



Flinders
UNIVERSITY

**INSPIRING
STEM
EVENTS AND
WORKSHOPS 2020**

 **STEM** AT FLINDERS

RAISING THE AWARENESS OF STEM IS OUR GOAL

No. 1 in Australia for learning resources in Engineering.

The Good Universities Guide 2020 (undergraduate)

SUPPORTING STUDENTS

Whether it's through interactive workshops, fun special events or engaging tours, Flinders University aims to inspire high school students to understand and enjoy STEM. Our workshops allow students to get hands-on with science, computing, mathematics, engineering and the environment. We run events that link industry, study and academia, and give students a snapshot of university life.

Throughout the year, you may see us inspiring not only students but the wider community at career expos, Open Days and a number of science-related events like Science Alive!

For the REALLY enthusiastic students, we have school holiday activities that provide a deeper insight into the STEM disciplines.

Please note: This booklet is subject to change.

SUPPORTING TEACHERS

We support high school teachers by ensuring our workshop content is linked to the current Australian curriculum requirements and by providing professional development opportunities throughout the year via our on-campus teacher workshops.

Our teaching professional staff have specialised expertise and can provide extra resources, training and mentoring to improve the way you deliver STEM in your classrooms. They can also be booked in to talk to your students about topical issues and their research.

Plan your year by checking out our program of events and a list of all of our workshops at the end of this booklet..

WANT TO KNOW MORE?

Email stem@flinders.edu.au with your contact details (including details of your school, teaching area and year level) and we will keep you up to date on activities and events, including all on-campus event information as it arises.

SAVE THE DATE

FREE TEACHER PROFESSIONAL DEVELOPMENT EVENINGS

As part of our ongoing commitment to high school science teachers and related discipline teachers, we are pleased to offer two Teacher Professional Development evenings for 2020 that will consist of presentations on current Flinders Research related to the STEM field and the opportunity to talk to academics and network with other like-minded teachers.

MONDAY 23 MARCH

5:00pm for 5:30pm start
Bedford Park Campus

Please note: This event will focus on science-related research, program to be released online soon.

MONDAY 18 MAY

5:00pm for 5:30pm start
Tonsley Campus

REGISTER YOUR INTEREST

To register your interest in Teacher Professional Development events, please email: stem@flinders.edu.au



EVENTS ON CAMPUS

TERM 1

6 March	Inspiring Women in STEM Suitable for year 11 & 12 female students	This event will focus on chemistry in sustainable manufacturing. Students will have an opportunity to hear from current students and leading Flinders' academics in this exciting field while completing their own interactive challenge. Lunch will be provided.
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TERM 2

15, 16 and 17 June	Forensic Science at Flinders Suitable for Year 10 students	Formerly the Chemical Murder Mystery, this popular event introduces students to the real world of forensic crime scene investigation. The day encompasses hands on forensic science workshops, problem solving activities and presentations with the aim to spark student interest in forensic, chemical and analytical science. Cost: \$15 per student, includes pizza lunch. For further information and to book please visit events.flinders.edu.au/events/forensic-science-flinders
30 June, 1 July and 2 July	The Science and Engineering Challenge Suitable for year 10 students	The Science and Engineering Challenge (SEC) is a national STEM outreach program presented by the University of Newcastle in partnership with Flinders University. Through the provision of meaningful, hands-on experiences they aim to inspire young people to make a difference by choosing a career in Science and Engineering. Bookings are made through Ruth Conry (South Australian Challenge Coordinator) email: ruth@conry.com.au
5 June	Brighter Futures Environment Summit 2020	Climate change, population growth, water scarcity and security, coal seam gas and fracking, mining and energy, nuclear and radioactive waste disposal, sustainable food production, water sanitation and hygiene are amongst some of the biggest challenges facing the globe. This event is for your environmentally passionate students and is designed by leading Flinders Environmental academics, government and industry leaders, to showcase our world-leading researchers and education programs.



