

Cutting Edge STEM Professional Learning Day

2024 PROGRAM



Wednesday 27 November 2024
Griffith University
Gold Coast campus



Cutting Edge STEM for Teachers 2024

Professional Learning Day
 Wednesday 27th November
 Gold Coast Campus

Make it matter

KEYNOTE SPEAKER

Associate Professor Michael Simmonds



Associate Professor Michael Simmonds, from Griffith University's Mechanobiology Research Laboratory, is at the forefront of developing transformative cardiac technologies that promise life-changing impacts for patients with heart failure. Through the Artificial Heart Frontiers Program, supported by a \$50 million Medical Research Future Fund (MRFF) grant, Assoc. Professor Simmonds leads a team working closely with BiVACOR on regulatory approval and ensuring these pioneering devices are blood-friendly. His lab's research on mechanobiology explores how artificial support devices, like artificial hearts, impact blood properties, aiming to improve the quality of life for patients undergoing cardiothoracic surgery. Assoc. Professor Simmonds' internationally recognized contributions have shaped new understandings in clinical hemorheology, earning him accolades such as the Rising Star Award from the International Society for Biorheology and the Emerging Leader recognition from the Australian Financial Review.

NAME OF PRESENTER	INSTITUTION / ORGANISATION	WORKSHOP TITLE	WORKSHOP ABSTRACT	YEAR LEVEL
Megan Scougall	Boonah SHS – Outstanding School STEM Award - Peter Doherty Awards for Excellence in STEM Education 2024	Developing Year 7-10 STEM Electives at Boonah SHS	Over the past two years, Boonah SHS has added STEM as an elective subject in Year 7-10. This has resulted in the school developing 10 STEM units from scratch for 2023/2024, with plans for several of these units to be updated or replaced for 2025. Due to the popularity of the elective and the number of STEM classes, it has meant that we have needed to upskill several teachers in STEM skills outside of their main teaching areas. In this presentation we will discuss the STEM units we have designed, the plans for our future STEM units, how we have upskilled our teaching staff, and our plans for how to grow this elective program in the future.	High School
Steve Iuliano	The School Locker	Design 3D LEGO Projects for the Classroom with Studio 2.0 by Bricklink	Learn how to build classroom LEGO models that can be explored in 3D / AR / VR with the winner of the STEM Moon to Mars international design competition by NASA and LEGO Ideas, Steve Iuliano. Steve is a qualified and experienced classroom teacher, featuring on TEDx Sydney and has worked with LEGO Ideas and NASA education programs at Kennedy Space Center at Cape Canaveral USA. Students and teachers can conceptualise and create amazing digital 3D LEGO models. In this workshop, we will create models together. This will be hands-on (please download Studio 2.0 by Bricklink for FREE - works on both a Windows PC or Mac, but not on iPad) so please bring your laptop unless you would just prefer to watch. We will also look at www.sketchfab.com where you can upload your 3D models from any program (including Studio 2.0) to have the option to explore 3D design projects in AR and VR.	Primary School, High School, Tech Staff
Ryan Nelson	Currumbin Wildlife Sanctuary	Nature Ed Workshops	The Nature Ed Team at Currumbin Wildlife Sanctuary is excited to be launching our new Nature Ed Workshops for educational groups in 2025, where we come to you. Too often, people back away from large, global problems thinking, "What can I do?" Our workshops ("Conservation in Your Backyard", "First Nations Fun on Country" and "Sustainability for Life") will provide participants with the knowledge, skills and ideas to make a positive difference.	Primary School, High School, Tech Staff

Shern Ren Tee	Griffith University	Le Chatelier's Colours	Nothing's better than a colourful chemical demonstration! Shern presents two colorimetric experiments that probe aqueous equilibria with (mostly) everyday materials. Firstly, universal pH dye combined with a rough-and-tumble serial dilution can help students grasp the differences between strong and weak acids, as well as visually demonstrate buffers and their ability to resist pH changes. Secondly, copper (II) chloride in acetone vividly changes colour upon adding water or salt, as well as cooled in ice or heated in warm water, enabling colourful discussions of equilibrium positions while eliminating the typically-used concentrated hydrochloric acid and its hazards. Both demonstrations tie in to Le Chatelier's Principle and general concepts of equilibria in reversible reactions.	High School
Sid Hooker + <i>Science on the GO!</i>	Griffith University	Physics Practicals - Unit 4 Explained and Demonstrated	Quantum Physics explained with hands on practicals for you and your students.	Senior School
Shern Ren Tee	Griffith University	The Chemist's Tour Guide to Numberland	Chemistry provides many opportunities for students to practice maths and connect numbers with their everyday lives. In this workshop, I introduce the "maths is a language" metaphor to help students approach maths with curiosity and self-compassion instead of fear. I then talk about how a physical chemist sees the world, and I show how both everyday objects and cutting-edge research relate to key quantitative concepts: mass, moles, concentration, volume, and energy.	High School
Dr Maksym Rybachuk	Griffith University	Reverse materials engineering - a powerful, hands-on way to teach materials science	The workshop offers interactive, problem-solving and object-oriented exercise to reveal the practical relevance of materials science in real life. The training will be focused on offering learners' disassembly projects to be taken apart, such as everyday objects (hardware items, etc.) and identify materials used (e.g., metals, polymers, ceramics). The learners will analyse 'function vs. material' relationships to connect material properties (e.g., strength, hardness, electrical conductivity, weight, etc.) with the object's function. Learners will then consider and recreate the objects with alternative materials solutions and will be challenged to re-design and re-fabricate components using different materials, meeting creativity with	Primary School, High School, Tech Staff

