Kingswood Science and Engineering Challenge
Thursday, 24 July 2014 - Friday, 25 July 2014

Presented by
The University of Newcastle

In cooperation with
The University of Western Sydney
The Rotary Clubs of Districts 9675 and 9685

Overview

The Science and Engineering Challenge is a day-long competition designed to provide year 10 (or year 9) high school students with a positive experience of science and engineering. A maximum of 8 schools per day compete against each other at one central venue.

Each school team is divided into 8 groups of 2 to 4 students. Each group works on either 1 full-day activity or 2 half-day activities. (There are 8 different workshop-style activities at each Challenge.) Each activity is assigned a colour. Students are given a wrist band the same colour as their activity. For example, students wearing a silver wrist band will usually do the full-day activity ‘The Bridge’, but students wearing a purple wristband will do one half-day activity in the morning and a different half-day activity in the afternoon.

Students are awarded points for each activity and the school with the most cumulative points at the end of the day is declared the winner. Winning schools will subsequently compete against each other for a place in the state and - perhaps - the national competition.

IMPORTANT: Please complete the following tasks by the date specified

ASAP
* Obtain approval from your Principal (if you haven't already)
* Book appropriate transport to the Challenge
* Arrange parental permission for students to attend.
* Submit the attached ‘Participant Registration Form’.

7/07/2014
* Deadline for submitting the ‘Participant Registration Form’.
* Full activity notes will be sent to you. Hand them to students.

The week before the event
* Ensure that all students have read their activity notes.
* Update the ‘Participant Registration Form’ with any changes

On the day of the Challenge
* Please arrive at the venue no later than 9:15 AM
* Bring a first aid kit and Participant Registration Form with you
* Students should bring pen/pencil and activity notes with them.
* When you arrive at the venue - before entering - inform the Event Assistant of any changes. Collect the student wrist bands and plain labels for people without media consent.
Why attend?
The Science and Engineering Challenge aims to challenge year 10 (and year 9) students to consider a career in Science or Engineering, and to make the requisite subject selections in senior high school. The program has been operating since the year 2000 and has a proven success record. See www.newcastle.edu.au/challenge/research/.

When?
Thursday, 24 July 2014 - Friday, 25 July 2014
**Arrive at the venue no later than** 9:15 AM
**Ensure that your school can stay until the end of all the presentations at** 2:30 PM

Where?
The University of Western Sydney (Building U)
Second Avenue
KINGSWOOD NSW 2747

Who?
Eight schools compete against each other on each Challenge day.
Each school brings a team of between 16 and 32 year 10 (or year 9) students.
Parents and members of the public are also invited to participate and/or watch.
The school teams are split into 8 colour-coded groups of 2-4 students.
Schools need to send a suitable number of teachers to supervise their students.
**NOTE: SCHOOLS CAN ONLY COMPETE IN ONE REGIONAL CHALLENGE PER YEAR.**

What is the cost?
The event is free but you must arrange and pay for return transport for your students.

How is the day organised?
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:15 AM</td>
<td>Schools arrive at the venue</td>
<td></td>
</tr>
<tr>
<td>9:35 AM</td>
<td>Short intro. by Team Leader</td>
<td></td>
</tr>
<tr>
<td>9:45 AM - 11:15 AM</td>
<td>Morning session (approx. 1.75 hr.)</td>
<td></td>
</tr>
<tr>
<td>11:30 AM</td>
<td>Lunch*</td>
<td></td>
</tr>
<tr>
<td>11:30 AM</td>
<td>Afternoon session (approx. 1.75 hr.)</td>
<td></td>
</tr>
<tr>
<td>11:30 AM</td>
<td>Colour group</td>
<td></td>
</tr>
<tr>
<td>ElectraCITY</td>
<td>11:30 AM</td>
<td>Purple</td>
</tr>
<tr>
<td>Helter Skelter Shelter</td>
<td>11:30 AM</td>
<td>Blue</td>
</tr>
<tr>
<td>Stringways</td>
<td>11:30 AM</td>
<td>Green</td>
</tr>
<tr>
<td>Puff Puff Golf</td>
<td>11:30 AM</td>
<td>Yellow</td>
</tr>
<tr>
<td>Eco-Habitech</td>
<td>11:30 AM</td>
<td>Orange</td>
</tr>
<tr>
<td>Hover Frenzy</td>
<td>11:30 AM</td>
<td>Red</td>
</tr>
<tr>
<td>Mission to Mars</td>
<td>11:30 AM</td>
<td>Pink</td>
</tr>
<tr>
<td>Bridge</td>
<td>11:30 AM</td>
<td>Silver</td>
</tr>
</tbody>
</table>