Five stars in computing and information systems for student support

TERM 3

14 & 15 August	Flinders Open Days All welcome	For two days our campus life is on display and staff and students are available to discuss courses, careers and student support. Our STEM Outreach Communication Officers, academics and current students will be on hand to answer all your students' STEM course questions. We will also be participating in activities across the two days.
22 & 23 September	Medical Mystery Suitable for year 11 biology students only	During this new event at Flinders Medical Centre, students will complete a series of tests involving biology, chemistry and paramedic science, while considering signs and symptoms of medical conditions, to arrive at a diagnosis. They'll discuss preventative healthcare options for the community. For further information and to book please visit events.flinders.edu.au/events/medical-mystery

NEW

TERM 4

4 November	Flinders Engineering and IT Students Innovation Expo	Are your students interested in understanding what our research students get up to? Our 2020 Student Innovation Expo invites high school students to our Tonsley campus to view the work of Honours, Masters and final year projects by innovative and inspiring Flinders University students. Tours and Flex bus rides can also be arranged.
2 – 4 December 2.5 days	The Science Experience Year 9 and 10 students	Flinders University welcomes <i>ConocoPhillips</i> Science Experience students to two and a half days of STEM-related interactive activities on campus. The program consists of hands-on workshops in our labs, thought-provoking lectures by academic staff as well as fun activities such as quizzes and competitions. Regional student groups can stay on campus for three days. For further information and to book please visit events.flinders.edu.au/events/the-science-experience

No. 1 in Australia
for overall experience in Computing & Information Systems.

The Good Universities Guide 2020 – overall quality of educational experience (postgraduate)

For further information and how to book event, please visit flinders.edu.au/stem-outreach Contact: stem@flinders.edu.au Ph: (08) 7221 8661

WORKSHOPS

With direct links to the SACE curriculum, our series of workshops aim to extend and complement your teaching resources for Year 11 and 12 students. All workshops run for 60 minutes unless otherwise stated.

All workshops are subject to availability and have capped numbers to comply with WHS policy.

IT AND TECHNOLOGY WORKSHOPS	DESCRIPTION	CURRICULUM LINKS
AI and Machine Learning with Lego Robots <i>Available terms 3 and 4 only</i>	From virtual assistants to autonomous cars, artificial intelligence is increasingly becoming part of our everyday lives. Learn more about AI and the techniques used in this field by training your own machine learning model and using this model to make a Lego robot respond intelligently to different inputs. (max 12 students)	Stage 1 and 2 Digital Technologies Stage 1 and 2 Design, Technology and Engineering
Rapid Prototyping Taster (90 minutes)	Rapid prototyping allows designers, engineers and inventors of all kinds to quickly create and test their ideas. Experience this for yourself with a visit to our Digital Fabrication Lab. Use PowerPoint to create a simple design and watch as your custom keyring, earbud fob, or earrings are laser cut ready for you to take home!	Stage 1 and 2 Design, Technology and Engineering
Brain Power: Exploring the Brain-Computer Interface	Can you control a computer with your mind? In this workshop you'll do exactly that! Get kitted out with a bio-sensing headband and see the electrical signals from your body and brain in real-time, then write some code to take it from theory to action! (max 20 students)	Stage 1 and 2 Digital Technologies
Immerse Yourself with Oculus VR (30 – 45 minutes)	New to the world of VR? Try it out for yourself with our Oculus Go headsets. Learn more about the history of VR and where we're at now, the principles of designing for a VR environment, and the exciting things we can do with all this tech!	Stage 1 Digital Technologies
FlinBIT Arduino Challenge: Construct and Code!	In this two-part workshop, students first construct an Arduino-compatible shield with basic sensors and Wi-Fi capability. They then experiment with adding more functionality via off board sensors. Finally, students use their shields to solve a health or environment related coding challenge. Students get to keep both their shield and the supplied Arduino Nano microcontroller on completion of the workshop.	Stage 1 & 2 Design and Technology, Stage 1 and 2 Digital Technologies
Durations: Construct only: 1.5hrs Construct and Code: 2.5hrs (plus lunch break)		
Unreal Engine Game Development	Do you have what it takes to become a professional game developer? Use Unreal Engine 4, software used by industry professionals, to make your own first-person shooter using node-based visual programming 'blueprints'.	Stage 1 and 2 Digital Technologies