			deeper understanding of potential trade-offs. The training will also address sustainability and material recycling challenge and learners where learners will consider and understand sustainability and lifecycle analysis of materials.	
Dr Jason van de Merwe	Griffith University	Marine Wildlife Cell Bank	Cell cultures are a valuable, ethical and novel tool for research into biological processes and health of animals. However, to date, their application to understanding the biology and health of marine wildlife has been limited, largely due to the lack of available cell lines for these species. At Griffith University, we have established Australia's first Marine Wildlife Cell Bank - for cetaceans (dolphins and whales), pinnipeds (seals), dugongs, and reptiles (turtles and crocodiles). This facilitates species-specific research into pharmacological, toxicological, microbiological and virological processes, thereby enhancing management and conservation of Australian marine wildlife, and providing a platform for the international scientific community to research these often threatened animals. This workshop will involve a short presentation about the Marine Wildlife Cell Bank, followed by a tour of the lab where the cell bank is housed.	High School, Tech Staff
Dr Melanie Roberts	Griffith University	Modelling the zombie invasion: Bringing mathematical modelling into the classroom	This workshop will provide an introduction to mathematical modelling and the modelling process as it is used by industrial/applied mathematics to address a broad range of complex problems. This hands-on workshop will use an example of a zombie invasion that can be taken into maths classrooms from years 7 - 12.	High School, Senior School
Dr Ruby Michael	Griffith University	Ecological Engineering: employing the power of engineering to rebuild ecosystems	Ecological Engineering harnesses the power of engineering with the deep insight of ecology to create solutions that bring back nature and have myriad benefits for humans, wildlife and ecosystems. Teaching in this space requires students to take a transdisciplinary approach, learn advanced STEM techniques and tools, and foster their relationship and connection with land.	High School, Senior School, Tech Staff
A. Prof Thomas Haselhorst	Griffith University	Molecules in Motion	Molecules in Motion: Interactive Molecular Visualisations for STEM Education	High School, Tech Staff

Dr. Erik Streed + Adam Whyte	Griffith University	Ion Trapping- A Gateway to Quantum Computing	Based on the Griffith Physics Charged Particle "Dust" Trap Demonstrator device. Shows visible to the human eye levitated pollen spores using the same Paul trap technology which resulted in several Nobel prizes and is at the heart of trapped ion style quantum computers. Also demonstrates stroboscopic effects to enable visualisation of phenomena faster than the human eye's response.	High School, Tech Staff
James McBroom + Matthew Unsworth	Griffith University	Six Not So Easy Pieces	An exploration into the world of statistics and probability through an analysis of six CU Methods External Exam questions.	High School, Senior School
Dr Alex Braczowski	Griffith University	Lessons from Fieldwork in Africa with Dr. Alexander Braczowski	<p>Join Dr. Alexander Braczowski, a leading conservation biologist, wildlife filmmaker, and Griffith University scientist, for an engaging workshop on integrating real-world conservation science into the classroom. With over 15 years of experience working on conservation projects with large carnivores such as lions and leopards, Dr. Braczowski will share insights from his global fieldwork, including his recent large-scale biodiversity survey in Uganda. This project involved collaboration with over 100 scientists and local communities and has led to impactful policies protecting vulnerable predator populations.</p> <p>In this workshop, Dr. Braczowski will discuss his experiences and challenges in wildlife conservation and provide educators with practical resources and strategies for teaching biodiversity, ecology, and conservation in ways that resonate with students. He will showcase multimedia resources, including films and articles from National Geographic and BBC Wildlife Magazine, to illustrate effective storytelling techniques that captivate and educate. Participants will leave with tools to inspire environmental awareness, foster critical thinking, and encourage scientific inquiry, empowering students to engage meaningfully in conservation issues. This workshop will be especially valuable for teachers seeking to enrich STEM curricula with real-world applications and foster a sense of environmental stewardship in their students.</p>	Primary School, High School, Senior School

