

# Year 9 and 10 STEM Futures Program Curriculum Handbook 2025

*Inspiring Great Minds*



Queensland Academy  
for Science Mathematics  
and Technology





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## Introduction

Dear Parents and Carers,

Students will soon be commencing the next phase of their learning as they move into the Year 9 – 10 program of study, known as our STEM Futures Program. This handbook is designed to support students and parents in selecting subjects for their program of study. I encourage you to review the contents of this handbook to learn about our STEM Futures Program and its importance in supporting students' transition from the IB Middle Years Programme to the IB Diploma Programme. The STEM Futures Program marks the start of students considering the subjects they are interested in studying in their IB Diploma, so important consideration is necessary.

To help families make subject selections, this booklet provides an overview of the curriculum as one of a number of strategies to ensure that students make informed choices that comply with the rules of the IB Middle Years and Diploma Programmes. While the Academy aims to offer all subjects listed in this booklet, it is important to note that this will be dependent on class numbers and the Academy's staffing capacity. Some subjects may not be able to be offered if minimum numbers are not met.

Students are required to complete their STEM Futures Program subject selection online. Details for completing the online subject selection will be provided by email, including dates for completion. The subjects available for selection are listed at the back of this booklet. The checklist on the subject selection page should be used as a guide to deciding on your subject selections.

Regards,

**Tanya Haggarty**

Associate Principal Academic

Queensland Academy for Science Mathematics and Technology

# Our Mission and Values

## Our Vision

Inspiring great minds through the provision of a world-class education that nurtures personal excellence and develops young people who are able to contribute positively to an ever-changing world.

## Our Values

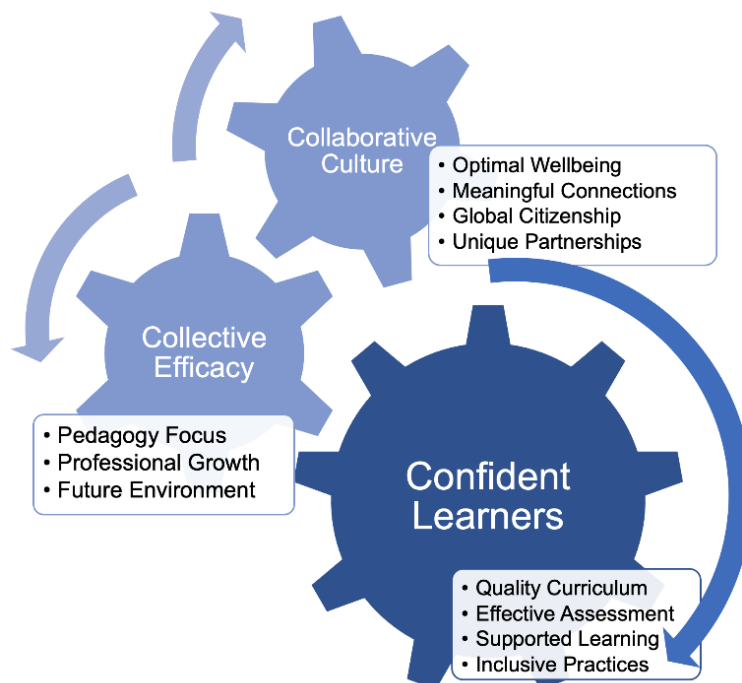
We value the ten aspirational qualities of the International Baccalaureate (IB) Learner Profile, which go beyond academic success to instil a sense of personal excellence, striving to improve in every aspect of our lives. The aim is not perfection but instead to achieve our potential; and flourishing as defined in positive psychology.

Inquirers	Open-minded
Knowledgeable	Caring
Thinkers	Risk-takers
Communicators	Balanced
Principled	Reflective

## Our Mission

To achieve the IB aims of developing inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect. Through the IB, we develop challenging programmes of international education and rigorous assessment. These programmes encourage our students to become active, compassionate and lifelong learners who understand that other people, with their differences, can also be right.

*(Adapted from the IB Mission Statement)*



# Overview of QASMT Curriculum Programs

The Year 7 – 12 curriculum framework at QASMT has been specifically developed to provide a STEM focussed curriculum, through the International Baccalaureate (IB) Middle Years Programme (MYP) and Diploma Programme (DP).

## Year 7 – 8 Foundation Program

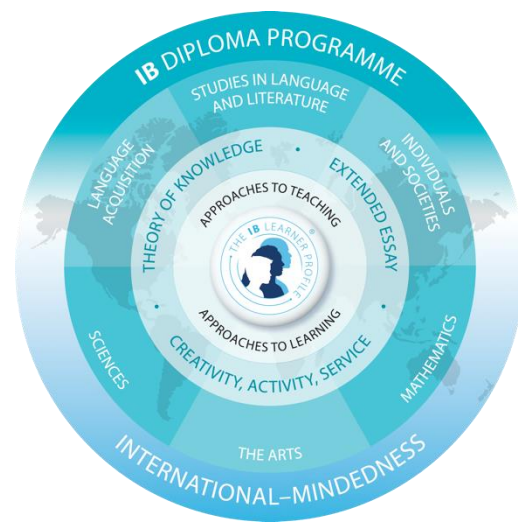
A rigorous and accelerated curriculum program developed through the IB Middle Years Programme, Year 3 standards, and mapped to the Australian Curriculum as relevant. The program is delivered through six full year courses and two semester courses across the eight MYP subject groups. Students choose their Language Acquisition and Arts courses.

## Year 9 – 10 STEM Futures Program

A STEM focussed curriculum program, developed through a core curriculum of Language and Literature, Mathematics and Language Acquisition and a STEM Futures curriculum across Sciences, Individuals and Societies, Design, The Arts and Physical and Health Education. The Year 9 program is developed through the IB Middle Years Programme, Year 5 standards, and mapped to the Australian Curriculum as relevant. The program culminates in completion of a STEM Futures Project. The Year 10 program is a bespoke program developed to prepare students for the rigours of the IB Diploma Programme and mapped to the Australian Curriculum as relevant. The program is delivered through semester core subjects and STEM Futures electives. The program culminates in the final semester with a Diploma Preparation Program.

## Year 11 – 12 Diploma Program

A rigorous, university preparation curriculum program, developed through the IB Diploma Programme. The programme is studied across six subject areas, either one subject in each subject group or two subjects in either Sciences or Individuals and Societies, instead of a subject in Arts. All students study three subjects at Standard Level, three subjects at Higher Level subjects and the inner core subjects, Theory of Knowledge, Extended Essay and CAS (Creativity, Activity and Service).



# The IB Learner Profile

The aim of all IB programmes is develop international mindedness in students who, recognising their common humanity and shared guardianship of the planet help to create a better and more peaceful world. IB learners strive to be:

<b>Inquirers</b>	They nurture their curiosity, developing skills for inquiry and research. They know how to learn independently and with others. They learn with enthusiasm and sustain their love of learning throughout life.
<b>Knowledgeable</b>	They develop and use conceptual understanding, exploring knowledge across a range of disciplines. They engage with issues and ideas that have local and global significance.
<b>Thinkers</b>	They use critical and creative thinking skills to analyse and take responsible action on complex problems. They exercise initiative in making reasoned, ethical decisions.
<b>Communicators</b>	They express themselves confidently and creatively in more than one language and in many ways. They collaborate effectively, listening carefully to the perspectives of other individuals and groups.
<b>Principled</b>	They act with integrity and honesty, with a strong sense of fairness and justice, and with respect for the dignity and the rights of people everywhere. They take responsibility for their actions and their consequences.
<b>Open-minded</b>	They critically appreciate their own culture and personal histories, as well as the values and traditions of others. They seek and evaluate a range of points of view, and they are willing to grow from the experience.
<b>Caring</b>	They show empathy, compassion and respect. They have a commitment to service, and they act to make a positive difference in the lives of others and in the world around us.
<b>Risk-takers</b>	Or Courageous. They approach uncertainty with forethought and determination; they work independently and cooperatively to explore new ideas and innovative strategies. They are resourceful and resilient in the face of challenges and change.
<b>Balanced</b>	They understand the importance of balancing different aspects of their lives— intellectual, physical, and emotional—to achieve well-being for themselves and others. They recognize their interdependence with other people and with the world in which they live.
<b>Reflective</b>	They thoughtfully consider the world and their own ideas and experience. They work to understand their strengths and weaknesses in order to support their learning and professional development.

## Academic Integrity

QASMT recognises that academic integrity is embodied within the IB Mission Statement, values and IB Learner Profile. QASMT has developed an Academic Integrity Policy which is enacted throughout the Academy. A clear, positive approach to academic honesty as good practice is imperative to ensure that:

- teacher and student integrity is promoted through sound teaching and learning practice
- student research is properly conducted
- assessment is authentic
- intellectual property and copyright regulations of Australia are upheld. This policy is consistent with the International Baccalaureate's philosophy and expectations and is designed to support the Middle Years Programme's Standards and Practices.

The aim of this academic integrity policy is to:

- promote the principles and practices of academic integrity to ensure that students and teachers are fully aware
- ensure that students do not have unfair advantage over other students through academically dishonest practices such as collusion, duplication, plagiarism or assessment misconduct
- ensure that the principles and practices of academic honesty are explicitly taught
- detail the opportunities which students receive to learn about and practise academic honesty
- define the specific skills and knowledge students need, to practise academic honesty

- outline the procedures to be taken when malpractice or infringement may have occurred
- to provide a coherent approach across all year levels.