Each school tests the bridge they have built in front of everyone at 1:45 PM
Challenge complete, schools leave at 2:30 PM

*Lunch is 30 minutes long. Afternoon activities will start without latecomers. There are no other breaks.*
Frequently Asked Questions

**What part do teachers play during the day?**
Teachers should encourage their students and monitor their behaviour.
Please supervise students during lunch and ensure they are ready to start on time.
Teachers should not directly assist students with the actual Challenge activities.

**If students don’t like an activity, can they change to another one on the day?**
No, not after the activities have started.
Usually 4 of the groups will be doing half-day activities and will swap after lunch anyway.

**How should we select the students who attend?**
You can select students in any way that you wish but please note the following:
* We have noticed that the ‘top academic students’ do no better than other groups.
* The ability to work well in a team is the most important ingredient for success.
* Low SES/disabled/special needs students are encouraged to be involved.

**What materials should students bring to the event?**
Students should bring pencil/pen, paper and the activity notes, everything else is provided.
Students are not allowed to use any other materials that they bring with them.

**What are the arrangements for food?**
- Students: Bring your own lunch
- Teachers: Free lunch is provided

**Why do we need media consent for everyone who attends?**
Quite often radio, TV and/or newspapers cover the event.
We do not need a copy of the actual media consent form, but you must inform us
(using the ‘Participant Registration Form’) of anyone who does not have media consent.
People without media consent will be given a plain white label to wear.

**What happens if there is a medical or behavioural problem with a student?**
Contact the Event Assistant/Team Leader immediately. They will get the supervising teacher.

**What should students wear?**
School or sports uniform is best.
Enclosed shoes must be worn for safety and comfort.

**What happens if our school wins on the day?**
The winning school will receive a trophy and an invitation to the state "Super Challenge".

**Why do we need to know how many Aboriginal or Torres Strait students are coming?**
We need to report how many Aboriginal or Torres Strait students have been involved.

**Who do I contact if I have other questions?**
Most general questions about the Challenge can be directed to the Local Organiser:
Nicolle Fowler
T: (02) 4736 0389  M:  n.fowler@uws.edu.au
The Team Leader runs the actual Challenge day and can answer more specific questions:
Peter Fullagar
T: (02) 4921 6551    M: 0418 407 322 (Best)    E: peter.fullagar@newcastle.edu.au

Check list
- Carefully read all this Teacher's Guide, including the FAQ above.
- Obtain approval to attend from your Principal to attend (if you haven't already)
- Book transport to and from the Challenge.
- **Sort students into groups and submit the ‘Participant Registration Form’ via email.**
- Arrange student excursion permission and check media clearance (see annex A).
- Distribute the full activity notes to students and ensure they bring them on the day.
- Bring a first aid kit and any changes to the Participant Registration Form with you on the day
- Tell your students about lunch, what to wear, to follow instructions of Challenge staff, etc.
- Make sure students are wearing their Challenge wrist bands before they enter the venue.
- To minimise disruption to the event, please arrive on time and stay until the end.
<table>
<thead>
<tr>
<th>Duration &amp; name of activity</th>
<th>Overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half Day ElectraCity</td>
<td>Students will be given a power distribution simulation board. They will be provided with different quality cables and are required to supply power to as many loads as possible, as cheaply as possible.</td>
</tr>
<tr>
<td>Half Day Helter Skelter Shelter</td>
<td>Students construct a tall earthquake-proof tower using only basic materials, sound engineering principles, and ingenuity. At the end of the session the towers are put to the test on an earthquake simulator.</td>
</tr>
<tr>
<td>Half Day Stringways</td>
<td>The aim of this half-day activity is to develop networks that convey water in the most efficient way possible. The higher the efficiency of linkage (i.e. minimum travel distance) the more points your team earns.</td>
</tr>
<tr>
<td>Half Day Puff Puff Golf</td>
<td>Students are given materials to build the chassis and axles for a light-weight car. Balloon(s) are then attached to the car and inflated. The balloon's deflation is the cars only propulsion.</td>
</tr>
<tr>
<td>Full Day Eco-Habitech</td>
<td>Build an Eco-Habitech model home to withstand fierce tests and be as ecologically friendly as possible. The value of materials and their 'carbon cost' are also counted.</td>
</tr>
<tr>
<td>Full Day Hover Frenzy</td>
<td>Students must construct a small hovercraft from motorised propulsion units, Styrofoam trays, balsa, plastic and tape. Scoring is based on manoeuvrability, speed, and ability to negotiate obstacles.</td>
</tr>
<tr>
<td>Full Day Mission to Mars</td>
<td>This activity requires students construct a vehicle to quickly transverse an undulating surface. Students will use rubber bands for the suspension system.</td>
</tr>
<tr>
<td>Full Day Bridge</td>
<td>Build a small bridge from balsa, pins, tape, paddle pop sticks etc. Points are awarded for strength and load-carrying capacity (tested with dynamic loads).</td>
</tr>
</tbody>
</table>
## Risk Assessment

