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) and well done in achieving 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 courses 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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Information for on-campus students

You will receive your official offer via email, which includes your User ID and Password for **my Student Centre - mySC**, which is where you can accept/defer your offer, manage your enrolment, receive your results and view your invoices.

Guidelines on how to successfully complete your enrolment and other important information is provided at http://www.federation.edu.au/future-students/study-at-feduni/apply/domestic/accepting-your-offer

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.

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.

Course Outlines

CHMGC1011 Chemistry 1

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.

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.

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.

Outcomes

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: optimisation, area and volume, introduction to differential equations; Vectors in two- and three- dimensional space.

Outcomes

1. 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 modeling

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

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 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.

ENGGC1210 Introduction to structural engineering

Structural engineering analysis and design topics include trusses, beams, columns, calculation of reactions and deflections. Design of simple structures.

Outcomes
As a project based course, this course should develop the student's knowledge and understanding. Understanding of the way in which civil engineers investigate and solve problems, including the need to understand the environment in which the problem is embedded. Knowledge of basic design. Knowledge of basic structural form and how structures carry load; static equilibrium; limit state concepts; truss analysis and stability; shear force and bending moment diagrams; buckling and serviceability; equilibrium and compatibility. Skills. Ability to acquire knowledge in the pursuit of solving engineering problems, ability to make critical observations of engineering problems and to successfully apply the acquired knowledge. Specific skills related to the analysis and design of simple structural elements. Communication skills, in both oral and written forms. Computer skills and knowledge of one structural analysis software package. Attitudes. Appreciation of the relevance of engineering knowledge to engineering practice. Confidence in the ability to tackle new engineering problems, particularly in the structural design environment, through the development of the above skills, knowledge and understanding.

ENGGC1211 Introduction to engineering systems

Introduction to engineering; the systems approach to engineering problems and their solutions; sustainable development, ecology and the environment; lifecycle concepts, safety, management, quality and economic analysis; engineering ethics. Group work, written reports and oral presentations.

Outcomes
To provide students with a vision and understanding of the scope of engineering, including emphasis on its breadth and interactions and linkages with other disciplines
To introduce students to the role of the engineer in society, including environmental issues.
To introduce the concepts of engineering ethics.

Bachelor of Civil and Environmental Engineering (Honours)
Program Code GCE5

Standard duration of study (years)	**4 years full-time / 8 years part-time**
Study mode and Location	**On campus Gippsland**
Total credit points required	**480**

Structure

Level one includes basic sciences such as mathematics and chemistry, as well as introductory engineering courses and an introduction to environmental science. The two engineering units provide a basis for civil engineering studies and will have material associated with environmental engineering added to supplement them.

At level two, students will undertake studies mainly in the areas of civil and environmental engineering. These include geomechanics, structures, hydrology and water supply, as well as environmental modelling. Basic mathematics will also be continued. The civil engineering courses will have material associated with environmental engineering added to supplement them.

Level three and four courses further extend studies in civil and environmental engineering design and analysis with increasingly complex tasks, as well as providing more advanced studies in transport, environmental management and environmental technology.

Requirements

Students must complete 480 points compromising of 405 points of core course and 75 points of electives usually taken in the third and fourth years of study.

Additional Information

Vacation employment/industrial experience

In order to fulfill the requirements of the various degree regulations and Engineers Australia, all engineering students must complete 12 weeks of approved engineering vacation employment and submit a report on that work. Such work is normally undertaken in the vacations between second and third years and/or between third and fourth years (but may also be taken between first and second years). Students who have completed all academic requirements for their degrees are not eligible to graduate until this vacation employment has been completed and a satisfactory report submitted.

Responsibility for course choice

Students are advised that while the course 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 course specific regulations and requirements. The Faculty will not accept responsibility for student error in course selection.

Responsibility to satisfy pre-requisite requirements

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.

Useful Websites

Program Finder - http://programfinder.federation.edu.au/ProgramFinder/displayProgram.jsp?ID=53134

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

Bachelor of Civil and Environmental Engineering (Honours) – Program Progression				
Year	**Semester**	**Course Details**	**Prerequisites**	**Credit Points**
First Year	**1**	ENGGC1211 Introduction to engineering systems		15
		ENVGC1711 Ecological systems and the environment		15
		MTHGC1020 Analysis of change		15
		CHMGC1011 Chemistry I		15
	2	ENGGC1210 Introduction to structural engineering		15
		ENVGC1722 Geophysical systems and the environment		15
		MTHGC1030 Techniques for modelling		15
		PHSGC1711 Applied Physics		15
Second Year	**1**	ENGGC2202 Steel structures	ENGGC1210	15
		ENGGC2204 Water systems		15
		ENGGC2206 Intro to Geo-engineering	ENGGC1210	15
		MATGC2731 Multivariate analysis	MTHGC1030	15
	2	CHMGC2752 Chemistry of the environment		15
		ENGGC2203 Concrete structures	ENGGC1210	15
		ENGGC2207 Waterway engineering		15
		MATGC2742 Mathematical modelling of the environment	MTHGC1030	15
Third Year	**1**	ATS3259 Geographical information systems for environmental		15
		ENGGC3201 Project management for engineers		15
		ENGGC3203 Environmental geo-engineering		15
		ENGGC3204 Water and wastewater	ENGGC2207	15
	2	ENGGC3202 Geo-engineering	ENGGC2206	15
		ENGGC3205 Traffic and transport		15
		ENVGC3737 Tools for environmental management	ENVGC1711	15
		ENGGC3206 Civil and environmental engineering design		15
Fourth Year	**1**	ENGGC4201 4th Year Project	Comp of 120 pt	15
		Elective (refer to online handbook for options)		15
		Elective (refer to online handbook for options)		15
		Elective (refer to online handbook for options)		15
	2	ENGGC4203 Management of water resources	ENGGC3204	15
		ENGGC4204 Road Engineering	ENGGC3205	15
		Elective (refer to online handbook for options)		15
		Elective		15
			Total	480