COURSE DELIVERY PLAN 2023

Bachelor of Science
COURSE CODE: ECST

CAMPUS	Footscray Park (FP)
COLLEGE	College of Engineering and Science
STUDY MODE	Full Time or Part Time
DURATION	3 years Full Time or Part Time equivalent
FEE TYPE	For information on course fees, refer to http://vu.edu.au/fees
APPLICATION METHOD	VTAC - https://vtac.edu.au Direct Application - https://gotovu.custhelp.com/app/landing
TIMETABLE	vu.edu.au/timetables
COURSE REQUIREMENTS	To attain the Bachelor of Science students will be required to complete 288 credit points, consisting of: • 96 credit points of First Year Core units; • 96 credit points of Major studies; AND select 96 credit points of: • 96 credit points of Major studies OR: • 2 x 48 credit points of two Minor studies.
FURTHER INFORMATION	Unit and course information is available from the University course search site at http://vu.edu.au/course-search or go to https://askvu.vu.edu.au or Phone VUHQ on 03 9919 6100
COURSE CHAIR	Roan Plotz
COURSE ADVICE	AskVU https://askvu.vu.edu.au/app/askcua

Note: Students are required to enrol in all units for semester 1 and 2, and are not permitted to enrol in more than 48 credit points per semester as a full-time load.

Core/Elective Core (a unit that must be completed) & Elective (you have some choice in what you select).

Prerequisites A number of units within the degree have 'prerequisites'. These prerequisites must be met before enrolment in the unit is permitted. Generally these prerequisites require the successful completion of a unit or units taken at an earlier stage in the course. Students should pay particular attention to these prerequisite requirements as failure to meet these can seriously hinder progression through the course.

Date of Publication: This information is current at the publication date: 20/10/2022. It is provided as information only and does not form part of a contract between any person and Victoria University.

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YEAR 1

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
NSC1210	Skills for the Scientist	Core	1B1	12	FP	
RBF1310	Biology 1	Core	1B2	12	FP	
NEF1105	Mathematics for Engineering and Science	Core	1B3	12	FP	
RCS1601	Chemistry 1A	Core	1B4	12	FP , SA	
RBF1150	Global Environmental Issues	Core	2B1	12	FP	
RBF1320	Biology 2	Core	2B2	12	FP	
NEM1002	Statistics for Decision Making	Core	2B3	12	FP	
RCS1602	Chemistry 1B	Core	2B4	12	FP	RCS1601

Students commencing in **Semester 1, Block 3 (1B3-2022)**, please enrol as per below only:

1B3-RBF1310
1B4-RCS1601
2B1-RBF1150
2B2-RCS1602
2B3-NEM1002
2B4-RBF1320

Students in this course must take **1 Major** and **2 Minor** options **OR** the **Double Major** option.

List of major/s available in this course:

NMABIT Biotechnology OR
NMAENV Ecology and Environmental Management

List of minor/s available in this course:

NMIACH Analytical Chemistry
NMICBM Cell Biology/Microbiology – cannot take this Minor if taking NMABIT as your Major
NMIEAA Ecology and Environmental Management – cannot take this Minor if taking NMAENV as your Major
NMIESC Environmental Science – cannot take this Minor if taking NMAENV as your Major
NMIMST Mathematics/Statistics
AMITEM The Entrepreneurial Mindset
EMIAGL Aboriginal Yulendj (Knowledge) and Community

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YEAR 2

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
	Major 1	Major	1	12		
	Major 1	Major	1	12		
	Minor 1 OR Major 2	Minor/Major	1	12		
	Minor 2 OR Major 2	Minor/Major	1	12		
	Major 1	Major	2	12		
	Major 1	Major	2	12		
	Minor 1 OR Major 2	Minor/Major	2	12		
	Minor 2 OR Major 2	Minor/Major	2	12		

YEAR 3

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
	Major 1	Major	1	12		
	Major 1	Major	1	12		
	Minor 1 OR Major 2	Minor/Major	1	12		
	Minor 2 OR Major 2	Minor/Major	1	12		
	Major 1	Major	2	12		
	Major 1	Major	2	12		
	Minor 1 OR Major 2	Minor/Major	2	12		
	Minor 2 OR Major 2	Minor/Major	2	12		

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MAJORS:

Biotechnology NMABIT

After developing a solid grounding in science and mathematics from the core units in first year, this specific group of units allows you to pursue a Major in Biotechnology.

