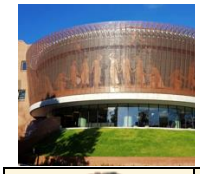

Secondary STEM Stream

Sibyl Centre, Women's College

	**8:00AM – F23 Administration Building** – *Registration* **9:00-10:30AM – F19 Eastern Avenue Auditorium** – *Official Opening and Plenaries* **10:30-11:00AM** – *Move to venue: Sibyl Centre, Women's College* **11:10-1:00PM** *Master of Ceremonies* **Professor Scott Sleap,** The University of Sydney
11:15 AM– 1:00 PM Keynote presentations	
	**11:15AM Associate Professor Cameron Webb,** Principal Scientist, Westmead Hospital, The University of Sydney *Beyond the Lab: The Human Side of STEM and Global Problem-Solving* **Synopsis:** Associate Professor Cameron Webb takes us through his career in medical entomology to show how STEM can create real-world impact. His story highlights the vital connections between science, government, and community, demonstrating how everyday environments can be powerful sites for scientific exploration. Grounded in public health and policy, Cameron's work exemplifies how interdisciplinary collaboration and applied research can address global challenges. Educators will gain practical insights into connecting STEM learning with meaningful experiences for students.
	**11:40AM Associate Professor Helen Georgiou,** School of Education, University of Wollongong *Engineering a Future for STEM: Beyond the Pedagogy Wars* **Synopsis:** Associate Professor Helen Georgiou explores the challenges and opportunities of embedding STEM in secondary schools, particularly in a policy environment dominated by explicit instruction. She unpacks the perceived tension between structured teaching and inquiry-based learning, arguing that both approaches can, and should, coexist. Drawing on practical insights from the STEM Teacher Enrichment Academy and the LIFT UOW Makerspace, Helen will share real-world examples of successful STEM integration. This keynote encourages educators to move beyond the "either/or" mindset and embrace flexible, evidence-based strategies that empower both teachers and students in high school settings.
	**12:05PM Dr Sham Nair**, Science Coordinator 7-12, NSW Department of Education *Teaching scientifically: Transforming science education with scientific principles* **Synopsis:** Dr Sham Nair presents a powerful case for rethinking science education by applying the same methods used in scientific research to our teaching practices. He highlights how collecting and analysing evidence of learning can help teachers make informed decisions that improve outcomes for students. By treating classroom practice as a process of testing, observing, and refining, educators can become more effective and responsive to student needs. This keynote will explore how even small adjustments to teaching strategies, guided by clear evidence, can significantly enhance student engagement and achievement. Dr Nair's approach offers a practical and inspiring framework for making science education more dynamic, meaningful, and impactful.
	**12:30PM Dr John Bartholomew,** Senior Lecturer in Quantum Science at the University of Sydney and Deputy Director of the Centre of Excellence for Engineered Quantum Systems. *Why quantum science matters: a brief history from 19th century light bulbs to Australia's billion-dollar investment* **Synopsis:** 2025 is the United Nations International Year of Quantum celebrating 100 years since the puzzling discoveries of the early 1900s were formalised into a general theory. This theory of quantum mechanics has transformed the world, driven by advances in science and technology. These advances have only accelerated in the last 30 years: we now have the exquisite control and precision fabrication required to build an entirely new generation of technologies from the quantum level up. And by *we*, I mean in Australia, happening right now. I will share a snapshot of the computers and sensors we are building in University labs and companies, in Sydney and across Australia that is helping drive quantum's economic and societal impact. It isn't possible to predict the careers your students will have a decade from now, but it is possible to reflect on how education can give today's student the best chance to have their own breakthrough career, whether in quantum or whatever might be next.
1:00 – 2:00 Lunch in Sibyl Centre	

2:00 – 2:50 PM Workshop session 1. Choose from 8 options:

1.1 Teaching mathematics through the proficiencies

Professor Eddie Woo, Sydney Academy of Teaching Excellence, The University of Sydney

Explore how focusing on mathematical proficiencies, understanding, fluency, problem-solving, and reasoning, can enhance the impact of STEM learning. Rather than emphasising isolated content areas, this workshop shows how STEM contexts can be used to develop deeper, transferable skills in mathematics. We will examine practical strategies for embedding proficiencies into teaching and explore how this approach can promote greater student engagement, critical thinking & long-term mathematical understanding.

