

Workshop Session 1

Title/Synopsis
Title: Teaching STEM to Preschool Children (Part 1) Conducted by: A/P Teo Tang Wee Synopsis: This course is designed for preschool educators interested in teaching STEM (science, technology, engineering, mathematics) activities to preschool children aged 3-7. They will learn about different STEM activities that align to the theme 'Discovery of the World' and pedagogies that they can adopt to carry out the activities.
Title: Teaching STEM to Preschool Children: Building Strong and Stable Bridges Conducted by: A/P Tan Aik Ling Synopsis: This course builds on Teaching STEM to Preschool Children (Part 1) and is ideal for preschool and lower primary teachers interested in bringing STEM learning to life. Participants will explore hands-on activities using a specially designed TWINKLE STEM kit that introduces concepts of balance, stability, and structure to young children through play and inquiry. The course equips educators with practical strategies to design and implement engaging STEM lessons around the theme of building strong and stable bridges.
Title: Reimagining Biology Learning in Our School Environment (Part 1) Conducted by: Dr Beverly Goh & A/P Chew Shit Fun Synopsis: How can we invigorate biology practical work using what we already have access to or can easily procure? How do we make our lessons relevant to real-world issues like food security and climate change? What emerging technologies can we make use of? This course seeks to equip biology and general science teachers with strategies, skills, and example hands-on activities to make biology learning embodied, stimulating, and applicable for students at all levels.
Title: Primary/Lower Secondary Science Demonstrations in Food Science Topics (An Introduction) Conducted by: Dr Johannah Soo, Dr Tan Lik Tong & Dr Teo Yong Chua Synopsis: This course is an introduction to scientific concepts using food-related topics addresses science demonstrations in food-related topics and their pedagogy. The topics covered include basic Molecular Gastronomy topics, as well as heat transfer in baking of cake products. The course introduces interesting hands-on activities using various food-grade materials to demonstrate key concepts for primary students, as well as secondary students. Participants will also be given opportunities to discuss how to incorporate these demonstrations into their classrooms.

Title/Synopsis**Title: Using Generative Artificial Intelligence for Item Generation and Automatic Assessment****Conducted by: Asst/P Gyeonggeon Lee****Synopsis:**

Recent advances in generative artificial intelligence have made substantial progress in item generation and automatic assessment field. This workshop first reviews principles and history of item generation and automatic assessment. After that, basic prompt engineering strategies such as few-shot learning and chain-of-thought are introduced, which are applicable to the topics. Lastly, participants will go through hands-on activities to try out item generation and automatic assessment, with their laptops and available generative artificial intelligence services.

Title: Make Our School Sustainable: STEM Activities Incorporating Emerging Technologies**Conducted by: Asst/P Jina Chang****Synopsis:**

This course equips teachers to design and facilitate energy-focused STEM activities. Participants engage in three STEM activities: (1) Augmented Reality (AR)-based wind-turbine design, where they use AR to explore and prototype different wind-turbine structures; (2) GenAI-supported solar-panel design, in which participants design and carry out investigations into how panel tilt angles and surface arrangements affect energy efficiency through discussion with GenAI chatbots; and (3) Sensor-enabled energy-efficiency solutions, where participants code and build simple monitoring devices (e.g., light or motion sensors) to reduce energy wastage. Participants will experience the suggested activities and discuss practical teaching strategies for learners at different levels.

Title: Pedagogical Use of AI in Science Education**Conducted by: Asst/P Edwin Chng****Synopsis:**

This workshop examines the pedagogical use of AI technologies within science classrooms. It will examine key AI affordances and discuss how the principled application of AI can potentially enhance teaching effectiveness and student outcomes. At the same time, risks and challenges associated with the use of AI in science classrooms would be highlighted, cautioning against the blind application of technology.

Title: Model/Prototype Making Skills Useful for STEM Learning (Introductory)**Conducted by: Mr Ng Yong Sim****Synopsis:**

Students are frequently required to create models or prototypes as part of their STEM learning activities. STEM educators who guide students through the process of conceptualising and developing their creative ideas can be more effective when they themselves have the skills to construct these models. This course offers valuable insights to help teachers build these essential skills. The skills acquired will be an enabler for teachers to engage students in critical, adaptive, and inventive thinking process.

