

GTCASA 2015 Youth Workshops Abstracts

Topic 1: morning sessions (9:30 am – 11:00 am)

Students select one topic which will continue for the three mornings of the workshops.
Please indicate your first three preferences on the workshop preference form.

1. *CSI: Adelaide – Forensic Fact or Forensic Fiction* with Associate Professor Stewart Walker

This workshop will consider the questions:-

To what extent are television programmes like CSI and Border Security realistic?

How do they relate to real crimes around Adelaide?

What can be done to improve the detection and prevention of crimes?

Using examples from real cases we will look at the application of science to solve crimes. This will include examples of research being done by Flinders students to improve techniques for solving and preventing crimes. Examples will include the analysis of hair, glass, drugs, blood, food and drink. (maximum 20 places)

2. *Medical Genetics – the new frontier in medicine* with Dr Karen Lower

The human genome was first sequenced over 10 years ago, and this event signalled the start of an era that has revolutionised medicine. In these sessions, we will look at how we go about sequencing our DNA in the lab and how this information is now being used to fight diseases such as cancer. We'll use this information to work through a real life medical case, including tracking a genetic disease in a family, finding the gene responsible, and working through potential treatments. (maximum 20 places)

3. *Simulation and Serious Games* with Marissa Milne and Dr Brett Wilkinson

What are serious games? Find out how computer games can be used to improve people's health and education, and build your own 'serious game' using Unreal Engine, a software package used by industry professionals. (maximum 20 places)

4. *Vertebrate palaeontology* with Carey Burke

In this series of three workshops, you will get hands-on experience in several aspects of the science of palaeontology.

- In the first workshop, you will work with the Bone Box to learn about Australian Pleistocene Marsupials. You will then learn about *palaeoreconstruction* by studying the skeleton of an extinct creature and attempting to reconstruct the animal as it may have looked when alive.
- The second workshop will be on *vertebrate skeletal anatomy*. You will attempt to accurately reassemble a skeleton and sketch/name the major elements and their diagnostic features.
- The third workshop will focus on *Palaeoichnology*. You will be introduced to trace fossils (footprints/trackways) and their scientific value. You will then create trackways and test the equations that scientists use to interpret them.

Students are requested to bring notebooks/paper and pencils to the workshop, and encouraged to bring cameras. (maximum 15 places)

5. *Philosophy with Leif Larsen BA (Hons)*

Students who attend these workshops will experience challenging, lively and enjoyable sessions, introducing the skills of Philosophy by engaging as a community in philosophical inquiry.

Workshop 1: Logic, reasoning and the art of philosophical argument. What distinguishes a good argument from a bad argument? What makes an argument valid or invalid? What is the difference between deductive and inductive reasoning? Does it matter?

Workshop 2: How to win an argument and infuriate people. Identifying and avoiding logical fallacies (especially the ‘fallacy fallacy’!)

Workshop 3: Community of Inquiry. We will investigate and debate a current ethical issue, utilising the skills and knowledge developed in the first two workshops. (maximum 25 places)

6. *Villains and action heroes with Dr Amy Hamilton*

Create your own animations using a variety of modelling materials including clay, fabrics, cotton and paints, combined with digital drawing and movie editing software, cameras, laptops and iPads. You will learn to storyboard, create characters and effects and to add sound and titles and edit your movie. (maximum 16 places)

Topic 2: middle sessions (11:30 am – 1:00 pm)

Students select one topic which will continue for the three middle sessions of the workshops. Please indicate your first three preferences on the workshop preference form.

1. *Animals, ecology and forensics with Vanya Bosicic*

Animal Adaptations: Learn about the evolution and how natural selection resulted in adaptations that have allowed animals to exist in a range of environments. This workshop will include hands-on activities where you will get to observe animals and analyse what adaptations allowed them to survive and be competitive.

Forensic Biology: Do you love watching a good crime show such as “CSI”? Ever wondered how forensic scientists solve crimes? The mystery will be solved in this exciting workshop that will teach you about DNA and genetic testing.

Wetland Ecology: You will have the opportunity to learn about freshwater ecosystems and how important their health is for sustainability of humans and the environment. The workshop includes hands-on activities where you will visit a local wetland and test biological samples in the field and in the wet lab, using a combination of chemistry and biology techniques. (maximum 20 places)

2. *An Adventure of the Physical and Chemical Nature with Nathan O’Brien*

Potato Plastic: Saving the planet can be a big responsibility, but who says scientists can’t have some fun along the way? Join in on the fun by polymerising biodegradable plastic out of potato starch.