This biotechnology major has a strong research and application focus and will produce graduates that are 'work ready' by combining an extensive laboratory program with training on state-of-the-art instrumentation and techniques along with a final year research project. The course combines studies in modern cell-, molecular-, immuno- and micro-biology to develop a broad range of knowledge and investigative skills that are applicable to a broad range of research fields, industries and employers. The laboratory program includes hands-on training on modern analytical equipment including applications, theory of operation, optimisation and data analysis.

The major includes two Capstone units:
NEF3001 Applied Project 1 which provides an overview of the broad range of research fields and industries that utilise biotechnological advances in real world settings. This unit also provides research training in industrial techniques as well as field trips to biotechnology companies. This unit also considers the broader context of biotechnological advances in modern society.

NEF3002 Applied Project 2 which enables students to complete either a research project in a field of biotechnology or a work placement in the biotechnology industry. This provides graduates with significant practical experience in a research or industry setting and provides training in the administrative requirements of lab-based research.

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
HBM2105	Medical Microbiology and Immunity	Major	2B1, 2B2, 2B3, 2B4	12	SA	RBM1528; or RBF1310
HBM2106	Human Genetics	Major	2B1, 2B2	12	SA	HBM1002, RBF1320
HBM3205	Clinical Genetics and Cellular Basis of Disease	Major	2B3, 2B4	12	SA	RBM2560, RBM2133
RBM2133	Cell and Molecular Biology	Major	1B2, 1B3, 1B4, WB1	12	SA	RBM2560; and RBM1528; or RBF1310
RBM2560	Medical Biochemistry	Major	1B1, 1B2, 1B3, 1B4	12	FP	RBM1528; or RBF1310; and RCS1602
RBM3720	Immunology	Major	1B1, 1B3	12	SA	HBM2105
NEF3001	Applied Project 1	Major	1B1, 1B4, 2B1, 2B4, SB1, WB1	12	FP	
NEF3002	Applied Project 2	Major	1B1, 1B4, 2B1, 2B4, SB1, WB1	12	FP	NEF3001

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Ecology and Environmental Management NMAENV

This Ecology and Environmental Management major has a strong research and application focus and will produce graduates that are 'work ready' by combining an extensive laboratory and field-based program with training centred on state-of-the-art techniques and information along with final year research projects embedded in the capstone units. The course combines studies in ecology, zoology, ecology, geography, genetics and applied ecological management to develop a broad range of knowledge and investigative skills that are applicable to a wide range of research fields, industries and employers. The laboratory and field programs, includes hands-on training on modern analytical equipment including applications, theory of operation, optimisation and data analysis.

The major includes two Capstone units:
RBF3210 Environmental Rehabilitation builds on previously taken units and introduces a range of tools that will assist in the rehabilitation of Victoria's terrestrial environments and communities. Topics include the ecological parameters and adaptations of organisms in diverse environments and the key ecological relationships amongst organisms. Rehabilitation projects based on approaches using ecological theory will be reviewed using contemporary case studies. Practicals will include hands-on experience in the use of the Native Vegetation Management Framework, the Habitat Hectare approach, development of land management plans, and specific threatened species rehabilitation programs.

RBF3620 Conservation and Sustainability ties together, in both theoretical and practical ways, concepts and practices for maintaining biological diversity, and how these concepts and practices can be integrated with social and economic needs.

More specifically, this unit brings together concepts such as the development of conservation theory and practice in Australia; extinction and its significance, including pathways to extinction; the meanings, levels and interpretation of concepts of biodiversity; ecological and adaptive management approaches to conservation and recovery, including design of reserves, setting priorities, off-reserve conservation and ex-situ (captive breeding, reintroduction and translocation). Practical field studies and site visits will investigate the contributions of zoo's, national and state parks, friends groups, councils and shires, other government agencies and private landholders to the conservation and recovery of plant and animal species, from insects to mammals, and from mushrooms to trees. The subject will also include practical appraisals of techniques used to determine integrity of ecosystems, landscapes and overall environment, the contributions made by biodiversity to ecosystem services and integrated methods for recovery and sustainable management of species and ecosystems.