1.2 From Data Fear to Data Fluency: Igniting data-infused Reasoning in Your Science Classroom

Dr Sham Nair, Science Coordinator 7-12 and **Chris Bormann**, Science Advisor, NSW Department of Education

This workshop supports science teachers in building students' confidence and capability in using data to think critically and solve problems. Aligned with the 7–10 Science syllabus, the session introduces practical strategies to help students analyze datasets, identify trends, and evaluate claims using evidence. Through hands-on activities and examples, participants will explore techniques such as data visualisation and descriptive statistics, while also accessing freely available resources to support implementation. Teachers will leave equipped with tools to embed data reasoning into science lessons and foster a classroom culture where analytical thinking becomes second nature.

1.3 How do we teach collaboration? Exploring framework for learning

Professor Micheal Anderson, Co-Director CREATE Centre, SSESW, The University of Sydney

This interactive workshop introduces Collaboration Circles, a structured framework designed to help students move beyond cooperation and engage in authentic collaboration. STEM teachers will explore each stage of the model, including offering, yielding, challenging, and co-construction, through practical group activities. The session focuses on strategies to develop students' communication, creativity, and critical thinking while building a collaborative classroom culture. Participants will leave with actionable tools to enhance learning outcomes in STEM and beyond.

1.4 Integrating First Nations Science into Teaching

Mick Cassey, Olivia Clarkson, Alice Hollott, Science and Engineering Challenge, University of Newcastle

Explore the intersection of traditional knowledge and modern STEM through the Science and Engineering Challenge's Fish Traps activity, inspired by the Brewarrina fish traps. This hands-on session invites educators to design river structures while learning about sustainable practices rooted in First Nations science. Participants will gain insight into how the activity aligns with STEM syllabi in Biology, Geography, and Design and Technology. The session includes an overview of the national program, practical engagement with the activity, curriculum connections, and resources to support classroom implementation and further professional learning in culturally responsive STEM education.

1.5 Making for all: TapeBlocks for creative accessible circuits

Associate Professor Kirsten Ellis, Faculty of Information Technology, Monash University

This workshop introduces TapeBlocks, an inclusive, low-cost circuit-making kit designed to break down barriers for students with disabilities. Participants will explore how TapeBlocks can be used to teach core electronics concepts through immediate, tactile feedback. The session highlights the development of technical skills, creativity, and problem-solving, while showcasing how students can design and build characters, costumes, vehicles, and more. With applications in both creative and physical computing, educators will gain practical strategies for embedding accessibility into electronics lessons and fostering an inclusive, hands-on learning environment.

1.6 Biodiversity Detectives: Exploring Nature with Citizen Science

Dr Larissa Braz Sousa, Victoria Zhang, A/Prof Christine Preston, Prof Alice Motion, The University of Sydney

Discover how citizen science can transform student learning by connecting classroom science to real-world biodiversity exploration. In this interactive session, we will use the iNaturalist app and simple tools like binoculars or microscopes to observe, identify, and classify species. Whether outdoors in a mini bioblitz or inside examining invertebrates, participants will learn how to guide students through hands-on investigations that support Stage 4–6 science outcomes. This workshop offers practical strategies to integrate technology, AI, and authentic research experiences into teaching, while fostering environmental awareness and scientific curiosity.

1.7 STEM Teaching and Learning in Action

Sandra Moore, STEM Enrichment Coordinator, NSW Department of Education

This workshop aims to deepen your understanding of best practice in STEM education, extend your awareness of STEM models of implementation and increase your access to STEM teaching & learning resources. We will use curriculum reform as a STEM opportunity and examine different models of STEM implementation with case studies. We will investigate how to set up conditions for success in STEM learning and share resources & enrichment activities that can be used & adapted in the secondary context.

1.8 Fun experiments which explore the human body!

Dr Jin Y. Huang, Dr Jaimie W. Polson, Dr Elizabeth M. Hegedus, Dr Dario A. Protti, Anthony Tran, Lincoln (Zhi Lin) Zhang and Dr Rachel A. Shparberg, The University of Sydney

This hands-on workshop dives into the fascinating systems of the human body through engaging, classroom-ready experiments. Participants will explore how the senses interact, test balance and reflexes, measure brain activity with EEG, and examine muscle signals using EMG. You'll even observe how heart rate and ECG readings respond to cold exposure. Each experiment demonstrates a

core concept of human biology, helping educators bring life science content to students in an interactive, memorable way. Ideal for teachers looking to energise lessons and deepen understanding of body systems.