Workshop Session 2

Title/Synopsis
Title: Teaching STEM to Preschool Children (Part 2) Conducted by: A/P Teo Tang Wee Synopsis: This course is designed for preschool educators interested in teaching STEM (science, technology, engineering, mathematics) activities to preschool children aged 3-7. They will learn about different STEM activities that align to the theme 'Discovery of the World' and pedagogies that they can adopt to carry out the activities.
Title: Igniting Curiosity: Using Microscale Chemistry to Foster Inquiry-Based Learning for Secondary Schools Conducted by: Dr Tan Lik Tong, Dr Mervin Ang, Asst/P Edison Ang, Dr Peter Lee & Dr Teo Yong Chua Synopsis: Discover how to ignite curiosity and foster critical thinking in your chemistry classroom with our Inquiry-Based Learning (IBL) Workshop! Designed for upper secondary school science teachers, this hands-on workshop will immerse you in microscale chemistry laboratory activities that are efficient and easily adaptable for practical classrooms. You will learn practical strategies to integrate IBL into your lessons, and design engaging, student-centered chemistry activities that promote exploration and collaboration. These approaches help students connect theoretical concepts to real-world applications while cultivating key 21st century competencies in students. Through interactive demonstrations, group work, and resource sharing, you will leave with ready-to-use IBL lesson plans and a deeper understanding of how to transform your teaching approach.
Title: Reimagining Biology Learning in Our School Environment (Part 2) Conducted by: Dr Norman Lim & A/P He Jie Synopsis: How can we invigorate biology practical work using what we already have access to or can easily procure? How do we make our lessons relevant to real-world issues like food security and climate change? What emerging technologies can we make use of? This course seeks to equip biology and general science teachers with strategies, skills, and example hands-on activities to make biology learning embodied, stimulating, and applicable for students at all levels.
Title: Developing a knowledge-rich science curriculum: What's worth knowing in my subject? Conducted by: A/P Lee Yew Jin Synopsis: The idea of powerful knowledge in the curriculum has caused a stir among educators in recent years. It proposes that learners in school are entitled to disciplinary knowledge that helps them think about the world and themselves in critical and imaginative ways that everyday life experiences cannot supply. This workshop helps teachers identify the hinge questions, concepts, and practices that can make their subject knowledge-rich and thus educative.

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Following an overview and introduction to methods to determine knowledge-richness, participants will be invited to deliberate on major ideas and ways of thinking and doing in their subject that make it powerful.

**Title: Harnessing Generative AI in Chemistry Problem-Based Learning
Conducted by: Asst/P Gyeonggeon Lee and Dr Johannah Soo****Synopsis:**

The MOE has developed a set of chemistry problem-based learning tasks to promote application and integration in chemistry lessons. This workshop will value-add to the existing curriculum by using Generative AI as a tool in classrooms to deepen students' epistemic discourse of authentic issues. Students will engage in dialogue with GenAI tools to facilitate the broadening of students' worldviews on complex issues. Chemistry teachers will find the workshop useful in integrating emerging technologies into chemistry-focused STEM lessons.

**Title: Claim–Evidence–Reasoning (CER) Demystified: A Practical Introduction
Conducted by: Asst/P Ong Yann Shiou****Synopsis:**

The CER framework was originally designed to support scientific argumentation, yet it is commonly used in schools as a catch-all structure for scientific explanations. This course clarifies what CER is actually meant for and why it doesn't fit every "explain" question. Participants will explore where CER helps students reason with evidence and where it may limit their thinking. The session also offers opportunities to craft or adapt questions so CER is used more purposefully. A practical introduction for teachers and parents seeking a clearer and more accurate understanding of CER in science learning.

**Title: Adding SPARKLES: Bringing Out 21st Century Competencies Learning in Primary Science
Conducted by: Asst/P Jina Chang & Mr Adrian Ong****Synopsis:**

This workshop is designed to help Primary Science teachers integrate MOE's Emerging 21st Century Competencies (e21CC) intentionally into SPARKLE kits-based inquiry. Participants will unpack key concepts of e21CC and explore practical ways to connect them to science lessons. The workshop positions SPARKLE kits-based inquiry activities as natural vehicles for Critical, Adaptive and Inventive Thinking, as well as Communication, Collaboration & Information skills. Teachers can extend on SPARKLE kit-based inquiries toward Civic, Global and Cross-cultural literacy. By the end of the workshop, teachers leave with a clear framework and adaptable strategies to make e21CC visible and teachable within regular Science lessons.

**Title: Generative AI-integrated Science Demonstrations
Conducted by: Asst/P Park Joonhyeong****Synopsis:**

This workshop supports science teachers in leveraging generative AI to enrich science demonstrations. Teachers will explore how generative AI can be used before, during, and after a demo to facilitate students' learning about scientific phenomena. The session also

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addresses how to promote critical use of generative AI, with attention to accuracy, verification, and dialogic flow for student inquiry. Through guided hands-on trials and collaborative design work, participants will experience integrating generative AI into several science demonstrations and develop resources for future classroom use, strengthening both their instructional repertoire and AI literacy.