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
NPU2110	Australian Landscapes and Biota	Major	1B2, 1B3	12	FP	
RBF2640	Australian Animals	Major	1B1, 1B4	12	FP	RBF1310
RBF2610	Fundamentals of Ecology	Major	2B2, 2B3	12	FP	RBF1310, RBF1320
RBF2620	Australian Plants	Major	2B4, SB1	12	FP	RBF1310, RBF1320
NPU3106	Conservation Genetics	Major	2B2, 2B3	12	FP	RBF1310, RBF1320, RBF2610
RBF3110	Marine & Freshwater Ecology	Major	1B2, 1B3	12	FP	RBF1310, RBF1320, RBF2640
RBF3210	Environmental Rehabilitation	Major	2B1, 2B4	12	FP	RBF1310, RBF1320
RBF3620	Conservation and Sustainability	Major	1B4, WB1	12	FP	RBF1310, RBF1320, RBF2610

COURSE DELIVERY PLAN 2023

MINORS:

Analytical Chemistry NMIACH

After developing a solid grounding in science and mathematics from the core units in first year, this specific group of units allows you to pursue a breadth minor in Analytical Chemistry.

Analytical chemistry is a cornerstone of the chemical industry and has many applications including food, forensic, pharmaceutical, medical and environmental analyses. This chemistry minor includes hands-on training on modern analytical equipment including applications, theory of operation, optimisation, maintenance and troubleshooting to produce work ready graduates.

This minor is appropriate for student undertaking major studies in a range of science discipline areas who wish to complement their studies with some training in chemical instrumentation operation and interpretation.

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
NPU2101	Analytical Methods 1	Minor	1B1	12	FP	RCS1601; and RCS1602
NPU2102	Analytical Methods 2	Minor	2B3	12	FP	NPU2101
NPU2103	Organic Synthesis	Minor	1B2	12	FP	RCS1602
NPU2104	Drug Discovery and Development	Minor	2B4	12	ORT	

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Cell Biology/Microbiology NMICBM

After developing a solid grounding in science and mathematics from the core units in first year this group of units allows you to pursue a breadth minor in Cell Biology and Microbiology.

This biotechnology minor is focussed upon the cellular processes fundamental to life and spans both single celled organisms through to complex multi-cellular life. In addition to the investigation of the intracellular processes underpinning life, the interaction between cells is also explored. This includes an understanding of multicellular cooperation, the basis of adaptive immunity and the breakdown of these regulated processes in disease (ie. cancer, auto-immunity... etc). It also explores the interaction between cells and the environment and the critical roles of microorganisms in the biosphere. This minor includes extensive practical training in methods for studying cellular processes including cell culture techniques, microbial culture/identification and immunological-based techniques.

This minor is appropriate for students undertaking major studies in a range of science discipline areas who wish to complement their studies with an understanding of the cellular basis of life and how that knowledge can be utilised in a broad range of settings, including medical, environmental, pharmaceutical and agricultural industries.

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
HBM2105	Medical Microbiology and Immunity	Minor	2B1, 2B2, 2B3, 2B4	12	SA	RBM1528; or RBF1310
RBM2133	Cell and Molecular Biology	Minor	1B2, 1B3, 1B4, WB1	12	SA	RBM2560; and RBM1528; or RBF1310
RBM2560	Medical Biochemistry	Minor	1B1, 1B2, 1B3, 1B4	12	FP	RBM1528; or RBF1310; and RCS1602
RBM3720	Immunology	Minor	1B1, 1B3	12	SA	HBM2105

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Ecology and Environmental Management NMIEAA

The units within this group comprise of the Ecology and Environmental Management Minor within the new Bachelor of Science degree (NBSC). These units have been selected to provide students with a thorough grounding in the latest advances in ecology and environmental restoration and management. The units selected provide a focus on the theoretical and practical foundations of biological and environmental research. The practical application of ecologically sound techniques across a broad spectrum of settings related to conservation and general environmental restoration and management, are covered in depth throughout these units. There is a clear focus on the applications, procedures and regulations used in ecological management and related industries to produce work-ready graduates.

