waves in various media, including adsorption of acoustic waves, scattering by reflection, refraction and diffraction; analyse simple DC circuits involving series and parallel resistors and describe the properties and circuit influences of capacitors and inductors; recognise the role of measurement, sensors and monitoring systems and the limitations inherent in instruments and their usage; to analyse equilibrium of force system.

SCIGC1020 - Introduction to statistical reasoning

Scientific method. The role of mathematical models in science. Principles of experimental and sampling design, data acquisition, analysis and presentation of data. Hypothesis testing and confidence intervals. Relationship between quantitative variables. Communication of scientific information.

Outcomes
On completion of this course students will be able to:

1. Understand the key steps of the scientific method and apply these to real problems that involve data analysis and interpretation;
2. Understand the importance of statistical techniques in the analysis of data;
3. Describe how statistical data is collected and analysed;
4. Use Excel to present and interpret data in numerical summaries and/or graphs;
5. Use appropriate statistical summaries to explore data;
6. Perform regression and interpret results;
7. Determine confidence intervals;
8. Conduct hypothesis testing and interpret results;
9. Communicate findings through a scientific report.

Bachelor of Science – Program Code GSC5

Standard duration of study (years)	3 years full-time / 6 years part-time
Study mode and Location	On Campus and Off Campus Gippsland
Total credit points required	360

Structure

This program consists of a minor and a major sequence in different areas of science, along with a specified number and type of science electives, a level two science core course, and elective courses.

Requirements

Students must complete all of the following:

(a.) at least one major sequence in a science area of study (120 points)

(b.) at least one minor sequence in a different science area of study (60 points)

(c.) at least one level one mathematics or statistics course from:

MTHGC1020 Analysis of change

MTHGC1030 Techniques for modelling

SCIGC1020 Introduction to statistical reasoning

(d.) the following core course:

SCIGC1010 Scientific communication

(e.) an approved combination of level one courses to ensure breadth of studies across science disciplines. Students can satisfy the level one breadth of studies requirement in one of two ways.

(f.) additional elective courses to take the total credit points to 360.

Note: Students must complete:

at least 90 points of science courses at level one and at least 24 points of science courses at level three

no more than 120 points of courses offered by another faculty

no more than 150 points of level one courses overall.

Additional Information

Recommended program of study

Stage one - Students must complete the level one mathematics or statistics course along with the level one breadth requirement. To ensure that maximum choice is available at level two it is recommended that at least three approved level one sequences in science are completed.

Stage two - It is recommended at least two science minor sequences and the core course SCIGC2010 are undertaken at stage two and that any remaining courses to complete the level one requirement of breadth of study across disciplines are completed.

Stage three - Students must complete their science major sequence and any remaining courses needed to complete any outstanding Program requirements at stage three. Additional level two and level three science courses may also be taken at stage three, for example to complete a second science major sequence or a double-major sequence.

Majors Applied Biochemistry, Applied Chemistry, Ecology and Environmental Management, Medical Bioscience, Applied Microbiology, Psychology, and Veterinary Bioscience.

Minors As per majors, plus, Mathematics and Modelling, and Human Physiology.

This sample shows you how to map your degree so as to complete all the requirements based on the stage one recommended program of study. There are various structure options within the Bachelor of Science. In some cases it may be possible to complete two majors within this degree. A program advisor will be able to assist with a personalised plan if you wish to take on this option. Advice should be sought from program advisers if you are unsure about course selection on 03 51226454 or scieng.gippsland@federation.edu.au