## What is the ‘STEM Futures Program’?

The notion of ‘STEM Futures’ was inspired to achieve a culmination of our vision and focus, a world-class STEM education that nurtures excellence and fosters global citizenship for an ever-changing world. Describing a STEM education is sufficiently broad to allow for development of our own definition and by encompassing a ‘futures’ notion we can aim towards a program to meet the following:

*A STEM education is an approach to learning where rigorous academic concepts are coupled with real-world lessons as students apply science, technology, engineering, or mathematics in contexts that make connections between school, community, work, and the global enterprise, enabling the development of STEM literacy and with it the ability to compete in the new economy (adapted from Tsupros, 2009).*

The vision of our STEM Futures Program is to deliver a future-focussed STEM curriculum that engages passionate, innovative learners capable of creating positive and sustainable change in the world. To achieve this vision, we have developed a curriculum through the IB MYP aligned to the IB DP.

The curriculum is comprised of STEM Futures Electives, written in collaboration with university/industry links to provide a challenging and engaging curriculum designed to enhance students’ knowledge, understanding and skills in STEM and global citizenship. Our collaborators so far include, The University of Queensland, Queensland University of Technology, Moreton Bay Environmental Education Centre, Queensland Virtual STEM Academy and SPARQ-ed; we are continuing to expand our collaborations as we develop this new and exciting curriculum.

## Course structure of the STEM Futures Program

Our STEM Futures Program in Year 9 and 10 has been designed to provide a ‘bridge’ for our students in moving from the IB MYP to the IB DP. The alignment of these programs can be seen in the Year 7 – 12 Subject Overview table below. Details of each STEM Futures Elective and alignment of the electives to DP subjects can be seen in the next section and are a very important part of the subject selection process.



# Year 7 – 12 Subject Overview

This table represents our full proposed Year 7 – 12 subject overview, please note all subject offerings and timings are dependent on resourcing and are only finalised after subject selection each year.

IB Subject Group	Year 7 & 8		Year 9		Year 10 Semester 1		Year 10 Semester 2		Year 11 & 12	
	Subject Name	Mins/week	Subject Name	Mins/week	Subject Name	Mins/week	Subject Name	Mins/week	Subject Name	Mins/week
<b>Language and Literature</b>	English Language and Literature	Y7:240 Y8:S1 190 S2 240	English Language and Literature	240	English Language and Literature	240	DPP English A Language and Literature HL/SL	SL:170 HL:240	English A Language and Literature HL/SL	SL:170 HL:240
<b>Mathematics</b>	Mathematics	Y7:240 Y8:S1 240 S2 190	Mathematics	240	Mathematics	240	DPP Mathematics Applications and Interpretation SL/HL	SL:170 HL:240	Mathematics Applications and Interpretation SL/HL	SL:170 HL:240
							DPP Mathematics Analysis and Approaches SL/HL	SL:170 HL:240	Mathematics Analysis and Approaches SL/HL	SL:170 HL:240
<b>Language Acquisition</b>	Chinese Language Acquisition	Y7:190 Y8:240	Chinese Language Acquisition	240	Chinese Language Acquisition	240	DPP Chinese B SL/HL	SL:170 HL:240	Chinese B SL/HL	SL:170 HL:240
	French Language Acquisition	Y7:190 Y8:240	French Language Acquisition	240	French Language Acquisition	240	DPP French B SL/HL	SL:170 HL:240	French B SL/HL	SL:170 HL:240
	German Language Acquisition	Y7:190 Y8:240	German Language Acquisition	240	German Language Acquisition	240	DPP German B SL/HL	SL:170 HL:240	German B SL/HL	SL:170 HL:240
	Japanese Language Acquisition	Y7:190 Y8:240	Japanese Language Acquisition	240	Japanese Language Acquisition	240	DPP Japanese B SL/HL	SL:170 HL:240	Japanese B SL/HL	SL:170 HL:240
	Latin Language Acquisition	Y7:190 Y8:240	Latin Language Acquisition	240	Latin Language Acquisition	240	DPP Latin B SL/HL	SL:170 HL:240	Latin B SL/HL	SL:170 HL:240
						Beginner Spanish Language Acquisition	240	DPP Spanish ab initio SL	SL:170	Spanish ab initio SL
<b>Individuals and Societies</b>	Individuals and Societies	170	<ul style="list-style-type: none"> <li>Disrupting the Market</li> <li>Future Global Cooperation</li> <li>World in Your Pocket</li> </ul>	170	Show Me the Money	170	DPP Business Management HL	HL:240	Business Management HL	HL:240
			<ul style="list-style-type: none"> <li>Future Global Cooperation</li> <li>Cultural Revolution</li> <li>World in Your Pocket</li> </ul>	170	Tragedy of the Commons	170	DPP Economics HL	HL:240	Economics HL	HL:240
			Forensic Psychology	170	Inside Your Head	170	DPP Psychology HL	HL:240	Psychology HL	HL:240
			Sustainable Futures	170	Blue Planet	170	DPP Environmental Systems and Society HL	HL:240	Environmental Systems and Society HL	HL:240
<b>Sciences</b>	Sciences	190	<ul style="list-style-type: none"> <li>Biochemical Solutions</li> <li>Healthy Future</li> <li>Forensic Psychology</li> <li>Sustainable Futures</li> <li>Biomedical Engineering</li> </ul>	170	Medical Biotechnology	170	DPP Biology SL/HL	SL:170 HL:240	Biology SL/HL	SL:170 HL:240
			<ul style="list-style-type: none"> <li>Biochemical Solutions</li> <li>Fuelling the Planet</li> <li>World of Reactions</li> </ul>	170	Future Materials	170	DPP Chemistry SL/HL	SL:170 HL:240	Chemistry SL/HL	SL:170 HL:240
			<ul style="list-style-type: none"> <li>Biomedical Engineering</li> <li>Fuelling the Planet</li> </ul>	170	Journey to Earth X	170	DPP Physics SL/HL	SL:170 HL:240	Physics SL/HL	SL:170 HL:240

			<ul style="list-style-type: none"> <li>Medical Physics</li> </ul>							
<b>Physical and Health Education</b>	Physical and Health Education	120	Healthy Future	170	Peak Performance	170	DPP Sports Exercise and Health Science HL	HL:240	Sports Exercise and Health Science HL	HL:240
<b>Design</b>	Design	*240/ Sem	Future of Automation	170	Computational Thinking	170	DPP Computer Science HL	HL:240	Computer Science HL	HL:240
			<ul style="list-style-type: none"> <li>Biomedical Engineering</li> <li>Disrupting the Market</li> </ul>	170	Living in a Digital Society	170	DPP Digital Society HL	HL:240	Digital Society HL	HL:240
<b>The Arts</b>	Arts	*240/ Sem	Artists as Change Makers	170						
			Soundtrack	170						
<b>Inner Core</b>									Theory of Knowledge	100
			Community Project	30					Extended Essay	30
	Service as Action	-	Service as Action	-	Certificate III in Laboratory Skills	30	Certificate III in Laboratory Skills	30	Creativity, Activity and Service	-
<b>Positive Education Program (PEEC)</b>	Positive Education Program	50	Positive Education Program	70	Positive Education Program	70	Positive Education Program	70	Positive Education Program	*30/ Year11

# Year 9 STEM Futures Electives

The following table lists the electives on offer in Year 9. Students choose six (6) STEM Futures Electives from the lists below. At least two electives must be chosen from category A, two electives from category B and one elective from category C. The remaining elective can be chosen across any category.

Elective Group	Elective Name	IB Diploma Programme Subjects											
		Business Management	Economics	Psychology	(All Individuals & Societies subjects)	Digital Society	Environmental Systems & Societies	Biology	Chemistry	Physics	Computer Science	Sport, Exercise & Health Science	The Arts*
Category A	Fuelling the Planet								x	x			
	Biochemical Solutions							x	x				
	World of Reactions								x				
	Medical Physics									x			
	Sustainable Futures						x	x					
Category B	World in Your Pocket	x	x										
	Forensic Psychology			x				x					
	Cultural Revolution		x		x								
	Future Global Cooperation	x	x		x								
Category C	Healthy Future							x				x	
	Disrupting the Market	x				x							
	Biomedical Engineering					x		x		x			
	Future of Automation					x					x		
	Artists as Change Makers												x
	Soundtrack												x
<b>IB DP Group Number</b>		<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3/4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>6</b>

\*Subjects offered at Queensland Academy for Creative Industries only

## How do students choose their Year 9 electives?

The STEM Futures Electives are designed to allow students to start to specialise in their subject selection and focus on their curriculum areas of interest. To choose their electives for Year 9, students and families should follow these steps.

1. Consider the subjects the student is interested in studying in the IB Diploma Programme. A guide to IB DP subjects is available in this handbook on pages 26 to 30. Please read this section carefully and make a list of the subjects the student is most interested in studying in the IB DP. Note the IB DP subject group of the subjects in the list and ensure the student has chosen at least one subject from each group and a second subject from Group 3 or Group 4 instead of a Group 6 subject. It doesn't matter if you have more than six subjects you are interested in at this stage. You might want to consider pre-requisites for university courses, this is a handy link to information on The University of Queensland website <https://study.uq.edu.au/study-options/undergraduate>. Another useful link for considering future course interests is available from Queensland University of Technology at <https://match-my-skills.qut.edu.au/>.