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Consequence</th>
<th>Risk Reduction</th>
<th>Likelihood</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>ElectraCity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ElectraCity board falling</td>
<td>Medium</td>
<td>Boards are supported to prevent tipping.</td>
<td>Unlikely</td>
<td>Low</td>
</tr>
<tr>
<td>Battery falling</td>
<td>Medium</td>
<td>Students are not allowed to walk between tables.</td>
<td>Unlikely</td>
<td>Low</td>
</tr>
<tr>
<td>spike injury from cable</td>
<td>Medium</td>
<td>Batteries to be placed towards the centre of the table. Coordinators only to move batteries. Students told not to remove plug ends. Points penalty applies.</td>
<td>Unlikely</td>
<td>Low</td>
</tr>
<tr>
<td>Weights falling on toes and fingers</td>
<td>Medium</td>
<td>Enclosed shoes required, long lead to operate equipment, instruction to coordinators to keep students at a 2m distance.</td>
<td>Unlikely</td>
<td>Low</td>
</tr>
<tr>
<td>Helter Skelter Sh</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stringways</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>String used as choking hazard.</td>
<td>Major</td>
<td>Students are supervised and awarded a points penalty for dangerous behaviour. Students are required to wind up string after each scenario.</td>
<td>Unlikely</td>
<td>Medium</td>
</tr>
<tr>
<td>Tripping hazard</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutting with scissors</td>
<td>Medium</td>
<td>Students advised on the correct use of scissors. Tracks to be taped down securely and marked with cones. Students are supplied with balloon pumps.</td>
<td>Unlikely</td>
<td>Low</td>
</tr>
<tr>
<td>Light-headedness</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrong use of equipment e.g. scissors and pins.</td>
<td>Medium</td>
<td>Students advised on the correct use of equipment. Sharp objects only provided when needed. Tape down power cords and clean up spills immediately. Only one person drops the weights on dwelling in the centre of the table. Tunnel does not operate unless correctly</td>
<td>Possible</td>
<td>Low</td>
</tr>
<tr>
<td>Slip/ trip Hazard. Test weight falling. Wind tunnel operation.</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lift Fan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Propellers</td>
<td>Medium</td>
<td>Students advised not to place hand near fan. Propellers glued to motor shaft and checked regularly. Safety glasses worn when testing. Test course taped to floor. Only people testing to be in test area. Students only given bags when needed</td>
<td>Possible</td>
<td>Low</td>
</tr>
<tr>
<td>Trip over test course</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suffocation Plastic Bags</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collapse of trestle Catch on screw</td>
<td>Medium</td>
<td>Trestles checked before each challenge day. Ensure screws are attached with wing nut inside surface so there are no protrusions.</td>
<td>Possible</td>
<td>Medium</td>
</tr>
<tr>
<td>Mission to Mars</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inappropriate use of equipment e.g. scissors, pins, hacksaw. Test weight falling during testing.</td>
<td>Medium</td>
<td>Students advised on the correct use of equipment. Sharp objects only provided when needed. All personnel to stand back from the rig when not required. Only one student to release trolley. Raised section on test rig which keeps trolley on course.</td>
<td>Unlikely</td>
<td>Low</td>
</tr>
</tbody>
</table>