Program Progression – Bachelor of Science				
Year	**Semester**	**Course Details**	**Prerequisites**	**Credit Points**
First Year	**1**	ENCOR1015 Intro to maths ** for students without maths methods		15
		1st Level Science Major		15
		1st Level Science Minor		15
		1st Level Science Sequence		15
	2	1st Level Elective		15
		1st Level Science Major		15
		1st Level Science Minor		15
		1st Level Science Sequence		15
Second Year	**1**	SCI2010 Scientific practice and communication ***		15
		2nd Level Science Major		15
		2nd Level Science Minor		15
		2nd Level Elective		15
	2	2nd Level Science Major		15
		2nd or 3rd Level Science Major		15
		2nd Level Science Minor		15
		2nd Level Elective		15
Third Year	**1**	3rd Level Science Major		15
		3rd Level Science Major		15
		2nd or 3rd Level Elective		15
		2nd or 3rd Level Elective		15
	2	3rd Level Science Major		15
		3rd Level Elective		15
		3rd Level Elective		15
		3rd Level Elective		15
			Total	360

Bachelor of Science (Biotechnology) – Program Code GSB5

Standard duration of study (years)	3 years full-time / 6 years part-time
Study mode and Location	On Campus and Off Campus Gippsland
Total credit points required	360

Structure

This Program consists of specified core courses at each year level, elective courses and at stages two and three, the appropriate strand-specific courses as described below.

Requirements

Students must complete all of the following:

Core Courses

- BTHGC2732 Recombinant DNA technology
- BTHGC2741 Biochemistry
- BTHGC2752 Cellular metabolism
- BTHGC3752 Molecular biology and biotechnology
- CHMGC2922 Spectroscopy and analytical chemistry
- MICGC2011 Introduction to microbiology and microbial biotechnology
- SCIGC1010 Scientific communication
- SCIGC1020 Introduction to statistical reasoning
- SCIGC2010 Scientific practice and communication
- SCIGC3716 Laboratory and workplace management
- five 15-point Industrial strand-specific courses
  - ◊ BTHGC3711 Food and industrial microbiology
  - ◊ BTHGC3732 Environmental microbiology
  - ◊ CHMGC2762 Design of molecules and macromolecules
  - ◊ CHMGC3930 Medicinal chemistry
  - ◊ STAGC2216 Data analysis for science

Additional course requirements

- one 15-point science elective course
- two 15-point level one biology courses
- two 15-point level one chemistry courses
- Additional elective courses to take the total credit points to 360.

Note: Students must complete:

- at least 90 points of science courses at level one and at least 60 points of science courses at level three
- no more than 120 points of courses offered by another faculty
- no more than 150 points of level one courses overall.

This sample shows you how to map your degree so as to complete all the requirements. Advice should be sought from program advisers if you are unsure about course selection on 03 51226454 or scieng.gippsland@federation.edu.au

Program Progression – Bachelor of Science (Biotechnology)				
Year	**Semester**	**Course Details**	**Prerequisites**	**Credit Points**
First Year	**1**	ENCOR1015 Intro to maths ** for students without maths methods		15
		BIOGC1711 Vertebrate biology		15
		CHMGC1011 Chemistry I		15
		First Level Elective		15
	2	SCIGC1020 Intro to statistical reasoning		15
		BIOGC1722 Cell biology		15
		CHMGC1022 Chemistry II		15
		SCIGC1010 Scientific communication		15
Second Year	**1**	BTHGC2741 Biochemistry	BIOGC1722 & CHMGC1011	15
		MICGC2011 Introduction to microbiology and microbial biotechnology	BIOGC1722	15
		CHMGC2762 Design of molecules and macromolecules	CHMGC1011 or CHMGC1022	15
		STAGC2216 Data analysis for science	SCIGC1020	15
	2	BTHGC2732 Recombinant DNA technology	BIOGC1722	15
		BTHGC2752 Cellular metabolism	BIOGC1722 & CHMGC1011	15
		SCIGC2010 Practice and application of science		15
		Elective Course		15
Third Year	**1**	SCIGC3716 Laboratory and workplace management	1st Level CHM 6pts 2nd Level Lab Science 6pts	15
		CHMGC2922 Spectroscopy and analytical chemistry	CHMGC1011 & CHMGC1022	15
		BTHGC3711 Food and industrial microbiology	MICGC2011	15
		CHMGC3930 Medicinal Chemistry	CHMGC2762	15
	2	BTHGC3752 Molecular biology and biotechnology	BTHGC2732	15
		BTHGC3732 Environmental microbiology	MICGC2011	15
		Elective Course		15
		2nd or 3rd Level Elective		15
			Total	360