Analytical Chemistry: Cycle through a range of stations and get hands-on with analytical chemistry techniques and learn how they are used in industry and research. Test your nose against a gas chromatograph, explore the chemistry behind glow sticks and more!

Cooling Gases: Chemistry and Physics combine in a fascinating show about the states of matter. Together we will investigate the more exciting aspects of how cryogenic temperatures affect the function of atoms and molecules using liquid nitrogen! (maximum 20 places)

3. Where science can take you – a showcase of Tall Poppy science with Dr Cristian Birzer, Dr Michael Short and Dr Stephanie Reuter Lange

This series of three workshops will be presented by young scientists who won Tall Poppies Awards in 2013 or 2014.

Combustion with Dr Cristian Birzer. Despite the encouraging growth of the renewable energy sector, combustion is predicted to provide more than 75% of the world's insatiable demand for energy until at least 2050. Developing better combustion systems is extremely challenging, and requires the application of some of the most advanced experimental and computational tools currently available. This workshop will cover many of the measurement approaches that enable the scientific world to better understand the processes in flames, and therefore propose designs for better combustors.

From toilet to tap - the story of our 21st century water cycle with Dr Michael Short. This workshop will take you through a brief history and current overview of the modern day anthropogenic water cycle. You will learn about how, why and where we collect, treat and dispose of our water and wastewater in Australia, some of the key engineering treatment solutions to urban wastewater management and their pitfalls, as well as getting unique hands-on insights into some cutting edge water research spanning topic areas such as carbon footprinting, biosolids, biogas for energy generation, and energy optimisation.

Evidence-Base Medicine and Clinical Trial Design with Dr Stephanie Reuter Lange. For a medicine to reach the clinic, it takes approximately 15 years of research and \$1 billion of investment. Through this workshop we'll examine the drug development process and evidence-based medicine, and discuss alternative and complementary therapies. Together we'll explore clinical trial design and compare the valid scientific method to pseudoscience. Most importantly, you're invited to come and help me prove that marshmallows can cure the common cold! (maximum 25 places)

4. Drama with Tom Cornwall, Adv Dip Arts (Acting), from the Helen O'Grady Drama Academy

The Helen O'Grady Drama focuses on using the medium of Drama to teach and develop characterisation, creativity, understanding of stage space, independence, and social skills in an environment which is fun! In this workshop students will get the chance to create their own characters and an original, self-devised play from scratch over three sessions with a professionally-trained actor. Day 1 will be all about students using their own physicality to transform themselves into completely original characters, through utilization of Laban Movement techniques. Students will also be encouraged to consider the psychology of their characters, i.e. what makes them act the way they do. Day 2 is all about taking the already-established characters and creating drama - by linking the characters together in a basic narrative and building a play scene-by-scene. This workshop allows the students to improvise and create a play under the direction of their teacher. Then on Day 3, students will rehearse and tweak their play in preparation for a final performance of their wholly original piece. Each lesson will also feature warm-up/warm-down activities and fun, challenging drama games. (maximum 25 places)

5. Creative Writing and Storytelling with Dr Andrew Miller

Human beings are storytellers. We tell stories to make sense of our lives and to have fun with our friends. We also tell stories to build personal identities and to foster relationships with others. Sometimes we make up stories to entertain or captivate. This workshop will explore techniques writers use to create evocative stories, including plot development, appealing to the senses, writing dialogue, and creating characters. Students will not only write short pieces but also share them with their peers. (maximum 25 places)

6. Art Master Class with Dr Amy Hamilton

Using contemporary materials, students will recreate the techniques of Old Masters. Participants will learn about the materials and techniques used by artists such as Rembrandt, Titian, Caravaggio and Vermeer and use acrylic paints to make a portrait of a person or animal in the same manner.

Participants will need to come prepared with an image of a subject (e.g. pet, friend, family member or self), preferably an image with strong contrast (strong light and dark areas).

(maximum 25 places)

Topic 3: Wednesday afternoon session (2:00 pm– 4:00 pm)

Students select one topic for these single workshops.