2. Read the Overview of Year 9 STEM Futures Electives section in this handbook. Make a list of the STEM Futures Electives you are interested in studying; you will need at least six subjects in your list and remember that you will need at least two subjects from category A, two subjects from category B, one subject from category C and the remaining subject from any category).
3. Use the STEM Futures Electives table on page 10 to find the alignment to the IB DP subjects. Note which STEM Futures Electives align with the IB DP subjects you are interested in.
4. If you still have more than six electives on your list, think about removing any that double up with the IB DP subjects you are interested in. You need to ensure your final list of six, has alignment with each IB DP subject you are interested in.

## Year 10 STEM Futures Electives

The following table lists the electives on offer in Year 10. Students choose three (3) STEM Futures Electives from the lists below. At least one subject must be from IB Diploma Programme Group 3 (Category A) and one from Group 4 (Category B), the remaining elective can be chosen from Group 3 or 4 across both categories.

Elective Group	Elective Name	Business Management	Economics	Psychology	Digital Society	Environmental Systems & Societies	Biology	Chemistry	Physics	Computer Science	Sport, Exercise & Health Science
Category A – Individuals & Societies	Show Me the Money	x									
	Tragedy of the Commons		x								
	Inside Your Head			x							
	Living in a Digital Society				x						
A&B	Blue Planet				x						
Category B – Sciences	Medical Biotechnology						x				
	Future Materials							x			
	Journey to Earth X								x		
	Computational Thinking									x	
	Peak Performance										x
	IB Diploma Programme Group Number	3	3	3	3	3/4	4	4	4	4	4

### How do students choose their Year 10 electives?

The STEM Futures Electives are designed to allow students to specialise in their subject selection and focus on their curriculum areas of interest and to prepare for the IB Diploma Programme. To choose their electives for Year 10, students and families should follow these steps.

1. Decide on the subjects the student is interested in studying in the IB Diploma Programme. A guide to IB DP subjects is available in the handbook. Choose one subject from each of Group 3 and Group 4 and choose a third subject from either Group 3 or 4.
2. Use the STEM Futures Electives table on page 11 to find the alignment to the IB DP subjects. Note which STEM Futures Electives align with the IB DP subjects you are interested in.
3. Read the Overview of Year 10 STEM Futures Electives in this handbook. Make a list of the STEM Futures Electives you are interested in studying.

4. If you still have more than three electives on your list, you will need to make a decision about which three IB DP subjects you are going to study so that you can choose the STEM Futures Electives which align with your IB DP subject choice.

## Year 9 STEM Futures Electives Overviews

### Fuelling the Planet

#### Curriculum Focus

Global energy use is increasing and fossil fuels continue to provide the vast majority of energy consumed worldwide. We use energy every day, to fuel our transport needs, generate electricity, power electronic devices, heat and cool our homes and provide light. Modern combustion fuels rely on transforming the energy stored in chemical bonds into useful forms of energy. However, harnessing the energy from non-renewable fossil fuels can also release undesirable products such as carbon dioxide, contributing to global climate change.

This elective explores the potential and pitfalls of alternatives to combustion fuels that align with our values of sustainability while also satisfying our future energy needs. Alternative fuels from renewable sources, including biofuels, nuclear power, hydrogen fuel cells and harnessing the energy from the sun, and wind sources may provide for cleaner, more sustainable energy than combustion of fossil fuels. Additionally, emerging research in new technologies for energy storage such as high-capacity long life batteries have the potential to revolutionise portable electronics, transportation and electricity generation.

#### Learning Outcomes

By the completion of this elective, students will:

- understand how energy is transferred in chemical reactions
- develop knowledge and understanding of electricity generation from a range of sources
- investigate renewable resources and alternative fuel sources
- design, analyse and evaluate experimental methods and data
- explore solutions to our future energy needs.

#### Collaboration

- UQ School of Chemical Engineering

### Biochemical Solutions

#### Curriculum Focus

Biochemical solutions combine the principles of biology and chemistry to develop products from raw materials and develop the processes for achieving this. Biochemical engineers develop new ways to use cells, enzymes and other biochemical agents to find solutions to global challenges and develop sustainable technologies. This elective will introduce students to some of the applications of biochemistry to solve current issues, such as producing new, cleaner fuels from natural resources, developing and implementing processes to produce food and drinks and improved approaches to reducing and dealing with environmental pollution.

Students will journey into the cell and its machinery to support life processes. They will explore the chemical changes in living things and applications that harness the power of these changes to create new products and processes. This elective will also explore the social, economic and environmental impact of science and technology, such as oil-eating bacteria that can help clean up pollution and spills, the use of microalgae in treating wastewater and microbial fuel cells to producing biodegradable materials to sustain the future of our planet.

#### Learning Outcomes

By the completion of this elective, students will:

- apply knowledge of cell biology and biochemistry in a range of applications
- understand the factors that affect rates of reactions and the action of biological catalysts
- explore biochemical solutions to sustainability
- design, analyse and evaluate experimental methods and data
- predict how future applications of science and technology may affect people's lives.

#### Collaboration

- UQ School of Chemistry and Molecular Biosciences

## World of Reactions

### Curriculum Focus

Chemical reactions happen everywhere, every day, inside us and all around us, constantly occurring within plants and animals, the air in our atmosphere, the lakes and oceans that we swim in, and the soil where we grow our food. There is a staggering array of chemical reactions and understanding them is essential to understanding life and the world around us. We use chemical reactions to make useful products that make our lives easier. However, sometimes these products, such as plastics and the chemicals in our electronics and electrical equipment, can also have harmful effects on our environment. By understanding how chemical reactions work, scientists are able to predict the outcome of reactions, identify the products formed, make chemical processes more efficient and conserves the environment.

In this elective, students will extend their understanding of atoms and atomic structure and its relationship to chemical processes. A wide range of chemical reactions will be studied and students will learn to represent these using chemical symbols, formulae and equations. Students will examine the nature and reactions of acids and of metals, and investigate their use and impact in various applications such as ocean acidification, green chemistry, electronics and electrical equipment. Students will apply their understanding of chemical reactions to evaluate how the application of chemistry in contemporary issues affects people's lives.

### Learning Outcomes

By the completion of this elective, students will:

- investigate the physical and chemical properties of elements and compounds
- perform experiments involving various types of chemical reactions
- represent chemical reactions using balanced formulae and equations
- collect, analyse and evaluate data involving chemical reactions
- conduct a scientific inquiry concerning an application of the chemical reactions studied
- solve problems using mathematical methods.

### Collaboration

- UQ School of Chemistry and Molecular Biosciences

## Medical Physics

### Curriculum Focus

Medical physics is the application of physics to healthcare and the use of physics for patient imaging, diagnosis and treatment of disease. The field of medical physics has played a key role in the evolution of modern medicine ever since the discovery of X-rays by Roentgen in 1895 and Becquerel's 1898 discovery of radioactivity. Diagnosis involves the use of medical imaging techniques including x-ray imaging, and ultrasound. Treatments such as radiation and nuclear therapy can involve the use of x-rays, electrons and other radioactive particles for treating diseases such as cancer.

The elective brings Physics principles to life through their relevance and practical application to modern medical diagnosis and treatment. It will provide students with an introduction to the properties of electromagnetic radiation, sound and radioactive decay. The unit also explores organs and systems and how their physical properties facilitate medical imaging and treatment. The elective will include the study of waves including optics and its applications. Students will also learn about the science behind some of the instrumentation of modern medical technologies that include radiation therapy, ultrasound and x-rays.

### Learning Outcomes

By the completion of this elective, students will:

- develop knowledge and understanding of waves, the wave equation and the electromagnetic spectrum
- explore applications of radioactive particles and the use of isotopes in nuclear medicine
- investigate medical procedures such as laser eye surgery and medical imaging techniques such as ultrasound, x-ray and CT
- solve problems using mathematical methods
- conduct scientific inquiry and evaluate experimental methods and data.

### Collaboration

- UQ School of Chemistry and Molecular Biosciences; UQ School of Chemical Engineering

## Sustainable Futures

### Curriculum Focus

Sustainability addresses the ongoing capacity of Earth to maintain all life. This elective develops the knowledge, skills, values and world views necessary for students to act in ways that contribute to a sustainable future, and focuses on human challenges to protecting environments and creating a more ecologically and socially just world through informed action. This elective aims to build knowledge and understanding of how actions to improve sustainability are individual and collective endeavours shared across local and global communities.

By 2050, the population of the world is estimated to reach 9.8 billion. One of the key challenges for a sustainable future is the need to develop cities to support this population growth. Cities of the future need to address this challenge through principles of sustainable design that focus on ecology, water usage, energy consumption, waste management, food production, culture and recreation, health and wellbeing, travel and mobility, business and suburban infrastructure, and education. Students will use their critical thinking skills and innovative ideas to find potential solutions for this current and emerging problem.

### Learning Outcomes

By the completion of this elective, students will:

- understand the flow of matter and energy through ecosystems
- explore biomes in different regions of the world
- develop skills in field techniques
- apply critical thinking skills to address future challenges
- research and develop design solutions for cities of the future.

## World in Your Pocket

### Curriculum Focus

Every individual in the world has needs and wants. Generating an income through operating a business that operates in a Queensland, Australian and world economic environment is explored throughout the unit.

Investing personal money into different assets such as; shares, property, bonds and term deposits is first studied with each having a varying degree of risk and return.

Students then investigate opportunities that exist in Queensland through our natural factors of production; climate, natural resources, high education levels and quality of living each present unique opportunities that businesses can take advantage of. With globalisation now present in all factors of life international trade, investment, competition, and growth become the foundation of the economic environment that students gain an understanding of. Students are therefore required to analyse trends and make informed decisions while they 'think locally and act globally'.

