

# Discover your future in engineering

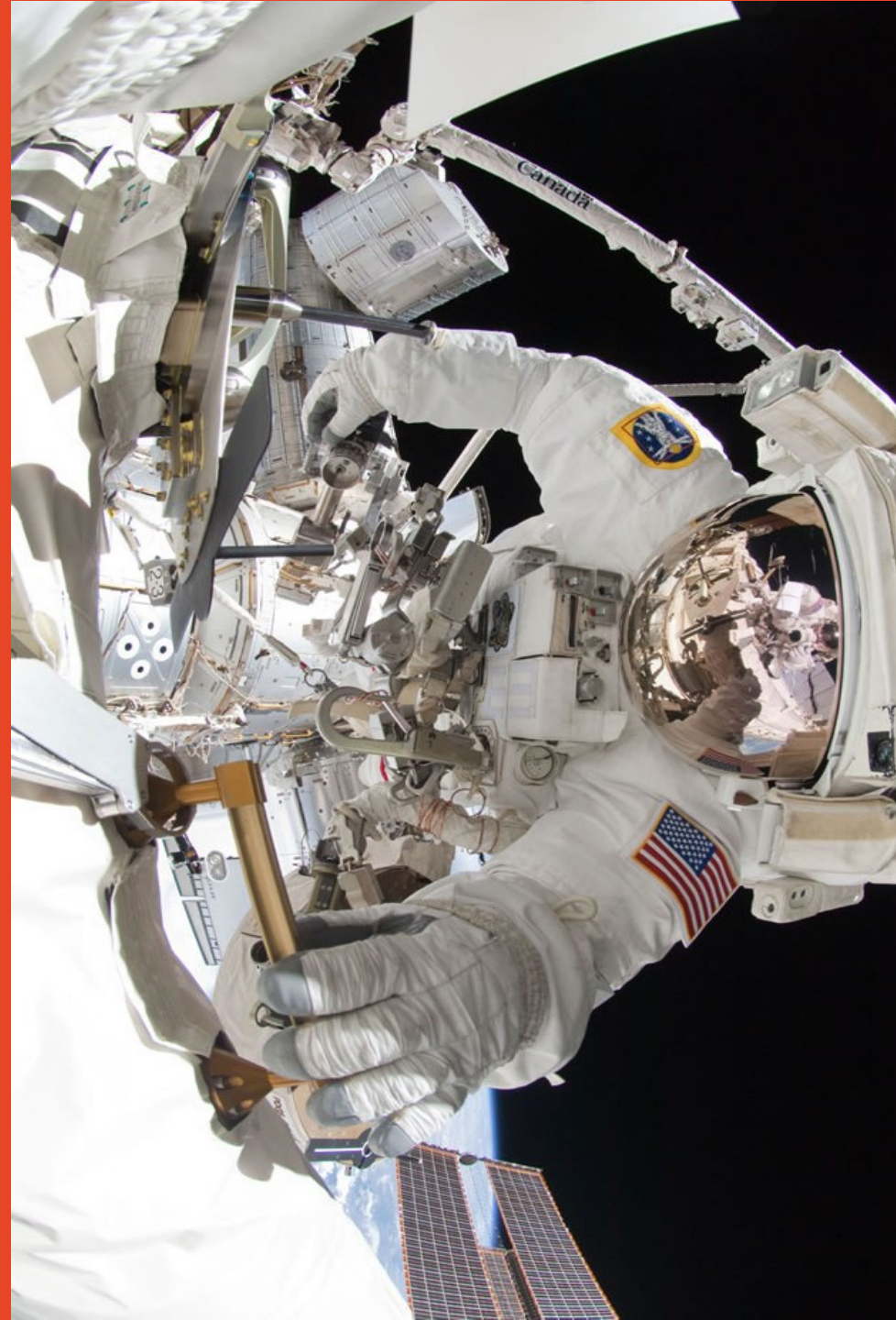
Faculty of Engineering and  
Information Technologies