Please indicate your first three preferences on the workshop preference form.

1. Engineering a better human body with Associate Professor John Costi

Biomedical Engineering combines and merges science and engineering principles, technology and innovation with health sciences and medicine, to produce devices or outcomes that benefit people – us! This interactive workshop will provide an overview of the field of Biomedical Engineering and examples of typical devices and applications from Australia and around the world. A particular focus will be on biomechanics of natural and artificial human joints. You will have an opportunity to understand how our bones and tissues behave during loading, why they can fail and how artificial joint replacements (e.g. knee or hip joints) are developed. We will also look at how we test and replicate human movement with a novel one-of-a-kind robot, where we will consider how to design this testing system. Finally, you will have the opportunity to visit a biomechanics research laboratory and see this incredible robot in action! (maximum 25 places)

2. Harvesting Radiative Energy with Dr Cameron Shearer

Are you interested to learn how heat can be converted into electricity? There is a lot of heat coming from the sun or from engines which just goes into the environment. This heat can be converted into electric energy and used for our needs. You will undertake hands-on experiments where you can learn what is important for converting heat into electricity in the most efficient way. You will also learn what is important for harvesting energy in the future.

(maximum 20 places)

3. *Space the final frontier - Energy from outer space with Professor Amanda Ellis*

As human activities in space increase, it is believed that travel in solar power-driven space ships should be possible in the future. The solar energy available in space is cleaner and a billion times more than what we use now. Unfortunately due to the filtering effect of atmospheric gases, the solar energy transmission from space to earth is not much. This means if we could harvest solar energy in orbit we could get nearly 144% more than the maximum amount of energy attainable on the surface of the Earth.

This workshop introduces how solar energy can be effectively harvested both on earth and potentially in outer space. We will build some solar-based devices and try and understand the benefits and limitations of such technology for now and the future. (maximum 20 places)

4. *Kendang Drumming with Dodi Darmadi*

The Kendang is a double-sided membrane drum used in Southeast Asia and India. Some of the oldest images of a kendang can be found in the ninth century temples in Borobudur and Prambanan, in Indonesia. One side of the drum is larger than the other, and has a lower pitch. It is played using a combination of hands and/or sticks.

In this workshop, you will hear about the Sundanese Kendang drums from Java and how they are made, before learning to play the drums using hands and sticks. You will learn a variety of rhythms, and have the opportunity to make up your own rhythms, as well as working as an ensemble. (maximum 20 places)

5. *The Creativity Circuit (a Boot Camp for Lateral Thinking) with Amelia Walker*

This workshop is for anybody who likes (or would like) to create visual art, stories, poems, music, sculpture, dance, theatre, comics, websites, fashion statements, blogs, recipes and/or new ideas of any kind. It's also a workshop for those who like to think beyond the taken-for-granted, ways that push the boundaries and break open new terrains.

The room will be set up in the style of an old-fashioned gym-class circuit, with a series of ten-minute stations through which to progress: everybody starts at different stations and then when the buzzer sounds, you move to the next. The twist is that instead of physical challenges there will be opportunities to participate in creative exercises involving writing, art and other modes of expression. These will be mixed up with very simple movement and/or problem-solving stations designed to enhance brain activity and thereby to improve your performance on the creative stations. The session is self-directed, which means that none of the stations are compulsory: you can skip the ones that you don't like and spend extra time on the ones you do. Or if sudden inspiration strikes, you can ditch the circuit and chill in our special "do not disturb" creation space. Teaming up with other participants to approach challenges together while socialising and having fun is both permitted and encouraged. In the final ("cool down") part of the class there will be an opportunity - for those who choose - to share what you have created with other participants. This may include sharing works you have already created before the class (i.e. bring along anything you'd like to read out or show to others). Sharing is, however, completely optional and there is no obligation to do so. There will also be chances simply to discuss creative processes and to exchange adventures in thought.

