National Science Week Regional STEM Pop-up - Maryborough

Name of course and trainer	Course description
Street Science with **Central Queensland University**	The street science show brings experiencing science through everyday items. Science is discovered through the audience exploring options for the experiments by engaging in questions. For primary school students this will include: • Colour changing carnation: students will learn about the essential function of a plant stem to their growth. Flowers with stems are placed in coloured water and as the water is absorbed, students will see the petals change colour. • Making a lava lamp: students work to integrate prior knowledge about solubility, miscibility of liquids and density to create a lava lamp. Through this activity they will develop an understanding of heat and convection whilst engaging in an activity which is exciting, engaging and creative. • Hover balloons: students create a hover balloon using a balloon and CD disc and the air flow created by the balloon causes a cushion of moving air between the disc and the surface. The disc will hover freely from the air between the disc and surface by reducing the friction. • Crash test dummies: students will create a model simulation of a crash as they explore the relationship between mass and inertia and how mass impacts the results of the crash, while also developing an understanding of road safety and the importance of seat belts. For secondary school students this will include: • Slimy science: slimy science undertakes chemical experiments followings scientific method exploring concepts such as mixtures, substances, polymers, cross linking, states of matter, elasticity, and viscosity as they create different types of slime. • Foamy mountain: students will experiment with exothermic reaction by creating a special form that is filled with oxygen. The yeast in the form acted as a catalyst to remove the oxygen when mixed hydrogen peroxide.
Flight and Space Science STEM Innovation with **It's Rocket Science Adventures**	Space science in action! Students will tinker and explore the science, engineering and technology of rocketry and space flight. Project-based STEM will have students design, build and test their own aerospace inventions. Instructor-led workshops will teach students: • Sustainable technology to design, build and test aerospace prototypes through a fair testing project • Principles of flight, aerodynamics and rocketry design to create a rocket prototype for testing • Laws of motion, forces, energy and use scaled instruments to predict, observe and evaluate either the altitude or velocity performance of their rocket.

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	The platform caters to students aged 4-17. **Learning Outcomes** The aerospace STEM project will develop students understanding of the real-life applications to space sciences, future problem solving and engineering innovations. Connecting young learners with the 50th Anniversary of Neil Armstrong's walk on the moon will empower students to dream big and start thinking about the possibilities of future education and careers in Australia's space industry.
Science-based musical theatre with **Professor Flint from HeapsGood Productions**	"A journey into our prehistoric past". The story of the land we live upon is billions of years old. During that time, an extraordinary number of plants and animals have called this place where we now dwell, home. In this session, we tell the story of some of the most remarkable life-forms that have come this way. Through interactive songs and storytelling, students will learn: • The prehistoric story of their local area, of Queensland, and of Australia, and why it is important • How we know what we know about the prehistoric past • What lessons there might be for us today in looking at past extinctions, their causes, and how the Earth was able to recover. The session includes links to the Australian Curriculum. **Learning outcomes** The primary outcome of this sessions aims to be a better understanding of the importance of the prehistoric story of Australia as it relates to who we are as Australians today. To learn about and be able to name the plants and animals from our past.
Virtual Reality (VR) with **Central Queensland University**	Creating & Extending Realities (CREATE XR) with Oculus Go & Oculus Quest. Students will learn how virtual reality devices can be used for functional decomposition, problem solving, collaboration, and comparative visualisation through the use of iPads, Oculus Go and Oculus Quest using the Google Tiltbrush platform. Students will conduct a variety of hands-on activities during the 1.5hr session: • Orientation to the environment using 3D printed models • Hands-on Drawing and Rough 2D sketching using iPad • Collaborative Prototyping using 3D paint tools on Oculus Go • Shared Scene Building and VR Art Expression using Oculus Quest & Google Tiltbrush