2:50 – 3:40 PM Workshop session 2.
Choose from 9 options

2.1 50°C: Climate, Heat and Resilience

Sophie Poisel, Head, Lang Walker Family Academy, (Powerhouse Museum)
Professor Sebastian Pfautsch, Western Sydney University
This workshop introduces STEM educators to the 50°C: Climate, Heat and Resilience program, an interdisciplinary initiative developed by Powerhouse with support from the NSW Office of the Chief Scientist and Engineer. Focused on the rising challenge of urban heat, the session explores four hands-on classroom tasks: using thermal photography to identify heat zones, analysing microclimate data, creating heat-safe messaging, and guiding student-led climate projects. Participants will gain practical experience with data tools and technologies while learning how to empower students to investigate local climate issues and design meaningful, community-focused solutions.

2.2 Bushfires: An exploration in maths and science

Dr Kriten Tripet and Helen Silvester, Australian Academy of Science
This workshop explores the integration of mathematics and science through the real-world context of bushfires. Using the updated Science 7–10 syllabus as a foundation, participants will work with data to examine how bushfires are measured, predicted, and analysed. Teachers will engage in hands-on activities that build students' capacity to interpret graphs, identify trends, apply statistics, and evaluate claims based on evidence. The session demonstrates how data skills can be developed through authentic, interdisciplinary learning experiences. It also highlights strategies to promote critical thinking and scientific reasoning, preparing students to understand and respond to complex environmental challenges through data-driven inquiry.

2.3 The Maths Behind the Magic: How Working Mathematically Powers STEM

Sally Gorman, Sydney Girls High School, DoE Math Growth Team
Calling all STEM teachers! Embark on a journey applying Mathematics into the real world. Discover new ways Mathematics underpins technology around us and how students can use day to day tools to explore Mathematics within STEM projects. Join me for an engaging and dynamic presentation as we delve into the world of games, challenges, Lego and more while having a blast with exciting Mathematics fundamentals. Gain insights into practical classroom activities that foster critical thinking, numerical literacy, and Mathematical reasoning. Unveil the hidden connections between Mathematics in STEM. With hands-on examples and collaborative activities, I will demonstrate how Mathematics and working Mathematically play a pivotal role in problem-solving and critical thinking across various STEM disciplines. Together, let's create inspiring and enjoyable learning experiences that foster curiosity, critical thinking, and a lifelong love for Mathematics in our students.

2.4 Integrating First Nations Science into Teaching

Mick Cassey, Olivia Clarkson, Alice Hollott, Science and Engineering Challenge, University of Newcastle
Explore the intersection of traditional knowledge and modern STEM through the Science and Engineering Challenge's Fish Traps activity, inspired by the Brewarrina fish traps. This hands-on session invites educators to design river structures while learning about sustainable practices rooted in First Nations science. Participants will gain insight into how the activity aligns with STEM syllabi in Biology, Geography, and Design and Technology. The session includes an overview of the national program, practical engagement with the activity, curriculum connections, and resources to support classroom implementation and further professional learning in culturally responsive STEM education.

2.5 AI Solutions for STEM Ecosystems

Dr Laura Boccanfuso, Van Robotics (International presenter)
Hugh Kingsley, The Brainery
This session explores how AI and robotics can be embedded into school STEM programs to build inclusive, future-focused learning ecosystems. Dr Laura Boccanfuso introduces Van Robotics' Classroom to Career program, where secondary students learn core robotics and AI skills by assembling and programming ABii, an AI-powered social robot, before delivering it to support primary learners. The workshop highlights how peer modelling, hands-on learning, and real-world applications can extend STEM opportunities beyond selective programs. Educators will gain insights into scalable approaches that boost engagement, support cross-age learning, and prepare students for careers in emerging tech fields.

2.6 Biodiversity Detectives: Exploring Nature with Citizen Science

Dr Larissa Braz Sousa, Victoria Zhang, A/Prof Christine Preston, Prof Alice Motion, The University of Sydney
Discover how citizen science can transform student learning by connecting classroom science to real-world biodiversity exploration. In this interactive session, educators will use the iNaturalist app and simple tools like binoculars or microscopes to observe, identify, and classify species. Whether outdoors in a mini bioblitz or inside examining invertebrates, participants will learn how to guide students through hands-on investigations that support Stage 4–6 science outcomes. This workshop offers practical strategies to integrate technology, AI, and authentic research experiences into teaching, while fostering environmental awareness and scientific curiosity.