### Learning Outcomes

By the completion of this elective, students will:

- make informed decisions in regard to personal finance considering risk and return factors
- explain why businesses seek to create and maintain a competitive advantage
- analyse Queensland and Australia's position within the global economy identifying opportunities
- examine major global trade relationships and benefits

### Collaboration

- UQ School of Economics; UQ Business School

## Forensic Psychology

### Curriculum Focus

Forensic psychology combines the study of psychology and biology to focus on how behaviour and cognition influence and change in human nature. There is a particular focus on criminal and corrections systems. Using a case study approach, students will examine a range of forensic evidence that may be used to build a criminal profile. Students will also explore various biological and psychological explanations for criminal behaviour.

This elective will provide a foundational understanding of neurobiology and neurophysiology to understand the biological basis of behaviour and learning, including the anatomy of the brain and biochemical imbalances. This elective will also provide an understanding of behavioural and cognitive explanations of criminal behaviour. The

intersection of biology, psychology and the law will include related topics such as crime scene analysis, jury behaviour, eyewitness and expert testimony and the key principles of the justice system.

### Learning Outcomes

By the completion of this elective, students will:

- develop knowledge and understanding of the nervous system, brain anatomy, learning and cognitions
- understand the key principles of Australia's system of justice and the role of Australia's court system
- investigate biological, cognitive and social explanations of crime
- consider how a range of evidence is used to make a case and reach a verdict
- develop skills of inquiry, investigation and critical thinking.

### Collaboration

- UQ School of Psychology

## Cultural Revolution

### Curriculum Focus

The study of History is not merely the study of the past; it is an organic discipline, continually being reviewed in light of changing perspectives, the discovery of new evidence and revision from new schools of thought. It is the interpretation of the past in the present. The future is forever impacted by the past. Global events that have had a lasting impact on creating change that impacts us in the 21<sup>st</sup> century will be explored. Economic theory such as that developed by Adam Smith but later counteracted by Karl Marx during the boom of the Industrial Revolution is one such example. Significant change also occurred between the World Wars with the Great Depression then the significant social change of the 1960s. Social history emerged in this period as a new field of historical study, focusing not on the history of great individuals and great ideas but on the experiences and achievements of ordinary people. The practices, beliefs, and objects from the period document the story of a world in transition. New technologies made the world a smaller place where ideas and cultural experiences could be shared at unprecedented levels.

### Learning Outcomes

By the completion of this elective, students will:

- analyse different perspectives of the past exploring migration impacts of the world
- examine social and political movements across time including imperialism, socialism, militarism, feminism and popularism
- critically evaluate sources to determine values, bias and limitations
- develop a range of communication skills that are effective across an IB education; summary skills, reflective writing and effective presenting

### Collaboration

- UQ School of Economics

## Future Global Cooperation

### Curriculum Focus

For a young nation, Australia ranks as one of the best places to live in the world by international comparisons of wealth, education, health and quality of life. Heavily influenced by mass immigration following the Second World War, Australia emerged from the period as one of the world's most multicultural countries. Foreign policy has also undergone significant change in the post war period. No longer looking solely to Europe or the United States of America, Australia has developed strong political and economic ties in the Asia-Pacific region.

The Future Global Cooperation elective will examine the key principles of the Australian political system, which enable stability and foster national prosperity. Students will develop a deep understanding of how the Australian government operates, how the citizens' choices are informed by the media and the structures in place to protect diversity and multiculturalism. Decision making at local, national and international levels always has to consider social, environmental and economic impacts. Comparisons will be drawn with contrasting government types throughout the Asia-Pacific region. With a well-grounded understanding of the roles and responsibilities of the Australian government on a national scale, the elective will then turn its focus to how Australia participates on a global scale, helping to maintain peace and security for all through its work with the United Nations.



## Learning Outcomes

By the completion of this elective, students will:

- compare different types of government
- understand the structure of Australia's political system
- unpack the international roles and responsibilities of the Australian government
- critically evaluate decisions using multiple perspectives in particular the balance between economic and environmental considerations
- explore Australia's contributions to foreign aid, peacekeeping and participation in international organisations.

## Collaboration

- UQ School of Economics; UQ Business School

## Healthy Future

### Curriculum Focus

The world now has more young people than ever before – of the over 7 billion people worldwide, approximately 26% are under the age of 15. In this elective, students will explore the current and future health issues facing adolescents, both locally and globally. Students will identify challenges to adolescent health such as regular physical activity, balanced use of technology, balanced nutrition, a healthy state of mind and community connection.

An appreciation of how the human body works is essential in understanding the basis of health and prevention strategies. Students will learn how human cells, tissues and organ systems function together to carry out the activities needed to maintain internal balance for a healthy life. The impacts of regular physical activity, the use of technology and unbalanced nutrition on the physiological systems responsible for the maintenance of health in humans will be explored. Students will also examine the external influences that could impact on their ability to make good decisions and plan a creative health promotion that addresses a contemporary or future health concern.

## Learning Outcomes

By the completion of this elective, students will:

- investigate the physiological basis of various health issues on the human body
- explore the impact of contemporary issues on adolescent health
- generate questions that can be investigated using scientific inquiry including observation, data recording, data analysis and critical thinking
- implement and refine leadership and collaboration skills
- apply and evaluate practical physical, tactical and strategic skills in a range of exercise and physical activity settings.

## Disrupting the Market

### Curriculum Focus

In our Disrupting the Market elective, we explore how innovative technologies can shake up industries and create new opportunities for businesses. One such technology is the laser cutter, which we have in our MakerSpace at QASMT, along with a bank of 3D printers. These tools have the power to disrupt markets in various ways, such as customization, faster product development, waste reduction, support for small businesses, and fostering innovation.

To create a successful product, it is crucial to understand the needs and desires of the target market. As designers, students will learn to gather valuable insights by directly engaging with their audience through conversations, conducting user research, and observing human interactions. Students will also use rapid prototyping techniques to present new ideas to our clients and get their feedback for further development. Students will develop the skills needed to become market disruptors - this means being willing to take risks, being aware of opportunities, having analytical thinking abilities, and developing excellent communication skills. Throughout the course, we will apply marketing knowledge and skills including the 4Ps (product, price, place, promotion), SWOT analysis, Ansoff matrix, break-even analysis, and the triple bottom line concept. We will use these tools to design innovative solutions that make use of disruptive technologies.

## Learning Outcomes

By the completion of this elective, students will:

- understand the qualities and skills of successful entrepreneurs
- explore the application of marketing concepts
- apply the design cycle to the creation of a unique product
- develop a range of feasible design solutions to a defined problem
- collect data to evaluate the success of a solution.

## Collaboration

- UQ Business School

## Biomedical Engineering

### Curriculum Focus

Biomedical engineering is a rapidly growing transdisciplinary field that bridges that gap between technology, medicine and biology. There is an increasing demand to leverage engineering principles in the medical field to develop innovative and personalised treatment. Biomedical engineers must possess a wide range of skills, including proficiency in research, design, collaboration and communication, alongside a comprehensive grasp of scientific principles within their field.

The Biomedical Engineering elective will offer an authentic learning experience where students will apply the engineering design process to a real-life medical implant scenario. They will develop foundational knowledge and understanding in musculoskeletal physiology, bio-compatible materials and biomechanics. Students will learn how to effectively communicate their findings, which is a key skill for scientists and designers.

## Learning Outcomes

By the completion of this elective, students will:

- develop an understanding of the engineering design process
- apply scientific principles to the design process
- explore a range of properties of materials
- use 3D printers to test their model
- develop, modify and communicate ideas.

## Collaboration

- UQ School of Chemical Engineering

## Future of Automation

### Curriculum Focus

Significant advances in technology over the last two decades, are providing now more than ever, increasing opportunities for the world population to spend time focusing on matters of global significance and less on repetitive, mundane tasks. One way in which computer scientists, mathematicians and engineers are investigating how technology can help to support this change, is in the research area of automation, where systems are designed to be less human dependent and more self-reliant. This elective introduces students to a real-world problem situated at the intersection of these cutting-edge STEM fields. Through the knowledge and skills students will learn in this elective, students will reflect on what the automation means for current and future generations, with particular focus on the development of technological and/or engineering solutions which will be required for successful automation.

Future of Automation asks students to investigate a variety of automated systems and discuss a range of technologies currently in use or being researched within this area. Students will use the Arduino microcontroller, various sensors and actuators in a hands-on, problem-based learning environment to investigate automated systems on a smaller scale and to understand some of the questions and challenges that researchers are facing in the field. The elective will culminate in students designing, creating and presenting a prototype (made using an Arduino microcontroller) for an automated system which will solve a real-life situation they have chosen to investigate.

## Learning Outcomes

By the completion of this elective, students will:

- develop an understanding of the role of automation now and in the future
- investigate the implementation of automated systems for the advancement of society

- synthesise multiple complex ideas to analyse, present and evaluate a solution
- explore the development of an automated product through the design cycle
- practice autonomy and confidence in applying and describing problem solving.

## Artists as Change Makers

### Curriculum Focus

Art and artists play an important role in effecting change and challenging audience perspectives by exposing the realities of modern life. It takes courage to see and do things differently. Change makers are inquisitive, open-minded, and resourceful. Contemporary artists around the world use creative and critical thinking, not only as part of the creative economy, but more importantly, to enhance the well-being of others and inspire a more just and beautiful world. Artists address concerns through emotional responses to their orientation in place and time, and draw inspiration from research in science, social history and community practices.