Dr Doug Auld, Snr Lecturer

# Space Engineering

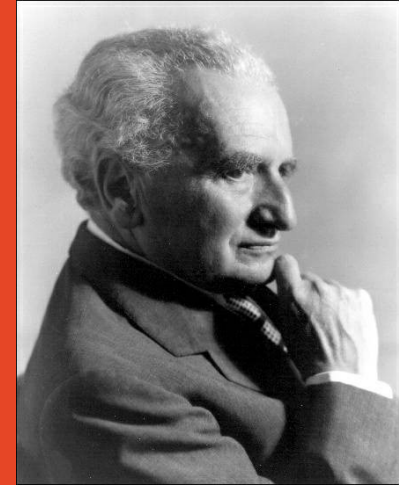


THE UNIVERSITY OF  
SYDNEY



Scientists discover the world that exists; Engineers create the world that never was.

Theodore Von Karman  
Aerospace Engineer  
1881-1963



Failure is an option here.  
If things are not failing  
you are not innovating  
enough.

Elon Musk CEO SpaceX



THE UNIVERSITY OF  
SYDNEY

# Why study with us?

## Study at a highly ranked university

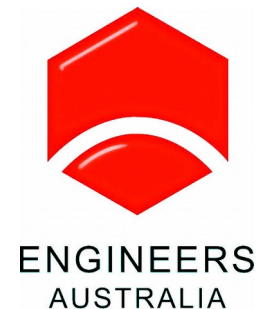
- regularly ranked in top 0.3% of universities worldwide
- In the top 30 in the world for engineering and technology\*
- Number 1 in Australia and 14 in the world for graduate employability\*\*
- Space Engineering highest entry ATAR for Australian Engineering programs.

## Globally recognised qualifications accredited by:

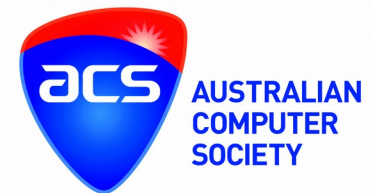
- Engineers Australia
- Australian Computer Society

\*QS World University Rankings by Faculty 2015/2016

\*\*QS Graduate employability rankings 2016



Accredited Program



# Why study with us?

## Flexible Entry options

**Flexible Entry** program gives you chance to receive an offer for a course if you achieve an ATAR that falls close to the cut-off ATAR

- \* available to domestic recent school leavers.
- \* doesn't include combined degrees with commerce, law, medical science or design in architecture.

**Flexible First Year** program gives you the chance to study in a standard program and if performance is above average (>75% average marks) then automatic transfer into 2<sup>nd</sup> year of Space Engineering program.

- \* available to all students.
- \* no increase in degree length
- \* no catch up subjects.

# Clear pathways, widest choice

Engineering degree options cover:

- aeronautical\*
- mechanical\*
- mechatronic\*
- biomedical
- chemical and biomolecular
- civil
- electrical
- software engineering

We offer:

- ability to personalise your degree with more than 15 majors
- option to broaden career options by combining your degree with studies in arts, law, architecture, science, commerce, music or medical science.

\* space engineering major is available as part of a standard 4 year program with these streams of engineering and in 5 year combined degrees.

# Advanced Engineering Program

- open to students demonstrating outstanding academic ability
- based on ATAR or equivalent (97.50 or higher for Advanced Engineering)
- offers the opportunity to work at advanced level in science, engineering or IT subjects, or in small supervised project groups tackling specific engineering problems relevant to the community
- will gain valuable insights into business planning, strategy development, assessment of a business proposition and financial planning
- Students with ATAR eligible for the Space Engineering major are all eligible for this program.

