



STEM Horizons

for High Achievers

Year 7

What is STEM?

STEM is an acronym for **Science, Technology, Engineering** and **Mathematics** practice and education.

Why STEM?

In the move towards a knowledge-based economy, a workforce of scientifically and technologically literate people is key.

In 2011-12, approximately 10.5% of the Australian workforce were directly employed in STEM-related occupations while 75% of the fastest growing occupations require STEM skills and knowledge.

"A renewed national focus on STEM is critical to ensuring that young Australians are equipped with the necessary STEM skills and knowledge that they will need to succeed".

State winner

Showcase Awards for Excellence in Schools

Showcase 2017
Awards for Excellence in Schools



Moreton Bay
ENVIRONMENTAL EDUCATION CENTRE
Inspiring Champions for the Bay

SPARQ-ed
Students Performing Advanced Research QLD

Griffith
UNIVERSITY



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STEM Horizons

Our passion is to provide extraordinary STEM experiences for students through a diverse range of unique opportunities. The STEM Horizons program for high achieving Year 7 students is the perfect opportunity to further enhance their knowledge and extend science learning beyond the classroom.

During the course of a school semester, students will complete 4 days of specialist activities at a range of locations including the Princess Alexandra Hospital, Griffith University and the waters of Moreton Bay. Activities are designed to be 'hands on' and provide opportunities to actively engage in higher order thinking and problem solving. Links to authentic 'real world' science further enhance engagement and connection with possible future careers.

Students will be working in small groups alongside peers from other schools with similar demonstrated interests and abilities in STEM subjects.

Schools are able to nominate identified students through an online registration process. For further information, please contact Darren Shepherd on 0414 597 209 or email dlshe0@eq.edu.au

Details of individual activities are provided in the pages that follow.

Activity 1

Brisbane Urban Environmental Education Centre: The Water We Drink



One of the main services provided to urban residents is a clean, safe water supply.

Water needs to be stored, treated and supplied to consumers and then the wastewater must be collected, treated and returned to the water cycle.

This activity at the Brisbane Urban Environmental Education Centre will explore some of the processes used to provide clean, safe drinking water at both the large scale utilities level and the smaller family or personal water supply.

About Brisbane Urban Environmental Education Centre

Brisbane Urban EEC is a Department of Education (DoE) facility located within the Newmarket State School Campus. The centre focuses on urban environmental investigations – urban environments, urban planning and lifestyles, and sustainability – with the main curriculum links to the subject areas of Science, Geography, History and Media Arts.

Most centre programs involve field investigations in the inner and central city areas of Brisbane, or classroom activities at the Centre at Newmarket.

Activity 2

SPARQ-ed: The building blocks of life: Naked

Science often involves working in complex situations – and requires **NEW** ways of thinking, problem solving, and technologies. You **MUST** know in order to understand!

DNA technology is at the forefront of science and is helping humans to solve problems previously thought insurmountable. Knowledge of basic DNA techniques is important to understanding their application in forensic, health, and medical fields. In this workshop, students use chemistry, chromatography and electrophoresis to isolate DNA and determine their sample quality. Participating students will apply modern laboratory skills and techniques, including micro-pipetting, microscopy, restriction enzyme digestions, that form the backbone of work performed by scientists and industry professionals.



About the SPARQ-ed facility

Students Performing Advanced Research Queensland (SPARQ-ed) is a unique educational outreach facility run as a collaboration between The University of Queensland's Diamantina Institute (UQDI) and Queensland's Department of Education and Training (DET).

First established in 2009 by Professor Ian Frazer, it features a state of the art biomedical teaching laboratory and online learning area located in the Translational Research Institute (TRI) in Woolloongabba.

Activity 3

Moreton Bay Environmental Education Centre: Energy at the Bottom of the Bay

Seagrass has been identified as a significant source of carbon storage (blue carbon), which continues to be of major scientific interest.

The vessel *Inspiration* will be the classroom on Moreton Bay for students to conduct seagrass surveys using underwater video gliders, investigating the seagrass meadows that are an integral part of the bay.

Baited Remote Underwater Video (BRUVs) will be deployed to record the presence of larger species that inhabit the bay. The links between water quality, seagrass beds and fish, sharks and crabs will be investigated. Students will have unique opportunities to engage in authentic science alongside scientists and post graduate students from the University of Queensland.



About Moreton Bay Environmental Education Centre

Moreton Bay EEC's vision is 'Inspiring Champions for the Bay' which is achieved through the provision of unique education experiences. The centre's 12 metre catamaran *Inspiration* enables students to experience the bay and venture to nearby surrounding islands to engage in authentic learning journeys using state-of-the-art scientific equipment.

Moreton Bay is recognised as wetlands of international significance under the Ramsar Wetland Convention. The centre is a Department of Education (DoE) facility located in Manly and is pleased to offer this range of experiences to students.

Activity 4

Griffith University: Freshwater CSI

Declining water quality continues to be a global concern as the human population grows, industrial and agricultural activities expand, and climate change threatens to cause major alterations to the hydrological cycle (UNDESA).

Freshwater CSI presents students with a wonderful opportunity to explore the exciting world that exists in our creeks and streams. PHD students and fisheries ecologist will guide students through the collection of primary data from 2 sites. Sampling techniques will cover biotic data collection, including aquatic macroinvertebrates and fish species, both native and introduced. Data loggers will be used to collect a range of abiotic data (e.g. dissolved oxygen, turbidity, salinity), with the aim of interpreting and comparing with secondary data sources to establish trends.

Students will also gain first hand exposure to researchers who are tasked with studying our waterways, and finding solutions to some of the challenges confronting our freshwater environments.



About Griffith University

Since opening its doors in 1975, Griffith University has grown to become Australia's ninth largest higher education provider, offering more than 300 degrees to in excess of 43,000 students from 131 countries. More specifically, the Nathan Campus is nestled among the natural backdrop of Toohy Forest.