NEW

WORKSHOPS

IT AND TECHNOLOGY WORKSHOPS	DESCRIPTION	CURRICULUM LINKS
Water Wheels: Hydroelectric Turbine Design (90 - 120 minutes) <i>Available terms 3 and 4 only</i>	A village in Nepal needs a new power source. As an engineer, it's your job to build a hydroelectric turbine that can harness the kinetic energy in the nearby river and provide the electricity they need! Visit our cutting-edge Civil Engineering teaching lab and use the industrial flume to test your team's creation.	Stage 1 and 2 Physics
Zumo Robotics 'Mission to Mars' Challenge	Jump into our first-year engineering labs and learn about robot navigation and sensors by programming a simple Arduino-based Zumo robot using the C programming language. Students will be presented with a maze and will program their robots to earn as many points as possible!	Stage 1 and 2 Digital Technologies
BIOLOGY AND ENVIRONMENT WORKSHOPS	DESCRIPTION	CURRICULUM LINKS
Human Anatomy (90 minutes)	The survival of multicellular organisms relies upon interdependent organ systems which facilitate the exchange of materials with their environment. Examine human specimens in the Anatomy Museum to understand how four organ systems work, how they can be impacted by disease and personal choices, and how research, understanding and advancements in the field can be influenced by economic and social perspectives.	Stage 1 Biology: Multicellular Organisms
Groundwater (2.5 - 3 hours at Bedford Park campus – can be teamed with an Oaklands Wetland tour of 1 hour duration)	Urbanisation has disrupted the natural water cycle, and the way we access this crucial resource. Use sand tanks to investigate groundwater flow in aquifers and the role of soils in transporting contaminants.	Stage 2 Earth and Environmental Science: Topics 1 & 3
Oaklands Wetlands - Environmental Health (approx. 4 hours)	Water is a valuable resource for humans and contaminated water can cause many health issues. Conduct experiments in a water system to investigate water quality and potential hazards to human health.	Stage 1 Earth and Environmental Science: Topics 5 & 6. Stage 2 Earth and Environmental Science: Topics 1 & 3

NEW

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WORKSHOPS

BIOLOGY AND ENVIRONMENT WORKSHOPS	DESCRIPTION	CURRICULUM LINKS
Oaklands Wetlands - Ecology (approx. 4 hours)	Water is a crucial resource for healthy ecosystems. Human activities can alter and pollute natural water systems, with flow-on effects. Conduct experiments to investigate water quality and its impact on local species.	Stage 1 Earth and Environmental Science: Topics 5 & 6. Stage 2 Earth and Environmental Science: Topics 1 & 3. Stage 1 Biology: Biodiversity and Ecosystem Dynamics
Animal Evolution (90 minutes)	How do populations respond to selection pressure from humans, invasive species and the environment? Through hands-on activities, students investigate natural selection and the gene pool in two examples of bird populations.	Stage 1 Biology: Biodiversity and ecosystem dynamics. Biology Stage 2: Evolution
Enzymes and Biotechnology (90 minutes)	Students learn about enzymes in a “real world” context in our state-of-the-art Biological Discovery Centre. Students will build on their understanding of cells, assays and enzymes in biotechnology. They will investigate the potential <i>Botrytis cinerea</i> fungus contamination in red wine by running an assay.	Stage 2 Biology: DNA and proteins
Forensic Biology (60 - 75 minutes)	Students have the opportunity to run gel electrophoresis while learning about how forensic biologists analyse DNA evidence to investigate crime and identify victims and suspects.	Stage 2 Biology: DNA and Proteins
Freshwater Ecology (105 - 120 minutes)	Students gain an understanding of freshwater systems and the importance of water quality monitoring for urban and environmental health. Students learn how to take and test biological samples in the field and in a wet lab using a combination of science techniques.	Biology Stage 1: Biodiversity and Ecosystem dynamics
GIS using space systems to monitor Earth's oceans	How has the Earth's sea-surface temperature changed over the past 40 years? Use 3D time-cube data from the National Oceanic and Atmospheric Administration (NOAA) and Geographical Information System to explore changes in sea-surface temperature through space and time. Learn about sea-surface temperature monitoring technologies and analysis and discuss the environmental and social implications of our warming oceans.	Most suitable for: Earth and Environment Stage 1 Topics 5 and 6. Earth and Environment Stage 2 Topics 1 and 4. Geography Stage 1 Topics 4 and 7. Geography Stage 2 Topics 1 and 2.