## Calculation of Risk

<table>
<thead>
<tr>
<th>Consequence</th>
<th>Unlikely</th>
<th>Possibly</th>
<th>Likely</th>
<th>Almost Certain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catastrophic - serious or death</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>EXTRM</td>
<td>EXTRM</td>
</tr>
<tr>
<td>Major - medical treatment</td>
<td>MED</td>
<td>MEDIUM</td>
<td>HIGH</td>
<td>EXTRM</td>
</tr>
<tr>
<td>Medium - first aid</td>
<td>LOW</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
<td>HIGH</td>
</tr>
<tr>
<td>Minor - no treatment</td>
<td>LOW</td>
<td>LOW</td>
<td>MEDIUM</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>
Media Consent Form

I (parent/caregiver) hereby consent to the University of Newcastle and its Partners to take or have taken by others, photographs, digital images and/or audio and/or video footage (the images) of the student named below, and to store the images, make copies of the images and publish the images in any form, in whole or in part, and distribute them in any medium including, but not limited to, print media, the Internet, CD-Rom, other multi-media uses or graphic representation, cinematography or video.

I consent to the images being used by the University or provided to others for the following purposes only:
• General news or promotion of the Challenge on TV, Radio or in Newspapers, in trade and other journals and on websites and the internet.
• The production of resources/programs that will assist the Challenge or the University of Newcastle in their educational mission,
• Promoting and advertising the resulting educational products/resources,

The University of Newcastle and its Partners undertake not to use any images in a way that would cause embarrassment or misrepresent the intent of the student’s participation.

I understand that neither I nor the student will be paid for giving this permission and I hereby waive any claim that I or we may have or may have had for remuneration, residuals, royalties or any other payment in respect of use of the images.

I agree that The University of Newcastle and its Partners shall not be bound to make any use of the images.

Student name (please print): __________________________________________
Student signature: ___________________________________ Date _______

Parent / Caregiver name (please print): __________________________________
Parent / Caregiver signature: ___________________________ Date _______

School name: _____________________________________________________
School address: ___________________________________________________
Code of Conduct
Science & Engineering Challenge

A code of conduct…
• Is a set of consistent guidelines for an acceptable standard of conduct.
• Addresses in a concise manner the broader issues of ethical responsibility, and encourages greater transparency and accountability.
• Provides reasonable expectations for participation in a Science & Engineering Challenge.

School students
• Come prepared, follow directions, and play by the rules.
• Never argue with event staff. If you disagree, ask your teacher to talk with the Challenge staff.
• Verbal abuse, taunting or intimidating event staff or other teams is not acceptable.
• Contribute to your team. Your team's performance will benefit; so will you.
• Be a good sport. Applaud all good results whether they are from your team or another.
• Treat everyone as you like to be treated. Do not bully or take unfair advantage of others.
• Cooperate with your teacher, team-mates and other teams.
• Respect the rights, dignity and worth of all participants regardless of their gender, ability, cultural background or religion.

Event staff
• Prepare fully, set a good example, and come prepared to assist all competitors equally.
• Always act with honesty, fairness, transparency and integrity.
• Compliment and encourage all participants to achieve their personal/team best.
• Be consistent, objective, professional and courteous when making decisions.
• Condemn unsporting behaviour and promote respect.
• Do not be alone with, or inappropriately touch a student.
• Place the safety and welfare of the participants above all else.
• Give all students a 'fair go' regardless of their gender, ability, cultural background or religion.

Parents and members of the public
• Focus on students’ creativity and commitment, rather than winning or losing.
• Encourage students to always work according to the rules and to settle disagreements without resorting to hostility or violence.
• Never ridicule or yell at anyone for making a mistake or performing below your expectations.
• Respect the decisions of Event Staff and teach students to do likewise.
• Show appreciation for volunteers, Event Staff, parents, teachers and administrators.
• Respect the rights, dignity and worth of all participants regardless of their gender, ability, cultural background or religion.

Teachers
• Give all students an equal opportunity to participate in the event.
• Respect the other schools by arriving on time and staying until the end of the day.
• Make students aware of the positive benefits of participating in the event.
• Do not help your students too much. Let them learn from experience, and don’t expose yourself to criticism by giving your team an unfair advantage.
• Work with your students to ensure that they behave appropriately throughout the day.
• Respect the rights, dignity and worth of all participants regardless of their gender, ability cultural background or religion.

The Science and Engineering Challenge is a high-quality, safe, ethical, smoke and drug-free event.