



THE SCIENCE AND ENGINEERING CHALLENGE TEACHER'S GUIDE



United Nations Day
Honour Award 2022



Brisbane North

Science and Engineering Challenge

Wednesday 5th February - Friday 7th February 2025

Presented by The University of Newcastle

In cooperation with The University of Queensland



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

CHECK LIST

- ☐ Carefully read all this Teacher's Guide, including the FAQ below.
- ☐ Your team must have a minimum of 16 students, and no more than 32.
- ☐ Sort students into groups and ensure that they are representing every colour (activity/s).
- ☐ Complete the 'Participant Registration Form' and submit it to the Local Organiser.
- ☐ Arrange student excursion permission and check media consent.
- ☐ Distribute the activity notes to your students.
- ☐ 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 staff, etc.
- ☐ Make sure students are wearing their Science & Engineering Challenge wristbands before they enter the venue.
- ☐ To minimise disruption to the event, please arrive on time and stay until the end.

WHY ATTEND?

The Science and Engineering Challenge encourages students to consider a career in science or engineering, and to study the enabling sciences in senior high school.
See www.newcastle.edu.au/challenge for more information.

WHEN?

Wednesday 5th February - Friday, 7th February 2025
Arrive at the venue no later than: 9:00 AM to start at: 9:25 AM
The event will finish at: 2:30 PM

WHO?

Eight school "teams" compete against each other on the day. Each school brings a team of between 16 and 32 students in Year 10 (or Year 9).

The school teams are split into 8 colour-coded groups of 2 to 4 students.

Schools need to send a suitable number of teachers to supervise their students.

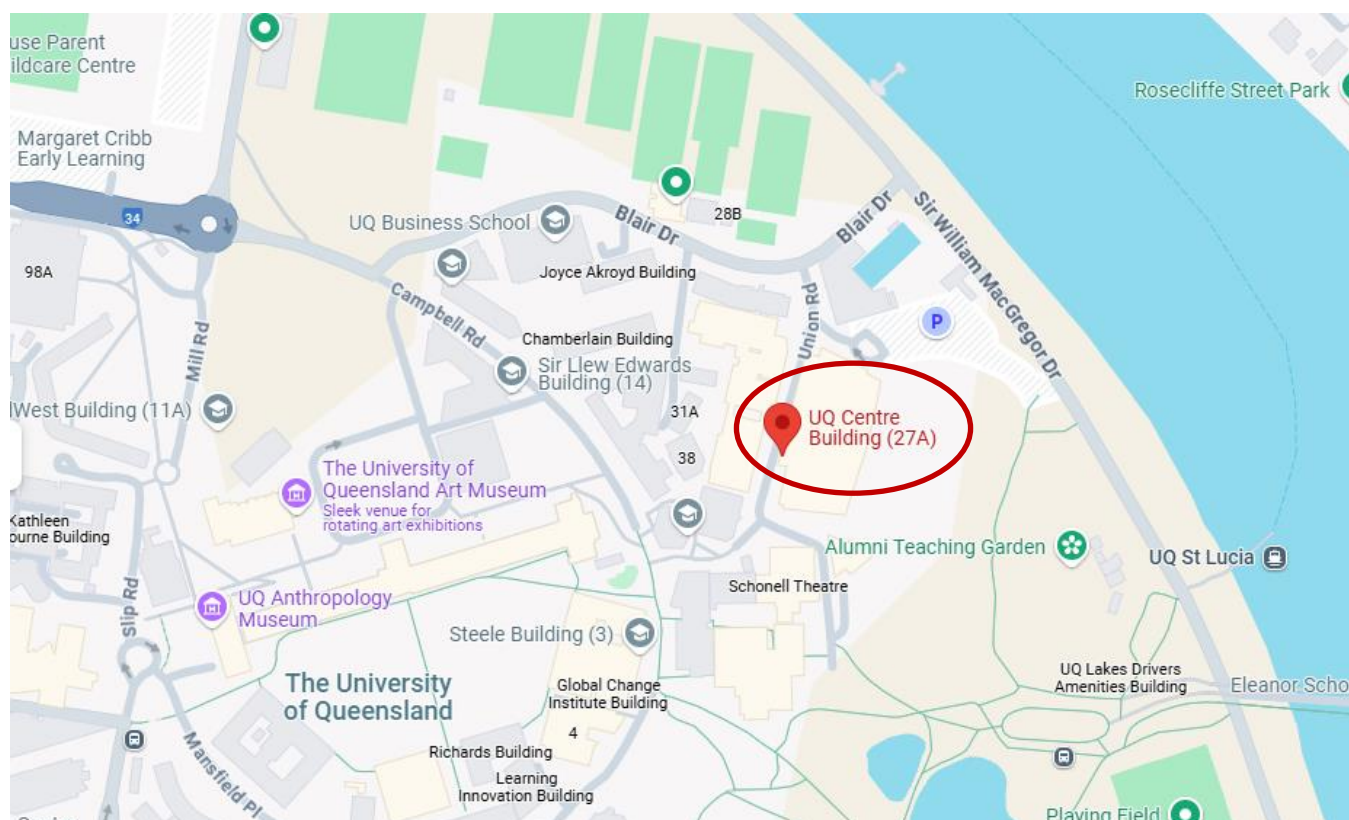
IF YOUR SCHOOL COMPETES ON MORE THAN ONE REGIONAL DAY (ANYWHERE IN AUSTRALIA), ONLY THE FIRST SCORE WILL BE COUNTED FOR NATIONAL QUALIFICATION PURPOSES.