Your circuit "coach" will be a published author, university tutor, researcher and bona fide fitness instructor who has coached aerobics classes in two languages (English and Dutch). But don't worry. There are guaranteed no push ups or star jumps! (maximum 25 places)

6. **"Objection, your Honour!" "Overruled!" with Sue Lyons, LL.B., G.D.L.P. (Distinction)**

Calling all budding lawyers, forensic scientists, police officers, actors and jurors! If you are interested in learning how our criminal law system works, or even if you just like watching courtroom dramas on TV, why not come and take part in a mock trial, held in the University Law School's moot court? Student volunteers will play all the roles - Judge, Prosecutor, Defence Counsel, Judge's Associate, Sheriff's Officers, expert (and other) witnesses, and defendants in this scripted mock trial, based on a real case from the District Court of SA. Then our jurors will retire to consider their verdict. In the process, you will learn what to do if you want to become a lawyer, the courtroom layout and protocols, the roles of the various court personnel and the sequence of events during a criminal trial.

"Guilty or not guilty?"

(maximum 25 places)

Topic 4: Thursday afternoon session (2:00 pm– 4:00 pm)

**Students select one topic for these single workshops.
Please indicate your first three preferences on the workshop preference form.**

1. ***Design and Innovation Workshop with Marissa Milne***

A lot goes into developing a product that is ready to sell to consumers. Try your hand at designing a new product, develop a prototype, and then come up with a marketing pitch. Can you convince us to invest?

(maximum 20 places)

2. ***Engineering a better world with Engineers Without Borders***

Engineers Without Borders Australia is a volunteer organization which encourages sustainable development in communities. We bring together engineering students, graduates, professionals and non-engineers who care about trying to build a world where everyone has enough resources, knowledge and technology to meet their needs. We work with communities in Australia and in South East Asia.

This workshop will give you an introduction to engineering and how it can make a difference to someone's quality of life. We will focus on global issues such as water, construction or climate change. The workshop will include two activities; in each activity you will design and build a solution to a different engineering problem. Facilitated by engineering students and young engineering professionals, you will learn about a different side of engineering.

(maximum 24 places)

3. ***Environmental Engineering with Vanya Bosicic***

This workshop focuses on how environmental scientists and engineers clean up and protect the environment from the threats of an oil spill. You will work in teams to assess the severity of an oil spill, and use everyday items to design, build, and test your own clean-up model.

(maximum 20 places)

4. *Stories of living in an uncertain world* with Dr Simon Williams

Humans are terrible at working with probabilities. You can tell because they still buy lottery tickets. So if our instincts are so bad what can we do? One approach would be to understand probability in a way that plays to our one of our strengths: a love of stories. Bayesian Inference casts probability into a narrative, so it can be used whenever we know the answers to the questions *What do we know?* and *When did we know it?* Like a crime show! Indeed we can use it to help solve crimes, free the innocent, figure out how to win at our favourite game shows and learn never to buy a lottery ticket ever again. (maximum 25 places)

5. *Bop till you Drop* with Tiffany Turner

Bop till you Drop prides itself in keeping kids active and having fun. Do you get excited whenever the music is playing and you feel like dancing? Will you dance till you drop? Hip Hop is a street style dance that is constantly evolving. It is a free, funky and soulful expression of movement used in many music video clips and TV programs such as "So You Think You Can Dance." At our Hip Hop classes you will start with a warm up, we will teach you a great dance routine to the latest music, ending in a cool down. By the end of the class you will be dancing like a real Hip Hop star! (maximum 25 places)

6. *Tessellating and LED Lantern Origami* with Claire Richards

Explore paper engineering and geometric shapes to create 3D tessellating paper sculptures. Design a surface images or pattern for an origami cube, planning for creases and folds. Look at how technology is used to design complex paper constructions without glue and customise an origami cube to suit a design that will be and turned into a glowing origami LED lantern. (maximum 20 places)

Topic 5: Friday afternoon session (2:00 pm– 4:00 pm)

Guest speaker for all workshop participants

***Light...what is it, and what is it good for?* with Professor Andre Luiten**

There is something so immediately different and special about light that makes it fascinating. My daily exploitation of the weird properties of light emphasizes its intrinsic strangeness and usefulness. This talk is intended to discuss and demonstrate some of these strange behaviours and to introduce you to some of the exciting and unexpected applications of the most pure form of light: the laser. Examples include the use of lasers in medicine, telecommunications, as well as cooling matter to the lowest possible temperatures for very precise measurements.

Professor Luiten's presentation will be preceded by displays of student work from art, vertebrate palaeontology, engineering, design, and writing workshops. The afternoon will end with a slide show of activities from all workshops.