Students will experiment and gain knowledge and skills in traditional and digital art forms. This unit will engage young people in developing work using art to build deeper ties between artist and audience. Reflecting on their artistic intention and the impact of their work on an audience, students become more aware of the role that art plays in their lives and in the world.

### Learning Outcomes

By the completion of this elective, students will:

- understand how and why artists use creative and critical thinking approaches
- experiment with and manipulate art media, techniques, styles and processes to realise ideas
- identify and explain how artists communicate and audiences interpret artworks through explorations of different viewpoints
- evaluate art practices from selected artists to inform their own artistic development
- produce a series of artworks that are conceptually linked and present their series to an audience.

### Collaboration

- UQ Faculty of Humanities and Social Sciences

## Soundtrack

### Curriculum Focus

Music is often a soundtrack to our lives as it is used to accompany personal milestones and celebrations, in times of happiness and sorrow, and also as we work, exercise or relax. Music is uplifting as it unites us within our personal social group, our community and across borders. As we collect a personal playlist of our own through a lifetime, certain songs or pieces take us back to a certain time in our life with others encouraging us to look to the future. Music allows us to express and maintain our identities so as performers, composers and participants in music, narratives are shared using common and original motifs and themes. Often the music score for a film or game is considered as a 'character' with some composers even being made into action figures alongside the action hero merchandise. Combining the power of music with the realism of film and video games offers added dimensions and possibilities to maintain identity and build relationships.

Soundtrack offers students a unique industry related experience digging deep into writing for and performing music from film and video games. The creative process offers a balance of technology and traditional music making in real life scenarios by experimenting with aspects such as genre, pace, texture, modulation, and rhythm - all choices students can make individually whilst meeting an overarching design brief. Students develop their knowledge of how ideas and intentions are communicated in and through Music. As students' progress through studying Music, they learn to value and appreciate the power of music to transform the heart, soul, mind and spirit of the individual.

### Learning Outcomes

By the completion of this elective, students will:

- develop their own original, creative voices as multimedia composers and performers by exploring music for film and video games
- demonstrate a deeper working knowledge and understanding of the powerful role music plays in sustaining characters, plot, action, mood and sense of place
- analyse and explore different genres drawn from a range of cultures and regions furthering an aesthetic appreciation and enjoyment of music
- build on and refine their knowledge, understanding and skills through music practices focusing on rhythm, pitch, dynamics and expression, form and structure, timbre and texture
- embrace new technologies whilst maintaining traditional approaches to music making.

# Year 10 STEM Futures Electives Overview

## Show Me the Money

### Curriculum Focus

An understanding of business is proven to better position graduates in the changing workforce. Successful business ventures require the individual to have not only the scientific and technical knowhow but also business prowess to sell it. Marketing plays a pivotal role in business strategy. The process of identifying, anticipating and satisfying ever changing consumer needs and wants is critical to the success of a business or brand. Companies like Apple, Virgin, Tesla Motors and Coca Cola rely heavily on marketing programs to ensure they stay in front of competitors and in the minds of customers. A successful marketing strategy will go a long way to ensuring a company is profitable.

Show Me the Money will explore the growth of small business in Australia and the reasons why businesses both succeed and fail. Students will learn how society influences business and the marketing techniques used. Applying the consumer decision theory, students will uncover the principles of consumer behaviour and marketing that influences purchase decisions. A number of consumer theories will be unpacked and assessed for their connection to viable business ventures. Students will also consider the importance of effective decision making around pricing and production levels within a business, to determine when a business becomes profitable, the importance of cash flow in the success of business and how to make investment decisions.

### Learning Outcomes

By the completion of this elective, students will:

- carry out effective primary market research
- identify how to effectively target and promote brands and products to customers
- recognise societal trends and how businesses can adapt to change
- identify and use the marketing mix
- understand the role of financial decision making within a business
- create and present entrepreneurial ideas
- develop persuasion skills in clear and concise format.

### Collaboration

- UQ Ventures
- UQ Business School

## Tragedy of the Commons

### Curriculum Focus

Common access resources are natural resources including forests, fisheries, oil and gas fields, national parks, grazing lands and irrigation systems. They are characterised by the lack of property rights, difficulty with excluding people from using them and rivalry in consumption. Governments are called upon to play a significant role in managing resources on local, state and national levels, as well as cooperating with other nations, to address issues arising from the overuse of these resources. However, when resources are shared across jurisdictions this becomes problematic. The Tragedy of the Commons elective will explore the issue of common access resource in the pursuit of local and global sustainability.

Sustainability has increasingly become a key focus for governments, organisations and communities worldwide. Approaches to achieving sustainable practices can differ greatly as the concept of sustainability has a variety of interpretations dictated by the disciplines approach. Common to all approaches is responsible resource management which presents a problem when it comes to common access resources.

### Learning Outcomes

By the completion of this elective, students will:

- examine issues of sustainability with an economic lens
- complete case studies into the management of common access resources
- explore issues of insufficient property rights
- draw connections between economic performance and living standards
- investigate sustainability and intergenerational equity.

### Collaboration

- UQ School of Economics

## Inside Your Head

### Curriculum Focus

The study of psychology is fundamentally about unlocking the secrets of what is Inside your Head and how this can help inform the understanding of our and others behaviour. During this psychology course you will take a journey that starts with the formative years exploring how humans and animals attach to caregivers and how these attachments can be interrupted affecting attachments to peers and partners later in life. The course also investigates how humans develop language ability and explore how some animals can learn language too, an ability often thought to be inherently human. We delve into major theories of learning and apply these to real world scenarios such as phobias, addictions, criminal behaviour and aggression. We identify key personality traits that drive our behaviours and affect our ability to manage stressful life events such as, moving to a new school, prepping for exam blocks and completing the IB. Furthermore, do the specific personality traits and lack of empathy found in psychopaths, sociopaths and narcissists make them immune to the same life stresses? Finally, we explore the history of intelligence testing and identify how the field continues to evolve and some of the controversies surrounding IQ testing. Throughout the course key psychological theories, studies and examples are used to support our learning. Importantly, the overarching key psychological debates of nature versus nurture, free will versus determinism and reductionism versus holism underscore our understanding of the complexities of psychology in the real world.

### Learning Outcomes

By the completion of this elective, students will:

- understand how stress is experienced biologically
- consider a range of research studies of intelligence and the ways it is measured
- explore the behaviourist approach and how it explains learning
- apply knowledge of learning theories to real life scenarios
- understand the influence of early attachment on later relationships
- apply and evaluate findings of research to explain behaviour
- describe a range of personality types and their major characteristics.

### Collaboration

- UQ School of Psychology

## Living in a Digital Society

### Curriculum Focus

We are (in) a digital society. Digital systems are changing our world and transforming how we think, communicate, collaborate and create. Nearly all organisations rely on computer systems to function in today's society: transportation systems, hospitals, banks, eCommerce and the entertainment industry. Living in a Digital Society invites students to explore two key popular concepts that are at the forefront of global innovation: big data and cyber security.

In their first unit, Being a Data Scientist, students will inquire into how past events, patterns or trends might help us to forecast future developments. Student will explore the concept of big data and how it is used our everyday lives such as personalised recommendations in online stores and streaming services and weather predictions through visualizations. In our second unit, student will explore questions such as: What happens when IT systems come under attack. What is cyber-crime? Who is involved and what are the consequences? What is the profile of a computer hacker? Using real world examples, such as the Lazarus Group and the Bangladesh Bank Heist, we will explore how and why computer systems may be compromised and the impact of cyber-attacks.

Living in a Digital Society develops future-proof critical thinking skills by preparing students to “think like a practitioner” in the social sciences and humanities. This elective facilitates the transfer of learning to new situations and is excellent preparation for the Extended Essay and Theory of Knowledge components of the Diploma Programme. Through a structured inquiry framework, students will explore primary and secondary sources, both academic and contemporary, develop research method techniques (qualitative, quantitative or mixed), reflect and share their learning. As part of the collaboration, students may visit the UQ Cyber Security and computing facilities and attend specialised lectures and tutorials, both f2f and online, led by UQ academics.

### Learning Outcomes

By the completion of this elective, students will:

- develop an understanding of how big data is used in our everyday lives

- develop a broad understanding of cyber security and motivations behind cyber crime
- explore diverse sources relevant to digital society
- develop transferrable academic research techniques
- investigate impacts and implications of digital systems for people and communities
- share discoveries about digital society with others.

#### Collaboration

- UQ School of Information Technology and Electrical Engineering
- UQ Cyber

## Blue Planet

#### Curriculum Focus

One of the United Nations sustainable development goals is to conserve and sustainably use the world's oceans, seas and marine resources. The ocean drives global systems that make the Earth habitable for humankind. Our rainwater, drinking water, weather, climate, coastlines, much of our food, and even the oxygen in the air we breathe, are all ultimately provided and regulated by the sea. Careful management of this essential global resource is a key feature of a sustainable future. However, at the current time, there is a continuous deterioration of coastal waters due to increased urbanisation, leading to further issues of pollution and increased use of marine resources.