2.7 Eco Detectives: How collaboration is rewilding the future one block at a time

Kelly Pfeiffer, Matt Nelson, NSW Department of Education, Zoo Education Team

Discover how game-based learning can drive environmental action in the classroom. This workshop introduces Eco Detectives—a Minecraft Education initiative developed by Australasian zoos, Microsoft, and Team Workbench—where students become virtual scientists solving real biodiversity challenges. Aligned with UN Sustainable Development Goal 15: Life on Land, the program immerses students in dynamic biomes as they use real-world data to restore ecosystems. Led by Taronga Zoo's education team, the session demonstrates how digital learning, STEM, and sustainability intersect. Educators will explore how to integrate this platform into teaching and inspire students to turn virtual problem-solving into real-world impact.

2.8 Fun experiments which explore the human body!

Dr Jin Y. Huang, Dr Jaimie W. Polson, Dr Elizabeth M. Hegedus, Dr Dario A. Protti, Anthony Tran, Lincoln (Zhi Lin) Zhang and Dr Rachel A. Shparberg, The University of Sydney

This hands-on workshop dives into the fascinating systems of the human body through engaging, classroom-ready experiments. Participants will explore how the senses interact, test balance and reflexes, measure brain activity with EEG, and examine muscle signals using EMG. You'll even observe how heart rate and ECG readings respond to cold exposure. Each experiment demonstrates a core concept of human biology, helping educators bring life science content to students in an interactive, memorable way. Ideal for teachers looking to energise lessons and deepen understanding of body systems.

2.9 How quantum literacy will be as important as digital literacy is now

*Secondary STEM delegates leave Sibyl Centre at 2:50PM, get **complimentary coffee** on the way, and arrive at J03 at 3:10PM to join Cross-Curricular stream for a dive into the future as they celebrate 2025 – the International Year of Quantum Science and Technology.*

Dr Rebecca Halligan, Superstar of STEM (Science and Technology Australia), COO, Sydney Quantum Academy

Associate Professor Simon Devitt, University of Technology Sydney, Director, Australian Quantum Software Network and Managing Director, h-bar: Quantum Technology Consultants.

We are at the beginning of a new technological revolution, one where information processing systems begin to incorporate the rules of nature at its most fundamental level, quantum. Not only will this usher in a new set of computational, communications and sensing technologies but it will also bring a whole new set of educational challenges. While quantum mechanics has proven itself to be the most successful theory that human beings have ever conceived, it carries conceptual baggage - so much so that the general public considers it to be accessible only to experts. This needs to change. We will discuss opportunities in Australia and efforts to build this new type of literacy, not just at the university level, but also with younger and younger students, using new tools, techniques and lessons that could serve as a re-imagining of how we teach large swaths of STEM in the future.

The session commences at 3:15PM and finishes at 4:30PM.

3:40 – 4:30 PM Workshop session 3.
Choose from 9 options:

3.1 CSIRO: Practical activities and approaches to support teachers in embedding Aboriginal and Torres Strait Islander perspectives in STEM learning

Destiny Paris, Bernadette Melton, Deadly in Generation STEM Program, CSIRO

This hands-on workshop introduces educators to Deadly in Generation STEM, a CSIRO initiative co-designed with Aboriginal Communities to embed Indigenous STEM knowledges into classroom practice. Participants will engage in practical activities, receive classroom-ready resources, and explore strategies for creating culturally safe learning environments. The session highlights the value of localising content, building community partnerships, and increasing teacher confidence to respectfully connect cultural perspectives with the science curriculum. Educators will leave equipped with tools to enhance student engagement and achievement—both Indigenous and non-Indigenous—through inclusive and authentic STEM learning experiences.

3.2 Questacon: Connecting STEM Capacity, Culture and Community

Heather Catchpole, Shelley Wilson, Kacy Scarborough, Questacon

Discover how Questacon is expanding its impact beyond the science centre through a national network of regional leaders. This session introduces Questacon's free professional learning opportunities for educators, designed to be accessible, inclusive, and locally relevant. Participants will explore how these programs support teacher capacity, build strong STEM cultures, and connect learning to community needs. The workshop offers insight into how cross-sector partnerships can enhance teaching practice and broaden student access to meaningful STEM experiences across Australia.

3.3 Designing Thinkers: Nurturing STEM Brains Through Mathematics

Miriam Lees, Education Consultant, Mathematics Association of NSW (MANSW)

This workshop explores how teaching mathematics for deep conceptual understanding equips students with essential habits of mind for success in STEM. Participants will examine how reasoning, pattern recognition, abstraction, and problem-solving are developed through rich mathematical tasks. The session highlights how shifting the focus from procedures to understanding fosters both critical and creative thinking. Educators will leave with practical strategies to turn their classrooms into spaces where students confidently explore ideas, justify their thinking, and make meaningful connections across STEM disciplines.