Bachelor of Science (Medical Bioscience) – Program Code GSM5

Standard duration of study (years)	3 years full-time / 6 years part-time
Study mode and Location	On Campus and Off Campus Gippsland
Total credit points required	360

Structure

This Program consists of core and elective courses. Students must complete the mathematics/statistics requirement at stage one before enrolling in level two science courses.

Requirements

Students must complete all of the following:

Core Courses

- BIOGC2731 Support and movement
- BIOGC1711 Vertebrate biology
- BIOGC1722 Cell biology
- BTHGC2732 Recombinant DNA technology
- BTHGC2741 Biochemistry or BTH2752 Cellular metabolism
- BTHGC3741 Medical cell biology
- BTHGC3752 Molecular biology and biotechnology or BTH3722 Medical microbiology
- MICGC2011 Introduction to microbiology and microbial biotechnology
- SCIGC1010 Scientific communication
- SCIGC1020 Introduction to statistical reasoning
- SCIGC2010 Scientific practice and communication
- Plus three of:
    - BTHGC3722 Medical microbiology
    - BTHGC3752 Molecular biology and biotechnology
    - CHMGC3930 Medicinal Chemistry
    - IMMGC3802 Essentials of applied immunology
    - SCIGC3716 Laboratory and workplace management

Additional course requirements

- 15 points of level one chemistry courses
- 15 points of level one psychology
- 15 points of level two physiology
- Additional elective courses chosen from any faculty, including courses offered for other science Programs.

Note: Students must complete:

- at least 90 points of science courses at level one and at least 60 points of science courses at level three
- no more than 150 points of level one courses overall.

Additional Requirements

Students must complete the equivalent of six weeks' professional training via an approved placement in a clinical or medical laboratory or community health organisation in order to complete the requirements for this program.

This sample shows you how to map your program so as to complete all the requirements. Advice should be sought from program advisers if you are unsure about course selection on 03 51226454 or scieng.gippsland@federation.edu.au

Program Progression – Bachelor of Science (Medical Bioscience)				
Year	**Semester**	**Course Details**	**Prerequisites**	**Credit Points**
First Year	**1**	CHMGC1011 Chemistry I *(pre-requisite for BTHGC2471)*		15
		BIOGC1711 Vertebrate biology		15
		1st Level Psychology course		15
		ENCOR1015 Intro to maths ** for students without maths methods		15
	2	SCIGC1020 Intro to statistical reasoning		15
		BIOGC1722 Cell biology		15
		SCIGC1010 Scientific communication		15
		Elective		15
Second Year	**1**	BTHGC2741 Biochemistry or BTH2752 (S2)	BIOGC1722 & CHMGC1011	15
		MICGC2011 Introduction to microbiology and microbial biotechnology	BIOGC1722	15
		CHMGC2762 Design of molecules and macromolecules (recommended)	CHMGC1011 or CHMGC1022	15
		BIOGC2731 Support and movement	BIOGC1711; prohibition-ANTGC2331, BIOGC2752	15
	2	BTHGC2752 Cellular metabolism or BTHGC2741 (S1)	BIOGC1722 & CHMGC1011	15
		BTHGC2732 Recombinant DNA technology	BIOGC1722	15
		Elective at level 1, 2 or 3		15
		SCIGC2010 Practice and application of science		15
Third Year	**1**	BTHGC3741 Medical cell biology	BTHGC2741	15
		SCIGC3716 Laboratory and workplace management	1st Level CHM 15pts 2nd Level Lab Science 15pts	15
		CHMGC3930 Medicinal Chemistry	CHMGC2762 or permission	15
		IMMGC3802 Essentials of applied immunology	BIOGC1711 or BIOGC1722 & BIO2721 or BIO2752	15
	2	BTHGC3752 Molecular biology and biotechnology or BTHGC3722 Medical microbiology	BTHGC2732	15
		Elective at level 1, 2 or 3		15
		Elective at level 2 or 3		15
		Elective at level 2 or 3		15
			Total	360