Australia has a large coastline with diverse and unique ecosystems. This includes the Great Barrier Reef Marine park, and 66 Ramsar wetlands (Wetlands of International Importance under the Ramsar Convention on Wetlands). Australia continues to be a popular International tourist destination and is set to play host to the 2032 Olympic games. Proposals for coastal development must therefore be evaluated in order to assess the environmental impact. In this elective, students will develop knowledge and understanding of the ecology of marine ecosystems, and the environmental legislation to protect them. They will gather field data from Moreton Bay to investigate human impact on the environment. Students will apply their skills and understanding to the 2032 Olympic and the impact this will have on the coastal ecosystem, in particular the sailing events.

#### Learning Outcomes

By the completion of this elective, students will:

- understand how environmental value systems impact behaviour
- investigate the human impact on coastal and marine environments
- record and analyse primary and secondary data
- investigate local and global case studies involving the causes and consequences of environmental damage
- evaluate environmental management strategies.

#### Collaboration

- UQ School of Biological Sciences
- Moreton Bay Environmental Education Centre

## Medical Biotechnology

#### Curriculum Focus

Biotechnology harnesses cellular and biomolecular processes to develop technologies and products that help improve our lives and the health of our planet. The term was first used by the agriculturalist Karl Ereky in 1919, when he predicted a time when we could use biology to make useful products from raw materials. In modern biotechnology, researchers modify DNA and proteins to shape the capabilities of living cells, plants, and animals into something useful for humans. Molecular biologists do this by sequencing DNA found in nature, and then manipulating it in a test tube, *in vitro* – or, more recently, inside of living cells, *in vivo*.

The discipline of medical biotechnology uses novel techniques to produce pharmaceutical and diagnostic products that help treat and prevent human diseases. New methodologies have significantly contributed towards improving health science, such as the sequencing of the human genome, uses of stem cells, genetic testing, gene therapy, and the development of antibiotics and vaccines. While there are great advancements and positives to medical biotechnology, the rapid progress of research and techniques also presents a number of new and unique ethical and social challenges within the context of human medical science.

#### Learning Outcomes

By the completion of this elective, students will:

- develop knowledge and understanding of patterns of inheritance, genes, DNA and the genetic code
- apply and evaluate analytical techniques such as gel electrophoresis
- understand mechanisms for defence against infectious disease and immunity
- explore the impact of vaccinations, antibiotics and the overuse of antibiotics
- evaluate the role, relevance and ethical implications of biomedical science in society.

#### Collaboration

- UQ School of Chemistry and Molecular Biosciences

## Future Materials

#### Curriculum Focus

Materials have been shaping human history since the dawn of civilisation and we continue to develop materials that better conform to our needs by making them stronger, lighter or more durable. Materials research constantly evolves to offer new, superior and smarter materials, and can be based on biomaterials such as spider silk or biopolymers or natural materials such as metals and crystal structures. Advances in technology also allow us to manipulate materials on a nano-scale to produce nanomaterials. The central theory behind materials science involves relating the microstructure of a material to its macromolecular physical and chemical properties. By understanding and then changing the microstructure, material scientists can modify existing materials or create new ones with specific properties for specific uses.

Chemistry is the study of matter, and in this elective, materials will be studied from a unified point of view to understand the relationships between the underlying structure, properties, and utilisation of the material. The elective will explore the chemistry behind materials research, which can be applied in a range of contexts such as aerospace travel, sustainable energy production and storage and biomedical applications. Through the study of future materials, students will build a foundational understanding of the essential nature of matter, from metals, alloys, carbon allotropes and polymers to materials that are composites of these for enhanced properties.

#### Learning Outcomes

By the completion of this elective, students will:

- investigate the chemical and physical properties of matter and materials
- predict and explain the properties of matter and material in relation to their structure.
- represent matter and chemical reactions using chemical formulae and equations
- collect, analyse and evaluate data and solve problems using mathematical methods
- conduct a scientific inquiry concerning an application of materials.

#### Collaboration

- UQ School of Chemical Engineering

## Journey to Earth X

#### Curriculum Focus

It's 2050 and a team of explorers are leaving Earth to settle exoplanet Proxima b 4.25 light years away. This inaugural interplanetary expedition will have to complete three stages: 1) Leaving Earth, 2) Travelling in interstellar space, 3) Landing on the exoplanet Proxima b

In the first stage, students will learn mechanics and rocketry concepts necessary to successfully launch a self-contained space vehicle. They will explore mathematical, conceptual, graphical and experimental representations of kinematics, forces and energy. During the second stage they will learn astronomy and astrophysics concepts to understand the features and processes of the universe. This will include astronomical measurement, star evolution and cosmology. We will also look at the technology required to sustain interstellar space flight over long distances. Finally, as we prepare to land on Proxima b students will examine fluid friction and momentum change. They will experiment with parachute design and investigate ways to safely control change in speed to facilitate a safe landing on the planet surface.

#### Learning Outcomes

By the completion of this elective, students will:

- investigate the mechanics of accelerated motion, forces acting on a body and energy transformation
- examine evidence for the Big Bang theory and the possible fates of the Universe
- explore stellar evolution and fusion reactions
- learn about astronomical observational technology and detection of exoplanets

- solve problems using mathematical methods.

#### Collaboration

- UQ School of Mathematics and Physics

## Computational Thinking

### Curriculum Focus

According to the Jobs of Tomorrow Report from the World Economic Forum (2020), the ability to problem solve 'on the fly' is both a valuable and essential skill for the future. Additionally, with the extraordinary pace of change in digital technologies, many professions of tomorrow will require strong technical expertise with increasing trends for interactive, data-based applications and improved user experience. This elective is designed to engage students in shaping the digital future through computational problem-solving. Computational Thinking lays the foundation for a pathway into the emerging software engineering opportunities that include Cloud Computing, Data Science, Cybersecurity, and Artificial Intelligence.

Computer scientists utilise computational thinking to solve complex problems. Computational thinking builds on the power and limits of computing processes, whether they are executed by a human or by a machine. A part of computational thinking is breaking a problem into simpler components and processes which are capable of collectively solving the problem. Students will explore this process, known as algorithmic thinking, and learn to construct computational solutions to simple and complex problems through a variety of interactive media. As algorithms are intrinsically tied to computer science, a good way to develop problem-solving skills is through learning algorithmic thinking. This elective explores the different specialisations of computer scientists and will culminate with the explicit learning of a programming language to develop students algorithmic thinking and problem-solving skills.

### Learning Outcomes

By the completion of this elective, students will:

- explain how problems can be solved through algorithmic thinking
- understand the common building blocks of algorithms, such as iteration and selection
- apply techniques to develop basic and complex algorithms
- synthesize skills and knowledge to design, develop and evaluate solutions.

#### Collaboration

- UQ School of Information Technology and Electrical Engineering

## Peak Performance

### Curriculum Focus

Like any human endeavour, sport and exercise evolve over time. Science and technology fuel these changes, providing more advanced equipment made with superior materials, better information about nutrition and training, and improvements in data generation and analysis that help push the limits of athletic capability. Today, sportswear brands are constantly re-inventing clothing and footwear to make it easier for athletes to out-perform themselves, and in the future, everything from shot puts to football turf will be artificially enhanced in order to push the boundaries of human limitations.

The most common method for improving performance in sport and exercise is to improve technique. In this elective, students will study biomechanics as an area of science that encompasses the analysis of the mechanics of human movement. Students will also evaluate training techniques and investigate improvements in equipment and technology that enhance performance in sport and exercise. Sports psychology will also be explored to provide an understanding of the psychological factors associated with peak performance, such as understanding of the different forms of motivation, social learning theory and how to better handle stress. The advantages of improved training techniques, technology, genetics and performance enhancing drugs also raises ethical questions about the future of sport, which will also be investigated.

### Learning Outcomes

By the completion of this elective, students will:

- develop knowledge of the fundamentals of biomechanics
- explore ways to measure and optimise physiological performance
- develop and evaluate training programmes



- explore new technologies in sport and exercise
- developing an ability to analyse, evaluate and synthesize scientific information, primary and secondary data.

### Collaboration

- UQ School of Human Movement and Nutrition Science



# International Baccalaureate Diploma Programme

The International Baccalaureate (IB) Diploma Programme (DP) is a rigorous and academically challenging pre-university curriculum for students aged from 16 to 19 years. The programme emphasises the importance of breadth and depth in academic study whilst maintaining a focus on the very way we understand knowledge through the Theory of Knowledge course. Students are encouraged to become active global citizens and understand the importance of care and compassion in an increasingly globalised world. The Diploma encourages students to develop their physical, emotional, intellectual and ethical selves and as such is well regarded and recognised by the world's leading universities.



*The IB Diploma Programme curriculum overview*

In the DP, students study six subject groups. At QASMT, students may choose to study an additional Sciences or Individuals and Societies subject instead of The Arts.

At the core of the Diploma Programme are the three course requirements that broaden the Diploma program experience and require students to apply their knowledge and understanding. The core includes the *Theory of Knowledge* course, the *Extended Essay* and *Creativity, Activity and Service*.

- **The extended essay** is a requirement for students to engage in independent research through an in-depth study of a question relating to one of the subjects they are studying.
- **Theory of knowledge** is a course designed to encourage each student to reflect on the nature of knowledge by critically examining different ways of knowing (perception, emotion, language and reason) and different kinds of knowledge (scientific, artistic, mathematical and historical).
- **Creativity, activity, service** requires that students actively learn from the experience of doing real tasks beyond the classroom. Students can combine all three components or do activities related to each one of them separately.