WHERE?

The UQ Centre
Union Rd,
St Lucia QLD 4067

MAP OF VENUE

Meeting point



CONTACTS

Most general questions about the event can be directed to the Schools Contact and Regional Chair:

Helen Burdon

P: 07 3365 2382 or 07 3365 8525 (diverts to mobile) | **E:** outreach@eait.uq.edu.au

The Team Leader runs the actual day and can answer more specific questions:

Anna Popowicz

M: 0473 122 331 | **E:** Anna.Popowicz@newcastle.edu.au

HOW IS THE DAY ORGANISED?

Schools arrive at the venue: 9:00 AM

Short intro. by Team Leader: 9:25 AM, activities commence immediately afterward.

MORNING SESSION	LUNCH*	AFTERNOON SESSION	COLOUR GROUP
Wind Turbine	11:30 AM	Confounding Communications	Purple
Confounding Communications	11:30 AM	Wind Turbine	Blue
Flight	11:30 AM	Job Juggle	Green
Job Juggle	11:30 AM	Flight	Yellow
Fish Traps	11:30 AM	ElectraCITY	Orange
ElectraCITY	11:30 AM	Fish Traps	Red
Eco-Habitech	11:30 AM	Eco-Habitech	Pink
Bridge	11:30 AM	Bridge	Silver

Lunch is 30 minutes long with the afternoon session commencing at midday.

Each school tests the bridge they have built in front of everyone at: 1:50 PM

Event concludes and schools leave at: 2:30 PM

OVERVIEW

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

Each school 'team' is divided into eight groups of between 2 to 4 students per group. Each group will then do either one full- day activity, or two half-day activities (i.e. one activity in the morning session, and a different one in the afternoon session). Students are assigned a colour to identify which activity(s) they will do during the morning and afternoon sessions - see table above.

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. The highest scoring winning schools from each region/zone will subsequently compete against each other for a place in the state and - perhaps - the national final.

FREQUENTLY ASKED QUESTIONS (FAQ)

WHAT IS THE COST?

Schools must arrange and pay for return transport for their students. There is usually a participant charge per school to attend the event day. These costs will be confirmed by your Local Organiser

WHAT PART DO TEACHERS PLAY DURING THE DAY?

Schools/teachers retain a duty of care to their students throughout their event. 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.

Students doing half-day activities will swap after lunch anyway. Students cannot swap wristbands.

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 a pen only to the event; 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: Bring your own lunch

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 bright yellow label to wear.

WHAT HAPPENS IF THERE IS A MEDICAL OR BEHAVIOURAL PROBLEM WITH A STUDENT?

You will be contacted immediately, in conjunction with the Team Leader / Event Assistant.

WHAT SHOULD STUDENTS WEAR?

Please wear school or sports uniform, with enclosed shoes (for safety and comfort).

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.

WHAT HAPPENS IF OUR SCHOOL WINS ON THE DAY?

The winning school will receive an award during the end-of-day presentation.