Bachelor of Science (Veterinary Bioscience) – Program Code GSV5

Standard duration of study (years)	3 years full-time / 6 years part-time
Study mode and Location	On Campus and Off Campus Gippsland
Total credit points required	360

Structure

This Program consists of core and elective courses.
Students must complete the mathematics/statistics requirement at stage one before enrolling in level two science courses.

Requirements

Students must complete all of the following:

Core Courses

- BIOGC1711 Vertebrate biology
- BIOGC1722 Cell biology
- CHMGC1011 Chemistry I
- CHMGC1022 Chemistry II
- ENVGC1711 Ecological systems and the environment
- SCIGC1010 Scientific communication
- SCIGC1020 Introduction to statistical reasoning
- BIOGC2710 Animal management and disease
- BIOGC2731 Support and movement
- BTHGC2741 Biochemistry
- BTHGC2752 Cell metabolism
- ENVGC2712 Biology and diversity
- MICGC2011 Introduction to microbiology and microbial biotechnology
- SCIGC2010 Scientific practice and communication
- BIOGC3712 Case studies in animal management
- BIOGC3132 Biology of Australian vertebrates
- BTHGC3722 Medical microbiology
- BTHGC3741 Medical cell biology
- One third level course from CHMGC3930, IMMGC3802, SCIGC3990, SCIGC3790

Additional course requirements

- 6 elective courses which may be chosen from any faculty, including courses offered from other science Programs.

Note: Students must complete:

• at least 90 points of science courses at level one and at least 60 points of science courses at level three
• no more than 150 points of level one courses overall.

This sample shows you how to map your program so as to complete all the requirements. Advice should be sought from Program advisers if you are unsure about course selection on 03 51226454 or scieng.gippsland@federation.edu.au

Program Progression – Bachelor of Science (Veterinary Bioscience)				
Year	**Semester**	**Course Details**	**Prerequisites**	**Credit Points**
First Year	**1**	BIOGC1711 Vertebrate biology		15
		CHMGC1011 Chemistry I		15
		ENVGC1711 Ecological systems and the environment		15
		ENCOR1015 Intro to maths ** for students without maths methods		15
	2	BIOGC1722 Cell biology		15
		CHMGC1022 Chemistry II		15
		SCIGC1020 Intro to statistical reasoning.		15
		SCIGC1010 Scientific communication		15
Second Year	**1**	Elective at level 1, 2 or 3	BIOGC1711	15
		BTHGC2741 Biochemistry	BIOGC1722 & CHMGC1011	15
		MICGC2011 Introduction to microbiology and microbial biotechnology	BIOGC1722	15
		BIOGC2731 Support and movement	BIOGC1711; prohibition ANT2331, BIO2752	15
	2	SCIGC2010 Scientific Practice and communication		15
		BTHGC2752 Cellular metabolism	BIOGC1722 & CHMGC1011	15
		ENVGC2712 Biology and diversity	ENVGC1711 & BIOGC1711 or BIOGC1722	15
		BIOGC2710 Animal management and disease		15
Third Year	**1**	BTHGC3741 Medical cell biology	BTHGC2741	15
		One third level course from CHMGC3930, IMMGC3802, SCIGC3990, SCIGC3790		15
		Elective at level 1, 2 or 3		15
		BIOGC3132 Biology of Australian vertebrates	ENVGC2712 & BIOGC2752	15
	2	BIOGC3712 Case studies in animal management	BIOGC2710	15
		BTHGC3722 Medical microbiology	MICGC2011	15
		Elective at level 2 or 3		15
		Elective at level 2 or 3		15
			Total	360