**Advanced Engineering** - must apply directly through UAC

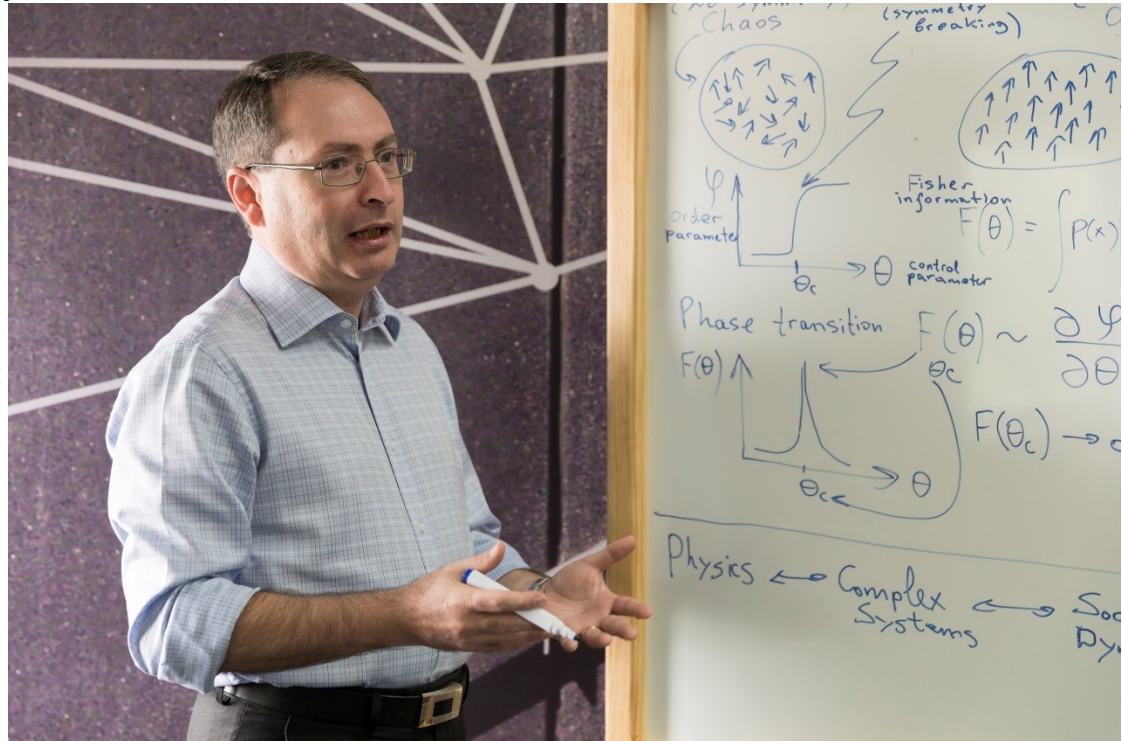
# What you need to study

## Prerequisite:

- Maths is now a prerequisite for the University of Sydney from 2019
- You need to be doing Mathematics (NOT general maths)
- Achieve Band 4 minimum

## Assumed knowledge:

We recommend you study Mathematics Extension 1 to prepare you for University study  
AND  
Physics



# Space Engineering

An overview.

Taken as a **major** in one of the standard engineering streams.

Aeronautical

Mechanical

Mechatronic

Separate UAC entry preference 511734. ATAR  $\approx$  99

Pitched at an Advanced Technology level.

Common first year with other standard programs.

Opportunity for students who do well in first year to move up from a standard stream to this major in second year.



## What would you be studying here?

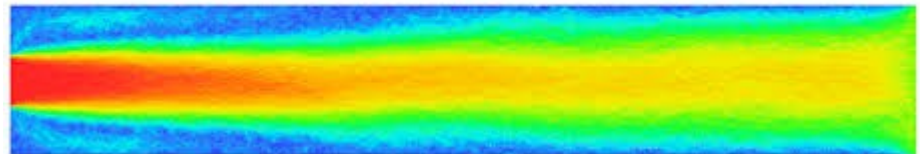
Year 1 : Science/Engineering Basics : Maths, Computing, Materials...