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BIOLOGY AND ENVIRONMENT WORKSHOPS	DESCRIPTION	CURRICULUM LINKS
GIS – Using space systems for mapping in 3 Dimensions	Enhance understanding of spatial concepts and improve ICT capability while using remote sensing and other spatial technologies to examine geographic phenomena. Use maps, imagery and an augmented reality sand box to gain an understanding of how we capture geographic information. Look at how we communicate this information using maps and other visualisation techniques.	Most suitable for: Stage 1 and 2 Earth and Environment ICT capabilities, SHE and Science Inquiry Skills. Stage 1 and 2 Geography ICT capabilities and Geographical Skills.
Marine Biology	Investigate our marine systems and the organisms that live within it. Students will have the opportunity to identify and discover various invertebrates and consider how their findings can be used to draw conclusions about ecosystem health.	Stage 1 Biology: Biodiversity and Ecosystem dynamics
Microbiology (90 minutes)	There is an outbreak of food poisoning at a local café and Environmental Health Officers have been sent to investigate. Students use microbiology techniques including gram staining to identify the samples to determine which species caused the illness and help the EHO's explain what went wrong in the food handling process.	Stage 1 Biology: Infectious Disease

NEW

In addition to workshops, we are also able to offer your students a 30-minute careers presentation which can be added on to your visit. Campus tours and FLEX bus rides can also be provided. Places fill up quickly and are subject to availability. For more information and to request workshops, please visit flinders.edu.au/stem-outreach

WORKSHOPS

CHEMISTRY, PHYSICS AND MATHS WORKSHOPS	DESCRIPTION	CURRICULUM LINKS
Forensic Geometry	Can you reconstruct a crime scene using maths? Students learn about the trigonometry involved in blood pattern analysis, and how it can be applied in other scientific and non-scientific contexts.	Stage 1 Mathematics and Stage 1 General Mathematics
Roller Coaster Construction	It takes a lot of physics to build a theme park! Students divide into groups and build miniature roller coasters. Students use physics to figure out how to make their roller coasters as fast and exciting as possible.	Stage 1 and 2 Physics
Analytical Chemistry (2 hours)	Developed to help achieve, cement and extend knowledge of some of the analytical chemistry techniques explored in the SACE Stage 2 curriculum. Experiments include chromatography and AAS. <i>Incurs a \$10 per student cost.</i>	Stage 2 Chemistry students only
Nanotechnology/Materials Science	Students will explore a variety of examples of nanotechnology and concepts around materials science including bulk and surface modification.	Stage 1 and 2 Physics Stage 1 Chemistry
Optics	The science of light is bizarre, and it has applications in surprising places. This workshop will explore a few key concepts in light and colour, as well as looking at their uses in a range of technologies.	Stage 1 and 2 Physics
Water Wheels: Hydroelectric Turbine Design (90 - 120 minutes)	A village in Nepal needs a new power source. As an engineer, it's your job to help build a hydroelectric turbine that can harness the kinetic energy in the nearby river and provide the electricity they need! Visit our cutting-edge Civil Engineering teaching lab and use the industrial flume to test your team's creation.	Stage 1 and 2 Physics
Sound through Light Electronics (45 - 60 minutes)	Students investigate some properties of light and sound waves by building an electronic circuit that allows them to emit signals with an LED and receive those signals using a small solar panel. Students need to bring along a device for playing music that has a standard audio jack (e.g. smart phone).	Stage 1 and 2 Physics

BRINGING SCIENCE TO LIFE AT OAKLANDS WETLAND

Educational workshops for high school students (years 11 & 12).

Topics include groundwater, environmental health and ecology. Gain first-hand experience in practical activities such as investigating water flow and contamination transport in model aquifers and conducting experiments on water samples to develop a risk assessment.

A tour of the wetland will complement all workshops.

For more information contact stem@flinders.edu.au



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With vehicles becoming increasingly automated, your students may never need a driving licence, but they will need to understand how driverless vehicles operate.

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