## Subjects offered in the IB Diploma Programme

The IB curriculum can be best understood through the IB circle, as shown on page 25. Students must study six subjects when undertaking the Diploma Programme, with one subject being chosen from each of Groups 1 to 5. The sixth subject may come from Group 3, 4 or 6. Three subjects must be studied at standard level (equivalent of 150 teaching hours each subject) and three at higher level (equivalent of 240 teaching hours each subject). Subjects are significantly more rigorous at HL level than at SL level. HL courses are designed for students with the high level of skills and understandings needed to succeed with the extra breadth and depth of subject material.

During the two-year program students will also complete an Extended Essay, study a Theory of Knowledge course and participate in the Creativity, Activity & Service course. The International Baccalaureate Organisation (IBO) has comprehensive guidelines that must be adhered to in order for students to receive the IB Diploma qualification.

## Subject Overviews

### Group 1 – Studies in Language and Literature

#### English Language and Literature

English Language and Literature provides students with the opportunity to learn about the complex and dynamic nature of language and explore both its practical and aesthetic dimensions. A core element of the course is the examination of the crucial role language plays in communication, reflecting experience and shaping the world. Students will also learn about their own roles as producers of language and develop their productive skills. Language choices, text types, literary forms and contextual elements all effect meaning. Through close analysis of various text types and literary forms, students will consider their own interpretations, as well as critical perspectives of others, to explore how such positions are shaped by cultural belief systems and to negotiate meanings of texts. Students will engage in activities that involve them in the process of production as well as help shape their critical awareness of how texts and their associated visual and audio elements work together to influence the audience/reader's interpretation. With its focus on a wide variety of communicative acts, the course enables students to develop an understanding of the foundational nature, and persuasive influence of language in local, national and global contexts.

#### Language A Literature (School Supported Self-Taught - SSST)

The IB encourages students to study their Group 1 subject in the Diploma Programme in their mother tongue wherever possible. Non-native English-speaking students at QASMT have the possibility of studying their mother tongue in the Diploma Program as one their six subjects. To accommodate this in the IB Diploma Programme we offer Group 1 in a range of other languages through the School Supported Self-Taught (SSST) program. Students completing their Group 1 subject in a different language to the rest of their course are eligible for a Bilingual Diploma. Language A Literature SSST is available for study in 55 languages. Please note that this is not a language learning course. It is a requirement for all SSST students to study English A as an additional Group 1 subject. Language A Literature SSST is studied instead of a Group 2 subject.

### Group 2 – Language Acquisition

Language courses aim to develop a variety of linguistic skills and a basic awareness of the target culture(s) through the study of a core syllabus and language-specific syllabuses.

#### Language B

Language B is a language acquisition course designed for students with some previous experience of the target language. In the language B course, students further develop their ability to communicate in the target language through the study of language, themes and texts. In doing so, they also develop conceptual understandings of how language works, as appropriate to the level of the course. Students continuing their language acquisition studies from the IB Middle Years Programme, will study the same language in the IB Diploma Programme at Language B. Language B subjects offer include Chinese, French, German, Japanese and Latin.

## Ab Initio

This beginner language course is designed for students who have some or no previous experience of learning or speaking the target language. The focus of the courses is on the acquisition of a new language for purposes and situations usual in everyday social interaction. These courses are not available for native speakers or students who have engaged in significant study of the language, including the IB Middle Years Programme. Further details about Ab Initio courses on offer at QASMT will be provided during subject selection for the Diploma Preparation Program. The Language ab initio subject offered is Spanish.

## Group 3 – Individuals and Societies

### Business Management

Business Management is a rigorous, challenging and dynamic discipline in the individuals and societies subject group. The role of businesses, as distinct from other organisations and actors in a society, is to produce and sell goods and services that meet human needs and wants by organising resources. Profit-making, risk-taking and operating in a competitive environment characterise most business organisations.

The Business Management course is designed to develop students' knowledge and understanding of business management theories, as well as their ability to apply a range of tools and techniques. Students learn to analyse, discuss and evaluate business activities at local, national and international levels. The course covers a range of organisations from all sectors, as well as the socio-cultural and economic contexts in which those organisations operate.

Emphasis is placed on strategic decision-making and the operational business functions of human resource management, finance and accounts, marketing and operations management. Links between the topics are central to the course, as this integration promotes a holistic overview of Business Management. Through the exploration of six concepts underpinning the subject (change, culture, ethics, globalisation, innovation and strategy), the Business Management course allows students to develop their understanding of interdisciplinary concepts from a business management perspective.

### Digital Society

The Digital Society course is the study and evaluation of the impacts of information technology (IT) on individuals and society. It explores the advantages and disadvantages of the access and use of digitized information at the local and global level.

Digital Society provides a framework for the student to make informed judgments and decisions about the use of IT within social contexts. Although Digital Society shares methods of critical investigation and analysis with other social sciences, it also considers social and ethical considerations that are common to other subjects in group 3. Students come into contact with IT on a daily basis because it is so pervasive in the world in which we live. This increasingly widespread use of IT inevitably raises important questions with regard to the social and ethical considerations that shape our society today. Digital Society offers an opportunity for a systematic study of these considerations, whose range is such that they fall outside the scope of any other single discipline.

### Economics

Economics, a dynamic social science, is essentially about dealing with scarcity, resource allocation and the methods and processes by which choices are made in the satisfaction of human wants. As a social science, economics uses scientific methodologies that include quantitative and qualitative elements.

The Economics course emphasises the economic theories of microeconomics, which deal with economic variables affecting individuals, firms and markets, and the economic theories of macroeconomics, which deal with economic variables affecting countries, governments and societies. These economic theories are to be applied to real-world issues. Prominent among these issues are fluctuations in economic activity, international trade, economic development and environmental sustainability. The ethical dimensions involved in the application of economic theories and policies permeate throughout the economics course as students are required to consider and reflect on human end-goals and values.

The Economics course encourages students to develop international perspectives, fosters a concern for global issues, and raises students' awareness of their own responsibilities at a local, national and international level. The course also seeks to develop values and attitudes that will enable students to achieve a degree of personal commitment in trying to resolve these issues, appreciating our shared responsibility as citizens of an increasingly interdependent world.

## Psychology

Psychology is the systematic study of behaviour and mental processes. Psychology has its roots in both the natural and social sciences and a variety of research designs are utilised. Overall Psychology provides a unique approach to understanding modern society.

Psychology examines the interaction of biological, cognitive and sociocultural influences on human behaviour, thereby adopting an integrative approach. Understanding how psychological knowledge is generated, developed and applied enables students to achieve a greater understanding of themselves and appreciate the diversity of human behaviour. The ethical concerns raised by the methodology and application of psychological research are key considerations in Psychology.

Psychology takes a holistic approach that fosters intercultural understanding and respect. In the core of the Psychology course, the biological approaches to understanding behaviour demonstrates what all humans share, whereas the cognitive and sociocultural approaches to understanding behaviour reveal the immense diversity of influences that produce human behaviour and mental processes. Cultural diversity is explored and students are encouraged to develop empathy for the feelings, needs and lives of others within and outside their own culture, therefore contributing to an international understanding.

## Group 4 – Sciences

### Biology

Biology is an experimental science that combines academic study with the acquisition of practical and investigational skills. Biologists attempt to understand the living world at all levels using many different approaches and techniques. At one end of the scale is the cell, its molecular construction and complex metabolic reactions. At the other end of the scale biologists investigate the interactions that make whole ecosystems function. Apart from being a subject worthy of study in its own right, Biology is recommended for students wishing to study medicine, biological science and environmental science in higher education and serves as useful preparation for employment.

### Chemistry

Chemistry is an experimental science that combines academic study with the acquisition of practical and investigational skills. It is called the central science as chemical principles underpin both the physical environment in which we live and all biological systems. Apart from being a subject worthy of study in its own right, chemistry is a prerequisite for many other courses in higher education, such as medicine, biological science and environmental science and serves as useful preparation for employment. Chemistry is recommended for students interested in university studies in all science fields, for many universities Chemistry is a pre-requisite study requirement.

### Computer Science

Computer science requires an understanding of the fundamental concepts of computational thinking as well as knowledge of how computers and other digital devices operate. The Computer Science course is engaging, accessible, inspiring and rigorous. It has the following characteristics:

- draws on a wide spectrum of knowledge
- enables and empowers innovation, exploration and the acquisition of further knowledge
- interacts with and influences cultures, society and how individuals and societies behave
- raises ethical issues
- is underpinned by computational thinking.

Computer Science students will become aware of how computer scientists work and communicate with each other and with other stakeholders in the successful development and implementation of IT solutions. While the

methodology used to solve problems in computer science may take a wide variety of forms, the Computer Science course emphasizes the need for both a theoretical and practical approach.

## Environmental Systems and Societies (ESS)

ESS is an interdisciplinary group 3 and 4 course that will be offered only at higher level (HL) from 2025. As an interdisciplinary course, ESS is designed to combine the methodology, techniques and knowledge associated with group 4 (sciences) with those associated with group 3 (individuals and societies). Because it is an interdisciplinary course, students can study ESS and have it count as *either a group 3 or a group 4 course*, or as both. If students choose the latter option, this leaves the opportunity to study an additional subject from any other group, including an additional group 3 or group 4 subject.