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
NPU2110	Australian Landscapes and Biota	Minor	1B2, 1B3	12	FP	
RBF2610	Fundamentals of Ecology	Minor	2B2, 2B3	12	FP	RBF1310, RBF1320
RBF3210	Environmental Rehabilitation	Minor	2B1, 2B4	12	FP	RBF1310, RBF1320
RBF3620	Conservation and Sustainability	Minor	1B4, WB1	12	FP	RBF1310, RBF1320, RBF2610

Environmental Science NMIESC

The units within this group comprise of the Environmental Science Minor within the new Bachelor of Science degree (NBSC). These units have been selected to provide students with a thorough grounding in the latest advances in botany, zoology, geography and ecology. The units selected provide a focus on the theoretical and practical foundations of biological and environmental research. The foundations of ecological knowledge and the key components of natural ecosystems are covered in depth throughout these units. There is a clear focus on the key elements needed to understand ecological applications, procedures and regulations used in ecological management and related industries. These key understanding will produce work-ready graduates that have a good grounding in environmental science.

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
NPU2110	Australian Landscapes and Biota	Minor	1B2, 1B3	12	FP	
RBF2610	Fundamentals of Ecology	Minor	2B2, 2B3	12	FP	RBF1310, RBF1320
RBF2620	Australian Plants	Minor	2B4, SB1	12	FP	RBF1310, RBF1320
RBF2640	Australian Animals	Minor	1B1, 1B4	12	FP	RBF1310

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Mathematics/Statistics NMIMST

After developing a solid grounding in science and mathematics from the core units in first year, this specific group of units allows you to pursue a breadth minor in mathematics and statistics.

These disciplines are at the heart of all modern science: from modelling of scientific problems to analyzing data. This minor includes the fundamental mathematics and statistics as used in modern applications, and will also provide you with the grounding to be an active and independent learner. This minor places great emphasis on applications, and also on the use of technology: from hand-held calculators to modern "industry strength" computer systems. As a science graduate with a solid grounding in mathematics and statistics you will be well placed to enter the workforce.

Much modern science requires the creation of a good mathematical model as an underpinning; this minor will provide the necessary tools to be able to create such models, analyze them, and use them for testing, evaluation, and prediction. As well, data produced from laboratory or field studies needs to be rigorously analysed, and this minor introduces the technical skills necessary for such analysis.

This minor is appropriate for student undertaking major studies in a range of science discipline areas who wish to complement their studies with some training in applied mathematics and statistics, and in the use of technology to support those fields.

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
RCM2611	Linear Statistical Models	Minor	1B1, 2B3	12	FP	NEM1002
RCM2713	Modelling for Decision Making	Minor	1B2, 2B4, WB1	12	FP	NEM1001
RCM2911	Linear Optimisation Modelling	Minor	1B1, 2B3	12	FP	
RCM3711	Computational Methods	Minor	1B2, WB1	12	FP	RCM2713; or RCM2611; or RCM2911

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Molecular Biology NMIMBI

After developing a solid grounding in science and mathematics from the core units in first year this group of units allows you to pursue a breadth minor in Molecular Biology.

This biotechnology minor concentrates on the chemical basis of life with a particular focus on the relationship between genes, the proteins they encode and the impact these have on organisms. This minor provides knowledge of biochemistry and genetics that can be utilised across a broad range of industries, from DNA-based technologies in forensic science and conservation biology, to the diagnosis of disease using biochemical and genetic analyses, to the genetic engineering of cells and organisms. This minor includes practical training in the techniques used in biochemical analysis, investigation of gene and protein function and genetic engineering. This minor also investigates the ethical implications of these technologies and their broader impact on society.

This minor is appropriate for students undertaking major studies in a range of science discipline areas who wish to complement their studies with an understanding of the molecular basis of life and how that knowledge can be utilised in a broad range of settings, including medical, forensic, conservation, pharmaceutical and agricultural industries.

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
HBM2105	Medical Microbiology and Immunity	Minor	2B1, 2B2, 2B3, 2B4	12	SA	RBM1528; or RBF1310
HBM2106	Human Genetics	Minor	2B1, 2B2	12	SA	HBM1002, RBF1320
HBM3205	Clinical Genetics and Cellular Basis of Disease	Minor	2B3, 2B4	12	SA	RBM2560, RBM2133
RBM2560	Medical Biochemistry	Minor	1B1, 1B2, 1B3, 1B4	12	FP	RBM1528; or RBF1310; and RCS1602

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Breadth Minors:

The Entrepreneurial Mindset AMITEM

The nature of work is changing. The rapid pace in which technology is developing is causing widespread disruption, both in organisational cultures and working practices. And with new technologies such as artificial intelligence and machine-learning, robotics, nanotechnology, 3-D printing, and genetics and biotechnology coming up, this disruption is only getting started.