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	As per current guidelines, the VR experiences will be split over the session and limited to 10 – 15 minutes, with time outside the VR experience to plan, prototype and debrief also provided. **Learning Outcomes** Through participation in this session, students will gain foundation knowledge in design thinking and iterative practice in line with the current ACARA Digital Technologies curriculum, as well as being exposed to innovative new technologies for learning.
Virtual Reality (VR) & Augmented Reality (AR) – Future Cities with **STEM Punks**	In this immersive STEM program the students will explore the challenges with designing 'Future Cities'. The students learn about STEM Tools including Virtual Reality (VR), Augmented Reality (AR), and 3D Design. The students use these new skills to design and immerse themselves in their designed cities of the future. **Learning Outcomes** The Workshop will be led by a qualified STEM Educator covering the following learning outcomes linked to the Australian Curriculum. • 3D Design • VR and AR as a design and collaboration tool • Coding • The challenges of future city designs including sustainability population growth, sanitation, and transportation • Teamwork, collaboration, and problem solving.
Virtual Reality (VR) experience with **CoralWatch**	Student workshops include an age appropriate explanation of issues the Great Barrier Reef is currently facing and how citizen scientists can help. Citizen scientists are people - young or old - who collect information to help researchers with their projects. Students will rotate through various activities during their 1.5 session, including: • A quiz about the issues and solutions around protecting marine environments • A virtual reef activity where students have the opportunity to practice monitoring the health of coral on a virtual reef • The very popular VR experience. **Learning Outcomes** VR content will provide a real-life reef experience connecting participants with the reef and motivate them to move towards a more sustainable future to help save reefs for future generations.

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Coding and robotics with **Junior Engineers**	Students will learn the foundations of coding through game play when they use Junior Engineers' online coding platform – CodeMonkey. Instructor-led workshops will teach students: • Key coding concepts • How coding is defined and applied in the real world • How to use CodeMonkey and engage in coding challenges. The platform caters to students aged 7 – 15, regardless of their prior experience in coding. **Learning outcomes** After completing up to 50 coding challenges during the 1.5 hour training session, students will be able to continue their self-paced learning at home by receiving free access to the CodeMonkey platform where they can complete 150 challenges (75 skill mode and 75 challenge mode) or access the platform for four months, whichever comes first.
Physical Computing with the BBC:Microbit **Building Block Studio**	Students will learn how tiny computers called Microcontrollers can sense the physical world and provide us with the ability to write code that responds to device's sensors. Depending on the year level, students will build fun and engaging projects such as: • A scrolling name tag • A step counter • A rock, paper, scissor game • A skill based game. **Learning Outcomes** The Microbit is a great tool to demonstrate the power of coding to real world data, understanding that a device can measure temperature, movement and respond in programmed ways.
Solar Car Racing **Building Block Studio**	Students will assemble a timber and 3D printed solar car with the goal of racing the car with different solar panel and motor gear configurations. Students will be led through the following activities: • How to assemble the solar car – using wing nuts and sliding pieces together • Design a unique flag to set the car apart from other students • Select a motor choice, a number of geared motors can be chosen – each with a different characteristic • How to wire the Solar panel • Students can choose the angle of the solar panel for maximum light capture. **Learning outcomes**

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	Students will discuss the use of renewable energy and the basic circuit used to draw power from a solar panel. Experiments such as panel placement and motor selection touch on engineering design – measure / iterate / improve.
Indigenous Sciences with **T.E.C.K.nology Indigenous Corporation**	Student workshops include an age appropriate explanation of social innovations that led to the development of civilisations focusing on the Aboriginal culture of Australia. They will learn the foundations of Indigenous agriculture, traditional and modern medicine, the role of women, language and heritage, and bush foods in traditional Aboriginal celebrations. Students will rotate through various learning and practical activities including but not limited to: • Welcome to country/smoking ceremony • Visual presentations on global social innovations • Observational science, developing hypothesis and testing assumptions • Learning about agriculture (e.g. grain and yam crops, silos storage), aquaculture, medicinal gardens, native bee apiaries, maintaining fisheries and sustainable usage • Demonstrations of Indigenous scientific/social, innovations/inventions e.g. sport, heavier than air flight, lore • Interactive displays of agriculture, pharmaceuticals, astronomy, navigation, weather forecasting using bio-indicators. • Preparation of foods and medicines including leaves of lemon myrtle, soap tree, mat rush (*Lomandra*), paperbark, gumbi gumbi (*Pittosporum*), acacia, she oak and piece of termite mound, native bees • Learn how Aboriginal women used natural fibres to make traditional dress garments worn at celebrations, and make a bracelet/anklet from raffia and bush nuts • Presentation where students will see a cooking pit, a paper bark tree, native bee hive and other utensils (e.g. coolamons, grinding stones, baskets etc.) • Bush food identification providing explanation of the uses and cooking processes involved, allowing students to touch, smell, taste and collect (where appropriate) • The effects of colonisation on Indigenous society and the mental health of first nations peoples • Compare how Aboriginal women played the role of midwives/educators within traditional Aboriginal society with the present day **Learning Outcomes** This interactive content will provide a real-life experience connecting participants with Indigenous culture through demonstrations of social and scientific innovations of our First Nations knowledge bases. Students will learn of traditional farming practices, how traditional Aboriginal sciences used the environment to provide medicines to care for their communities, and creation and use of garments of traditional dress worn at Aboriginal celebrations. Creating empathy for the struggles and issues impacting the Indigenous peoples of modern Australia. The importance of retaining