ESS is a complex course, requiring a diverse set of skills from its students. It is firmly grounded in both a scientific exploration of environmental systems in their structure and function and in the exploration of cultural, economic, ethical, political, and social interactions of societies with the environment. As a result of studying this course, students will become equipped with the ability to recognize and evaluate the impact of our complex system of societies on the natural world. The interdisciplinary nature of the course requires a broad skill set from students and includes the ability to perform research and investigations and to participate in philosophical discussion. The course requires a systems approach to environmental understanding and problem-solving, and promotes holistic thinking about environmental issues. It is recognized that to understand the environmental issues of the 21st century and suggest suitable management solutions, both the human and environmental aspects must be understood. Students should be encouraged to develop solutions from a personal to a community and to a global scale.

Through the exploration of cause and effect, the course investigates how values interact with choices and actions, resulting in a range of environmental impacts. Students develop an understanding that the connections between environmental systems and societies are diverse, varied and dynamic. The complexity of these interactions challenges those working towards understanding the actions required for effective guardianship of the planet and sustainable and equitable use of shared resources.

## Physics

Physics is an experimental science that combines academic study with the acquisition of practical and investigational skills. It is the most fundamental of the experimental sciences as it seeks to explain the universe itself, from the very smallest particles – like quarks and leptons (perhaps  $10^{-17}$  m in size), perhaps truly fundamental – to the size of the universe itself. Students with an aptitude in Mathematics or physical science or simply a desire to work in fields like Astronomy, Nanotechnology, Rocketry, Medicine, Engineering, Dentistry, Architecture or Photonics (to name a few), should consider studying the Physics Programme. A challenging but richly rewarding program of study, with many exciting career options available.

## Sports, Exercise and Health Science (SEHS)

SEHS is an experimental science that combines academic study with the acquisition of practical and investigative skills in the context of health and exercise. It is an applied science course, with aspects of biological and physical science being studied within the specific contexts of health and physical activity. Students are introduced to the traditional disciplines of anatomy and physiology, biomechanics, nutrition and training principles. Topics covered in this course include anatomy, function of the musculoskeletal system, physics of motion (forces, Newton's Laws of Motion, projectile motion), nutrition and components of fitness. Students undertake both theory and practical work, and are introduced to the scientific inquiry skills required to successfully undertake a scientific research project. Students apply their learning to practical activities in various indoor and outdoor scenarios, however practical skills are not assessed in this course.

## Group 5 – Mathematics

Mathematics has been described as the study of structure, order and relation that has evolved from the practices of counting, measuring and describing objects. Mathematics provides a unique language to describe, explore and communicate the nature of the world we live in as well as being a constantly building body of knowledge and truth in itself that is distinctive in its certainty.

Two courses are available in Mathematics and both subjects are designed to appeal to students with varying levels of ability and motivation in mathematics, but will be developing their mathematics fluency, their ability to think

mathematically, to recognise mathematics around them and to be able to use their mathematics in either abstract or contextual settings.

### Mathematics Analysis and Approaches

This course is designed for students who enjoy developing their mathematics, to become fluent in the construction of mathematical arguments and develop strong skills in mathematical thinking. They will explore real and abstract applications, sometimes with technology, and will enjoy mathematical problem solving and generalisation. This course caters for students with a good background in mathematics who are competent in a range of analytical and technical skills. The majority of these students will be expecting to include mathematics as a major component of their university studies, either as a subject in its own right or within courses such as physics, engineering and technology. Others may take this subject because they have a strong interest in mathematics and enjoy meeting its challenges and engaging with its problems.

### Mathematics Applications and Interpretation

This course is designed for students who are interested in developing their mathematics for describing our world, modelling and solving practical problems using the power of technology. Students who take Mathematics: Applications and Interpretation will be those who enjoy mathematics best when seen in a practical context. This subject is aimed at students who will go on to further education in order to study subjects such as social sciences, natural sciences, statistics, business, some economics, psychology, and design, for example.



## Queensland Academy of Science, Mathematics & Technology Year 9 Subject Selection – 2025

Subject selections are completed online at OneSchool ([oslp.eq.edu.au](https://oslp.eq.edu.au)). Students login using their school username and password, subject selections only become available on the published date in Term 3.

All students study English Language and Literature, Mathematics and their chosen Language Acquisition subject.

Students choose six (6) STEM Futures Electives from the lists below. At least two electives must be chosen from category A, two electives from category B and one elective from category C. The remaining elective can be chosen across any category.

Choose two electives from Category A and B, one elective from category C (these are should be your first preferences). Choose five electives from the last section, students must not choose electives they have already chosen in Category A, B or C. Students must select five (5) electives in the additional electives section, as choices two (2), three (3), four (4) or five (5) will be allocated if their first preferences are not available. Students are recommend to choose additional electives from each Category.

1. **Category A (choose two):**
  - a. Fuelling the Planet
  - b. Biochemical Solutions
  - c. World of Reactions
  - d. Medical Physics
  - e. Sustainable Futures
2. **Category B (choose two):**
  - a. World in Your Pocket
  - b. Forensic Psychology
  - c. Cultural Revolution
  - d. Future Global Cooperation
3. **Category C (choose one):**
  - a. Healthy Future
  - b. Disrupting the Market
  - c. Biomedical Engineering
  - d. Future of Automation
  - e. Artists as Change Makers
  - f. Soundtrack
4. **Additional electives across all categories, do not choose electives you have already selected (choose five in preference order):**
  - a. Fuelling the Planet
  - b. Biochemical Solutions
  - c. World of Reactions
  - d. Medical Physics
  - e. Sustainable Futures
  - f. World in Your Pocket
  - g. Forensic Psychology
  - h. Cultural Revolution
  - i. Future Global Cooperation
  - j. Healthy Future
  - k. Disrupting the Market
  - l. Biomedical Engineering
  - m. Future of Automation
  - n. Artists as Change Makers
  - o. Soundtrack

Please refer any questions about subject selections to the Deputy Principal Performance – Ms Catherine de Freitas Pessoa at [crdef0@eq.edu.au](mailto:crdef0@eq.edu.au) or 07 3377 9333.

**Please do not return this form, subject selections must be done online through the portal indicated above.**





## Queensland Academy of Science, Mathematics & Technology Year 10 Subject Selection – 2025

Subject selections are completed online at OneSchool ([oslp.eq.edu.au](https://oslp.eq.edu.au)). Students login using their school username and password, subject selections only become available on the published date in Term 3.

All students study English Language and Literature, Mathematics and their chosen Language Acquisition subject. Students choose three (3) STEM Futures Electives from the lists below. At least one elective must be chosen from each category. Students must choose a Category A, B and C elective.

Choose one elective each from Category A and B (this should be your first preference in each category) and choose three electives from Category C. Students must not choose electives they have already chosen in Category A or B. Students must select three (3) electives in Category C, choice one (1) should be their first preference as choice two (2) and three (3) will be only allocated if their first preference is not available.

### 1. Category A (choose one):

- a. Show Me the Money
- b. Tragedy of the Commons
- c. Inside Your Head
- d. Living in a Digital Society
- e. Blue Planet

### 2. Category B (choose one):

- a. Medical Biotechnology
- b. Future Materials
- c. Journey to Earth X
- d. Computational Thinking
- e. Peak Performance
- f. Blue Planet

### 3. Category C (choose three – must be different from choice in Category A & B):

- a. Show Me the Money
- b. Tragedy of the Commons
- c. Inside Your Head
- d. Living in a Digital Society
- e. Blue Planet
- f. Medical Biotechnology
- g. Future Materials
- h. Journey to Earth X
- i. Computational Thinking
- j. Peak Performance

Please refer any questions about subject selections to the Deputy Principal Performance – Ms Catherine de Freitas Pessoa at [crdef0@eq.edu.au](mailto:crdef0@eq.edu.au) or 07 3377 9333.

**Please do not return this form, subject selections must be done online through the portal indicated above.**



## Queensland Academy of Science, Mathematics & Technology

### Year 10 Subject Selection – 2025 (incoming students only)

Subject selections are completed online through the survey link sent from Enrolments. All students study English Language and Literature and Mathematics.

Students choose a Language Acquisition subject – either at beginner level (Language ab initio) or advanced level (Language B). Students choosing an advanced language will need to undergo testing to confirm their readiness for studies at that advanced level.

Students choose three (3) STEM Futures Electives from the lists below. At least one elective must be chosen from each category. Choose one elective each from Category A and B (this should be your first preference in each category) and choose three electives from Category C. Students must not choose electives they have already chosen in Category A or B. Students must select three (3) electives in Category C, choice one (1) should be their first preference as choice two (2) and three (3) will be only allocated if their first preference is not available.

#### Language Acquisition (choose one):

- a. Beginner Spanish
- b. Advanced Chinese
- c. Advanced French
- d. Advanced German
- e. Advanced Japanese

#### STEM Futures Electives (choose from each category):

##### 1. Category A (choose one):

- a. Show Me the Money
- b. Tragedy of the Commons
- c. Inside Your Head
- d. Living in a Digital Society
- e. Blue Planet

##### 2. Category B (choose one):

- a. Medical Biotechnology
- b. Future Materials
- c. Journey to Earth X
- d. Computational Thinking
- e. Peak Performance
- f. Blue Planet

##### 3. Category C (choose three – must be different from choice in Category A & B):

- a. Show Me the Money
- b. Tragedy of the Commons
- c. Inside Your Head
- d. Living in a Digital Society
- e. Blue Planet
- f. Medical Biotechnology
- g. Future Materials
- h. Journey to Earth X
- i. Computational Thinking
- j. Peak Performance

Please refer any questions about subject selections to the Deputy Principal Performance – Ms Catherine de Freitas Pessoa at [crdef0@eq.edu.au](mailto:crdef0@eq.edu.au) or 07 3377 9333.

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