A BRIEF DESCRIPTION OF CHALLENGE ACTIVITIES

ACTIVITY	AIM	METHOD	CAREERS
Wind Turbine	Students construct fan blades using basic materials to catch wind provided by an electric fan.	Construct fan blades from cardboard, wooden skewers, masking tape and other materials. Turbines will be scored on how efficiently and quickly they spin.	Civil Engineer Construction Manager Architect
Confounding Communications	Create functional codes to accurately and efficiently send secret messages using pulses of coloured light.	Using light boxes that transmit red, green and blue light along a fibre optic rod, students can communicate using up to seven colours in unlimited combinations.	Software Engineer Mathematical Modeller Computer Systems Engineer Scientific Analyst
Flight	Build a model glider to be launched using the Y.E.E.T. (YOLO Electronic Ejection Technique).	The glider will be scored based on distance travelled, precision of landing, and accuracy hitting a target. One glider will be made for all tests, but this glider can have slight modifications (i.e. flaps, ailerons, weight distribution) between launches.	Software Engineer Mathematical Modeller Computer Systems Engineer Scientific Analyst
Job Juggle	Students will solve a series of scheduling problems based on real life scenarios by arranging coloured tiles into lanes on a board: the Scheduler X1000.	12:00:00 AM	Computer scientist Software designer Electrical Engineer Scheduling Officer
Fish Traps	Use 3D printed rocks to setup collection points for various sizes of "fish", represented by marbles.	Students will design a variety of different traps with the 3D printed rocks. They will work through scenarios aiming to catch specific amounts and sizes of "fish"	Civil Engineer Sustainability Scientist
ElectraCITY	The power is in your hands, the task is to provide the lowest-cost electricity to the city's infrastructure.	Work out the most efficient pathways while weighing up the cost of cables and their resistance, and the cost of leaving some buildings without power!	Renewable Energy Engineer Ren. Energy Systems Design Mathematical modeller Energy Systems Designer Data cabling technician
Eco-Habitech	Students will build an ecologically friendly house that must meet certain requirements.	Houses are costed from the materials chosen by the teams and points are awarded via a series of tests.	Civil Engineer Construction Manager Architect Sustainability Scientist
Bridge	Design and construct model bridges to support a trolley carrying 'gold' ingots across a gap in the tracks.	Understanding physics and material properties will help transform cardboard, balsa, tape etc. into bridges capable of bearing dynamic loads 200 times their weight!	Civil Engineer Surveyor Mathematical Modeller Architect

RISK ASSESSMENT

	HAZARD	CONSEQUENCE	RISK REDUCTION	LIKELIHOOD	RISK
Wind Turbine	Constructed fan blades flying off	Major	Safety glasses worn in testing area	Possible	Medium
Confounding Communications	Battery falling, Curtain falling over	Medium	Batteries to be placed towards the centre of the table. Curtain frame to be angled to minimise tipping.	Unlikely	Low
Flight	Inappropriate use of scissors or craft knife.	Medium	Students advised on the correct use of equipment. Sharp objects only provided when needed. Adequate supervision of cutting.	Possible	Medium
	Flying gliders	Major	Only flown in designated areas, with no one in this area during flight	Possible	Medium
	Moving Parts	Medium	Eye protection worn. Supervision of launcher use.	Unlikely	Low
Job Juggle	Choking Hazard	Major	Students advised not to place parts in mouth	Unlikely	Medium
Fish Traps	Choking hazard	Catastrophic	Students advised to not place parts in mouth.	Unlikely	Medium
	Tripping hazard	Medium	Inform participants of the trip risk and ensure any marbles are picked up immediately	Possible	Medium
ElectraCITY	Board or Battery falling	Medium	Boards are supported to prevent tipping, Batteries to be placed towards the centre of the table.	Unlikely	Low
	Spike injury from cable	Medium	Students told not to remove plug ends. Point penalty applies.	Unlikely	Low
	-	-	-	-	-
Eco-Habitech	Cutting with scissors	Medium	Students advised on correct use of scissors	Possible	Low
	Falling weights	Medium	Students advised to stand away from testing area	Possible	Medium
	Tripping Hazard	Medium	Power cord secured with cord covers in low traffic areas	Unlikely	Low
Bridge	Inappropriate use of equipment e.g. scissors, pins, hacksaw	Medium	Students advised on the correct use of equipment. Sharp objects provided only when needed.	Unlikely	Low
	Test weight falling during testing.	Medium	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.	Possible	Medium

	CALCULATION OF RISK Action required for risk not in green	LIKELIHOOD			
		Unlikely	Possibly	Likely	Almost Certain
Consequence	Catastrophic - serious or death	Medium	High	Extreme	Extreme
	Major - medical treatment	Medium	Medium	High	Extreme
	Medium - first aid	Low	Medium	Medium	High
	Minor - no treatment	Low	Low	Medium	Medium

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 event 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 Science and Engineering 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 event

PARTICIPANTS (GENERALLY 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 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, follow the rules, and assist all participants 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 participant.
- Place the safety and welfare of the participants above all else.
- Give all participants a 'fair go' regardless of their gender, ability, cultural background or religion

PARENTS AND MEMBERS OF THE PUBLIC

- Focus on participants' creativity and commitment, rather than winning or losing.
- Encourage participants 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 encourage participants 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 participants an equal opportunity to join in the event.
- Respect the other schools by arriving on time and staying until the end of the day.
- Make participants aware of the positive benefits of joining in the event.
- Do not help your class/team too much. Let them learn from experience, and don't expose yourself to criticism by giving your team an unfair advantage.
- Work with participants 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.