Year 2 : Engineering Fundamentals : Fluids, Thermodynamics, Materials  
Structural Analysis, Design and  
[Orbital Mechanics, Satellite Systems, Launch Vehicles, Space Law](#)

Year 3 : [Aeronautical](#) : Aerodynamics, Propulsion, Aerospace Structures and Design, Flight Mechanics, Control Theory or  
[Mechanical](#) : CFD, Thermal Engineering, Advanced Materials, Mechanical Component design or  
[Mechatronic](#) : Control Programming with Feedback, Robotics, Electronic Power systems and  
[Detailed Satellite Component Systems Design](#)

Year 4 : Individual Research Project, Electives and  
[Integrated Systems Engineering, complex path tracking, Navigation and Sensor/Actuator multivehicle control.](#)

Mach Number Contours Re=250



# Why would you be studying here?

## Fundamental Components.

Meets requirements for Engineers Australia accreditation.

Covers the basics required for any graduate engineer.

No narrow restriction on career paths.

## Advanced Components.

In depth coverage of specialist topics focusing on Space Engineering.

International collaboration.

Current Technology Focus. Advanced Lab and Project Work.



# Who would you be studying with here?

Experts in research at the international level.

Lawrence Hargrave Professor : Greg Chamitoff (ex NASA astronaut)

Senior Lecturers expert in : Rocket Nozzle Design  
Rarefied Gas Dynamics  
Re-entry vehicle flows  
Composite Lightweight Structures  
Automomous Multi-vehicle Control  
Smart Materials .....

A small cohort of Australia's best engineering students



## Where would you go from here?



Postgraduate Research

Local Aerospace Companies.

Related High Tech Companies.

Graduate Traineeships in  
Industry.

General Engineering Positions.

Our Aim is to graduate highly skilled, highly motivated engineers who are willing to take a leadership role in the Australian industry.

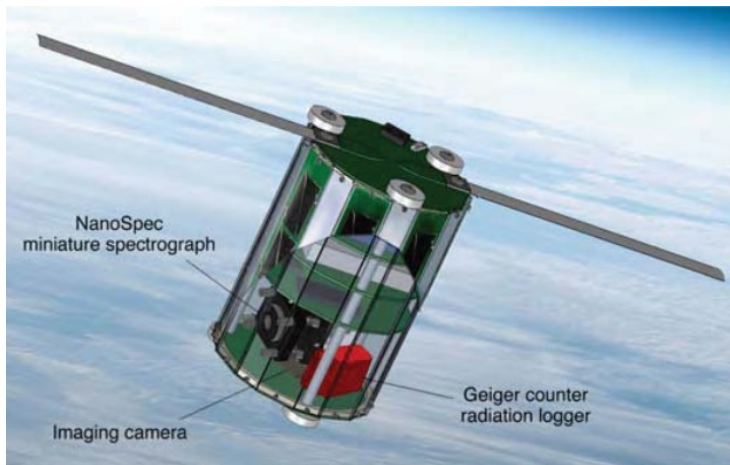
# Current Projects

I-Inspire Picosatellite Projects.

Collaboration between Engineering and Physics departments

Collaboration between universities.

Usyd, ANU, UNSW, UAdelaide, UniSA



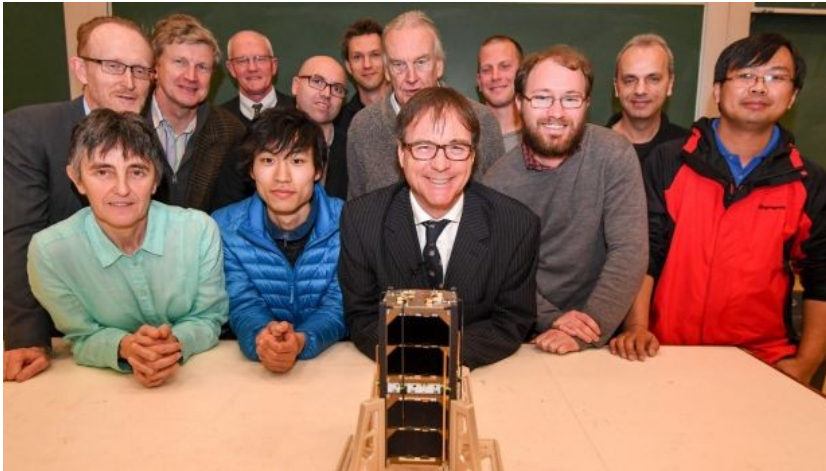
I-inspire 1 high altitude balloon launch