3.4 Integrating First Nations Science into Teaching

Mick Cassey, Olivia Clarkson, Alice Hollott, Science and Engineering Challenge, University of Newcastle

Explore the intersection of traditional knowledge and modern STEM through the Science and Engineering Challenge's Fish Traps activity, inspired by the Brewarrina fish traps. This hands-on session invites educators to design river structures while learning about sustainable practices rooted in First Nations science. Participants will gain insight into how the activity aligns with STEM syllabi in Biology, Geography, and Design and Technology. The session includes an overview of the national program, practical engagement with the activity, curriculum connections, and resources to support classroom implementation and further professional learning in culturally responsive STEM education.

3.5 Using CSIRO's real-world science to increase student engagement

Clarissa Ferreira and **Graeme Buckie,** Education Officers, CSIRO

This interactive workshop highlights how CSIRO research can bring real-world relevance to classroom science. Participants will explore the Question Formulation Technique, a student-centred strategy that sparks curiosity and drives scientific thinking. Using current CSIRO projects tackling Australia's major challenges, the session models how to engage students with authentic problems and evidence-based inquiry. Educators will leave with practical strategies and free resources to make science more meaningful and inspiring for learners, while building stronger links between classroom content and national research priorities.

3.6 Unlock Creativity with Canva for Education

Jo Muirhead, Mel Beazley, Canva

Empower your teaching with Canva! In this interactive workshop, you'll discover how to use Canva templates to streamline lesson planning, explore time-saving tips and tricks, and design visually engaging resources that enhance student engagement. Whether you're new to Canva or ready to elevate your skills, this session will guide you through essential features like layering, editing, and customisation. We'll also look at ways to foster student creativity and collaboration using ready-to-use classroom tools that make learning both fun and meaningful. Leave feeling inspired and equipped to transform your teaching practice—one design at a time!

3.7 Pathways & Partnerships: How Business and Education Can Transform STEM Outcomes (IASE)

Russ Tauton, STEM Project Officer
Paul Roger, Principal Corrimal High
Andy Stirling, Bluescope Steel
Neil Bessant, Regional Industry Education Partnerships

This session showcases the collaborative work of the Illawarra Academy of STEM Excellence and regional industry partners, including BlueScope Steel, in building sustainable education-to-employment pathways. Participants will explore how strategic partnerships can expand student access to STEM, enhance career readiness, and respond to regional workforce needs. The workshop will outline

the structure of IASE's consultative model, highlight real-world successes, and unpack the shared value these initiatives deliver to schools and industry alike. Educators will leave with practical insights and frameworks to help develop meaningful, local partnerships that open doors for students and strengthen community ties.

3.8 Fun experiments which explore the human body!

Dr Jin Y. Huang, Dr Jaimie W. Polson, Dr Elizabeth M. Hegedus, Dr Dario A. Protti, Anthony Tran, Lincoln (Zhi Lin) Zhang and Dr Rachel A. Shparberg, The University of Sydney

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3.9 How quantum literacy will be as important as digital literacy is now

Continued: From 2:50 to 4:30PM

Dr Rebecca Halligan, Superstar of STEM (Science and Technology Australia), COO, Sydney Quantum Academy
Associate Professor Simon Devitt, University of Technology Sydney, Director, Australian Quantum Software Network and Managing Director, h-bar: Quantum Technology Consultants.

We are at the beginning of a new technological revolution, one where information processing systems begin to incorporate the rules of nature at its most fundamental level, quantum. Not only will this usher in a new set of computational, communications and sensing technologies but it will also bring a whole new set of educational challenges. While quantum mechanics has proven itself to be the most successful theory that human beings have ever conceived, it carries conceptual baggage - so much so that the general public considers it to be accessible only to experts. This needs to change. We will discuss opportunities in Australia and efforts to build this new type of literacy, not just at the university level, but also with younger and younger students, using new tools, techniques and lessons that could serve as a re-imagining of how we teach large swaths of STEM in the future.

4:30 – 6:00 Social and networking activities (included in registration – please **select** which option you will attend on conference app)

4:30 – 5:30 PM Engineering Tour (limited numbers) - meet at Engineering J03

4:30 – 6:00 PM STEM Festival Networking Event – TAG Family Foundation Grandstand

6:00 – 10:00 PM Dinner – The Refectory Banquet Hall, The University of Sydney (additional registration required)