Success in this new world is increasingly dependent on personal initiative; a self-starting, future-oriented and persistent proactive mindset. Such a mindset combined with effective teamwork in a multidisciplinary context has been the driver of entrepreneurial success for decades. More and more employers are starting to demand these skills from their employees as well.

This unit set equips students with the skills and competencies to future-proof yourself, creating experiences that allow for a strong start to and succeeding in your chosen profession (be that as an employee or self-employed). Students work collaboratively on employing an evidence-based approach to identifying problems and implementing solutions, equipping themselves with the skills and knowledge to lead in the future of work.

The first unit explores how to come up with ideas and how to critically assess the potential of the idea. During this unit we introduce a number of key processes and concepts like where to start when exploring ideas, how to run user interviews and pretotyping. The second unit introduces the Minimum Viable Product (MVP) and allows students to experiment with the evidence-based, iterative approach of User Validation. The third unit focuses on how to effectively communicate the findings of the first two units in a compelling story to gather critical support. Finally, the last unit introduces students to growth strategies and how these strategies drive execution.

The unit set culminates in a pitch-style event where the students pitch their project in a live setting to an audience of stakeholders, integrating the knowledge, skills and understandings they have developed.

The Entrepreneurial Mindset unit set aims to provide career defining experiences. The minor is demanding and is a great fit for students who want to be part of something exciting and new while creating their own success.

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
AEN2001	Problem Discovery	Minor	?	12	FP	
			1B1, 2B1		ORT	
AEN2002	Solution Validation	Minor	?	12	FP	
			1B2, 2B2		ORT	
AEN3001	Storytelling for Impact	Minor	?	12	FP	AEN2002
			1B3, 2B3		ORT	
AEN3002	Hacking Growth	Minor	?	12	FP	AEN2002
			1B4, 2B4		ORT	

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Aboriginal Yulendj (Knowledge) and Community EMIAGL

With UNESCO's acknowledgement that Indigenous groups globally are challenged from 'development', global warming and globalisation and the Australian government's adoption of the UN Declaration on the Rights of Indigenous Peoples, how might Indigenity assert itself legally, politically, culturally, socially and technologically to secure/ensure an equitable and respected place in a multicultural globalised Australian context?

How might key Aboriginal issues underpinned by self-determination, land and country, treaty, economic development, urban and regional planning, traditional owners, cultural heritage and art, human rights, ethics and community development be considered and applied in a changing world and in Australian civics and citizenship, workplaces and community?

The Aboriginal Yulendj (Knowledge) and Community minor will be available for students enrolled in VU undergraduate programs and it will use Moondani Balluk (embrace people) units in decolonial and postmodern theories to consider a range of complex topics concerning personal and national identity in a changing global world. In this minor, students will explore, analyse and deconstruct their own disciplinary and lived perspectives as well as explore, reflect and understand the impacts and outcomes of colonisation for Aboriginal individuals, families and communities in South East Australia. Topics to be explored include history, human rights, traditional owners, sovereignty, governance and societal structures, coloniality and systems of power and community ethics.

UNIT CODE	UNIT TITLE	UNIT TYPE	SEM	CREDIT POINTS	CAMPUS	PRE-REQUISITES
AEK1204	Aboriginal History and Political Movements	Minor	2B1, 2B2, 2B3, 2B4	12	FP	
			2B2		W	
AEK1105	Aboriginal Traditions and Policy	Minor	1B2, 1B3, 1B4	12	FP	
AEK2205	Politics of Aboriginal Art	Minor	1B3	12	FP	AEK1105; or AEK1204
AEK2203	Indigenous Perspectives On Sustainability	Minor	2B3	12	FP	AEK1105; or AEK1106; or AEK1204
AND						
AEK3203	Working Ethically in Aboriginal Community	Minor	2B1, 2B3	12	FP	AEK1105; or AEK1204; and AEK2203; or AEK2205
AEK3204	Aboriginal Political and Reflective Learning	Minor	1B4	12	FP	

Students please note that when enrolling into this Minor that you follow the below only as the requirement is 48 cp.

AEK1105 **OR** AEK1204 (Year 1) - You take one of these units only
AEK2205 **OR** AEK2203 (Year 2) - You take one of these units only
AEK3203 (Year 3)
AEK3204 (Year 3)