Dr Vincent Raoult	Griffith University	Shark Ecology	Sharks are fascinating and polarising creatures. However, much of the information on these animals is biased and does not really align with the truth. In this workshop I'll provide some thought-provoking information on shark ecology and conservation that will challenge preconceptions of these creatures, while using examples of how real-world research gives us this information.	High School, Senior School
Dr Vincent Raoult	Griffith University	Drone-based surveys of coral reef bleaching events	In this workshop I'll demonstrate the basic principles of drone research and how drones allow us to provide rapid analysis of habitats that were historically hard to measure. I'll walk the audience through basic drone operation, mission planning, and then analysis of these outputs using a real world example of bleaching monitoring at Lizard Island, on the Great Barrier Reef.	High School, Senior School
Professor Susan Bengtson Nash	Griffith University	Monitoring of the Antarctic sea-ice ecosystem with whales	TBC	High School, Senior School
Sea World	SeaWorld	Educator's for Marine Conservation and Student Engagement	This workshop for educators focuses on Sea World's research initiatives in wildlife health, ecology, and species conservation. Participants will explore various ongoing research projects and gain insights into effective conservation strategies. The workshop will also include interactive demonstrations of student engagement activities designed to enhance understanding of marine conservation and related biological functions. Educators will leave with practical resources and strategies to inspire their students and foster a deeper appreciation for marine ecosystems and conservation efforts.	Primary School, High School
A. Prof Joanne Jamie	Macquarie University	STEM Making with Natural Resources to Solve Global Challenges	In this hands-on workshop, you'll have the opportunity to extract and test your own medicine from native plants, drawing on the knowledge of First Nations peoples, and you will harness the vibrant pigments of fruits to capture light and generate solar energy. These activities, developed by Macquarie University and the National Indigenous Science Education Program (NISEP), are designed to address real-world sustainability challenges. They are versatile and can be tailored to student groups of various ages and STEM disciplines, whether conducted in-class or on Country. The activities also prioritise accessibility, sustainability, and the	Primary School, High School, Tech Staff

			safe, reliable use of chemicals and materials.	
A. Prof Joanne Jamie	Macquarie University	Hands on for Sustainability: Making Solar Power from Plant Pigments	Engage Your Students with Real-World Science! Join us for an exciting hands-on workshop where you will use the vibrant pigments of fruit to capture light and generate solar energy through a Dye Sensitised Solar Cell (DSSC). This activity, developed by Macquarie University and the National Indigenous Science Education Program (NISEP), is designed to bring real-world sustainability challenges into the classroom. It is particularly suitable for students year 8 – year 11. Why This Workshop is Perfect for Your Students: Flexible and Adaptable: Tailored for student groups of various ages and STEM disciplines. Educational and Relevant: Highlights the importance of sustainability. Safe and Accessible: Carefully designed to ensure the safety and reliability of the chemicals and materials used. Inspire your students with this innovative approach to learning about renewable energy and sustainability!	Primary School, High School Tech Staff
A. Prof Joanne Jamie	Macquarie University	Hands on for Sustainability: Indigenous Knowledges Driving Plant-Based Medicinal Solutions	In this hands-on workshop, you'll extract and test your own medicine from native plants, guided by the knowledge of Indigenous peoples. Macquarie University and the National Indigenous Science Education Program (NISEP) use this activity to emphasise the significance of Indigenous knowledge and address real-world sustainability challenges. The activity is flexible and can be adapted for student groups of various ages and STEM disciplines, whether conducted in-class or on Country. It also considers the accessibility and sustainability of the activities, ensuring the safety and reliability of the chemicals and materials used. The workshop includes a tour of the native plant resources at Griffith University Campus.	Primary School, High School, Tech Staff
Abigail Twyman	QCAA	K-10: Australian Curriculum version 9 Mathematics	K-10: Australian Curriculum version 9 Mathematics – overview of resources for implementation (Abigail Twyman)	Primary School, High School
Cath Menzler	QCAA	K-10: Australian Curriculum version 9 Science	K-10: Australian Curriculum version 9 Science – overview of resources for implementation (Cath Menzler)	Primary School, High School