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	Indigenous knowledge for the benefit of environmental and social issues impacting modern Australia.
Drone Training with **Ace Aviation**	Students will be introduced to the world of commercial drone or Remotely Piloted Aircraft Systems (RPAS). Qualified Instructors and licensed pilots will teach students: • The fundamentals of flying an RPA • The Standard Operating Conditions (SOC) mandated by the aviation regulator (CASA) • Safety protocols • There will also be opportunity for discussion about some of the commercial roles RPAS are now performing. The students will then be taken outside for hands on flying training using the very popular and reliable flying platform - DJI Mavic. The course will cater for students in Yr 9-12. **Learning outcomes** After completing the day, the students will have gained the knowledge to operate an RPA (>250grams and <7kg) to meet compliance with CASA regulations (SOC) and have a better understanding of the safety requirements and possibilities as a commercial remote pilot (Licensed – RePL holder).
Drone training with **Central Queensland University**	Students will learn the basic of forces and light using drones. They will be introduced in ways in which unmanned aircraft (drones) are used in society, the basics of directional flight using a joystick control, and the fundamentals of autonomous flight using block coding. **Learning Outcomes** The workshop activities are linked to the following learning outcomes of the Australian Curriculum. • Science Year 2: Physical Sciences: A push or a pull affects how an object moves or changes shape; and Science as a Human Endeavour: Describing how everyday items work, using knowledge of forces or materials • Mathematics Year 2: Measurement and Geometry: Location and Transformation • Mathematics Year 3**:** Measurement and Geometry • Technologies Year 3-4**:** Digital Technologies Process and Production Skills

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Innovation & Entrepreneurship with **STEM Punks**	In this immersive STEM program the students will go through four stages of Design Thinking, STEM Tools, Rapid Prototyping, and how to sell their idea. The students will learn about new STEM Tools including, Drones, Coding, Sensors, and Electronics. A themed problem will be presented to the students with a set timeline to come up with a new and innovative solution. The combined learnings of the day will see the students pitch their design and engineered solution to a panel of potential investors. **Learning outcomes** The Workshop will be led by a qualified STEM Educator and Entrepreneur covering the following learning outcomes linked to the Australian Curriculum. • Design Thinking • Entrepreneurial Thinking • Drones in disaster zones • Overcoming blockers to innovation • Coding • Sensors, Electronics, and Digital Systems • How to transform ideas into customer value.
Speed Science with **Wonder of Science Flying Scientists**	Students will hear from STEM professionals from the Wonder of Science Flying Scientists program. The event is similar to 'speed dating', where approximately six students will sit at a table with a STEM professional and hear about the STEM professional's research, career, why they were interested in STEM subjects, why they selected a STEM career, and what it is like to be scientist. The activity will run for 1.5 hours and there will be 3 rotations of students at each session. There will be three session over the two days. The aim of the event is to allow students to meet STEM researcher role-models, inspire students to select STEM subjects and careers and to inform them about the great work scientists are doing right here in Queensland. **Learning outcomes** A better understanding of the experience needed to work in a STEM-related field, and the science research currently underway in Queensland.