Robyn McNamara	QCAA	Senior: Revised Mathematics syllabuses	Senior: Revised Mathematics syllabuses – overview of key changes and resources for implementation (Robyn McNamara)	Senior School
Adam Richmond	QCAA	Senior: Revised Science syllabuses	Senior: Revised Science syllabuses – overview of key changes and resources for implementation (Adam Richmond)	Senior School
Antonio Grimm	Griffith University	ADaPT Interactive Tour	An interactive tour of the Advanced Design and Prototyping Technologies Institute. Technology to be explored includes biomedical and aerospace manufacturing using industrial 3D printers.	High School, Senior School, Tech Staff
Dr Heather Shearer	Griffith University	Using Online Geographic Information Systems Portals (Queensland Globe) for Simple Data Analysis	Geographic Information Systems (GIS) such as QGIS and ArcGIS Pro are powerful stand-alone software capable of complex spatial analysis. However, in Queensland, there are a number of online systems that can also perform simple GIS tasks. In this talk, I briefly explore some data sources, and show people how to use Queensland Globe, an online portal for displaying spatial datasets, that can also do simple analysis and create attractive and useful maps.	Primary School, High School
Dr. Audrey Copeland & Jacob Heilbronn	Benowa State High School	Tackling a real-world problem in biology using virtual reality (VR) tools	The Currumbin Project at Benowa State High School is an interdisciplinary initiative that combines digital technology, ecological science, and project-based learning to engage Year 7 students in real-world problem-solving. In partnership with Currumbin Wildlife Sanctuary (CWS), students designed a sustainable kangaroo enclosure and created immersive VR resources to educate the public about wildlife conservation. Students applied their knowledge of species classification, ecosystem interactions, and habitat needs to the enclosure design, incorporating conservation principles. They also developed a VR experience for English, French, and Japanese-speaking visitors, showcasing kangaroos and their habitats. The project yielded excellent outcomes, with students demonstrating a strong grasp of ecological and digital concepts. Their work was featured at the school science fair and CWS, earning praise from educators and visitors alike. The project also underscored VR's potential as an educational tool, showing how integrated technology and environmental education can drive engagement, learning, and real-world impact in conservation.	Primary School, High School

Cassidy Winter	Griffith University	Bees of Brisbane: Resources for Identification, analysis, and research	PhD candidate Cassidy Winter (Green Infrastructure Research Labs) showcases the various tools that she has found valuable during her ecological study and science communication; and how these can be applied to research projects for students, teachers, HDRs, and Postdocs.	High School, Tech Staff
Dr. Danielle H. Heinrichs and Prof. Brendan Mackey	Griffith University	Bridging the Gap: Five creative approaches for STEM to engage with Climate Action	This workshop features five PhD candidates from Griffith's Climate Action Beacon presenting innovative approaches for engaging with climate action. Discover how to harness creativity and co-design to tackle wicked problems and consider how your students and school might collaborate in future citizen sciences projects. Our five approach cover topics such as the use of drones for environmental mapping, behaviours for sustainable surf tourism, the right to repair, transition design theory and communication for climate action through film and digital storytelling techniques.	Primary School, High School, Senior School
Dr Thanh Tam Nguyen	Griffith University	Exploring Job Markets with Big Data and AI	The workshop delves into the transformative impact of data analytics and artificial intelligence on modern job markets. Attendees will explore how AI-driven tools and big data can reveal insights into job market trends, skill demands, and emerging career opportunities. Through hands-on sessions and case studies, participants will learn techniques to leverage data sources, such as online job postings and economic indicators, to analyse employment patterns and predict future workforce needs. This workshop is ideal for professionals, teachers, and policymakers interested in understanding labour market dynamics and designing data-informed strategies for workforce development.	High School, Senior School
Melissa Trill	Numinbah Valley Environmental Education Centre	Environmental Education Center Energy Trailer	This hands-on program deepens students' understanding of energy, with a focus on electrical energy, transfer, and transformation. Students engage with turbines, solar technologies, and other learning tools to investigate how electrical energy is generated in Australia, considering environmental and economic impacts of non-renewable systems. They also have fun transforming their own kinetic energy to power a range of everyday devices. The Energy Trailer serves as a platform for students to compare and evaluate renewable energy sources and explore how Australia's energy needs can be met. Students also	Primary School, High School, Tech Staff

			explore scientific inquiry processes, such as posing questions, collecting and analysing data, and evaluating findings to draw reasoned conclusions. Additionally, they examine how science and technology collaborate to address societal needs and how design decisions incorporate sustainability principles. Through the lens of consumer choices, students consider personal and community strategies for promoting sustainable energy solutions.	
Dave Canavan	Stile	The Science of Studying	How do your students study? Do they know what works and what doesn't? What strategies are evidenced based and what doesn't help at all? In this workshop, evidence based cognitive study skills will be explored and explained.	Primary School, High School, Senior School
Bridie Schultz	Sativus	TBC	TBC	Primary School, High School

Credit Card is the preferred payment method. Tickets can be purchased at:

<https://app.secure.griffith.edu.au/griffithpay/Cutting-Edge-STEM-Professional-Learning-Day-2024.html>

If your school requires an invoice for payment, please complete all teachers details in one submission

<https://forms.office.com/r/AgU2RFPxJq>

A link for workshop selections will be sent in an additional email soon.

Please contact Anita Brant (Hazell) - STEM Outreach Manager for any questions

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