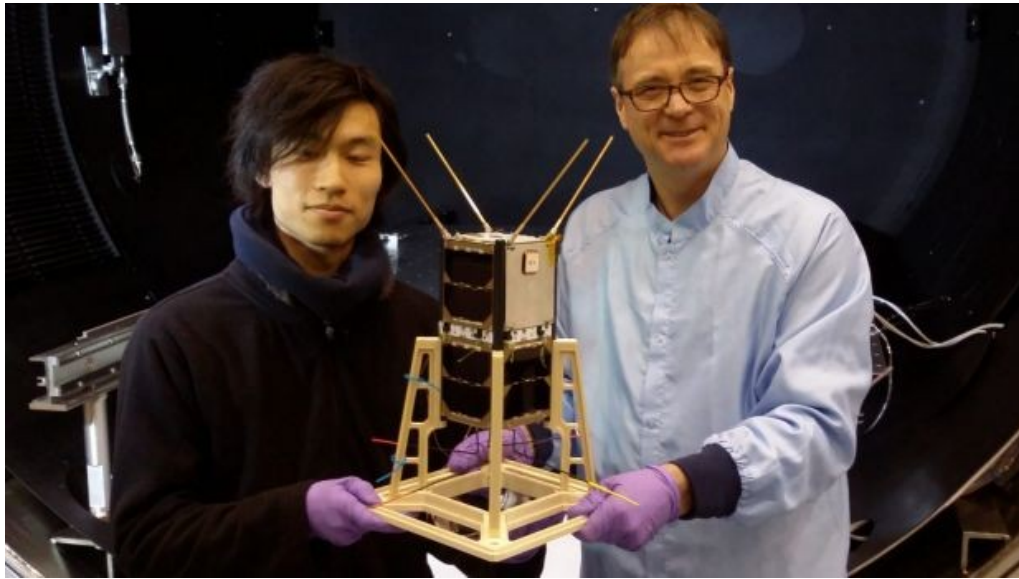
## Pre launch testing

Mount Stromlo space testing facilities in Canberra



## The Usyd Team

Physics  
Engineering  
Earth Sciences



## I-inspire 2

### CubeSat

To be launched as part of the global QB50 project to explore the thermosphere

Instrumentation :   Langmuir probes  
                          High resolution imager  
                          GPS signal analyser  
                          Radiation detector.

Aim : Investigate effect of Space Weather (Solar Wind) on the upper atmosphere and low earth orbits.

Current status :

In transit to US for Antares launch to ISS  
Deployment in late 2016  
along with 2 other Australian Uni built Cubesats.





# Co-Curricular Activities

Developing your network  
and enhancing your career



# Societies and Clubs

- American Institute of Aeronautics and Astronautics (AIAA USSB)
- WINDSOC
- Sydney University Women in Engineering (SWAE)
- RAeS



# The Resource Room

- Journals: AIAA Journal, Journal of Aircraft, Journal of Propulsion and Power
- Magazines: Aerospace America, Aviation Week & Space Technology, Australian Aviation
- Technical Manuals & Textbooks



# Social Activities

- WINDSOC barbeques
- Semester Opening Trivia Nights
- Yuri's Night Movie: Apollo 13



# Extra Projects

- Zero Robotics
- Texas A&M University + USyd UAV project
- Formula SAE



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# Talks & Lectures

- Jetstar Head of Engineering: David Lau
- SR-71 Test Flight Pilot: Rick McCrary
- Greg Chamitoff (Former NASA Astronaut & Lawrence Hargrave Professor of Aerospace Engineering)
- Sandra Magnus (AIAA Executive Director and former NASA Astronaut)



# Annual Aerospace Networking Evening



- Qantas
- Airbus Group
- Hawker Pacific
- Saber Astronautics
- Northrop Grumman



# Conferences

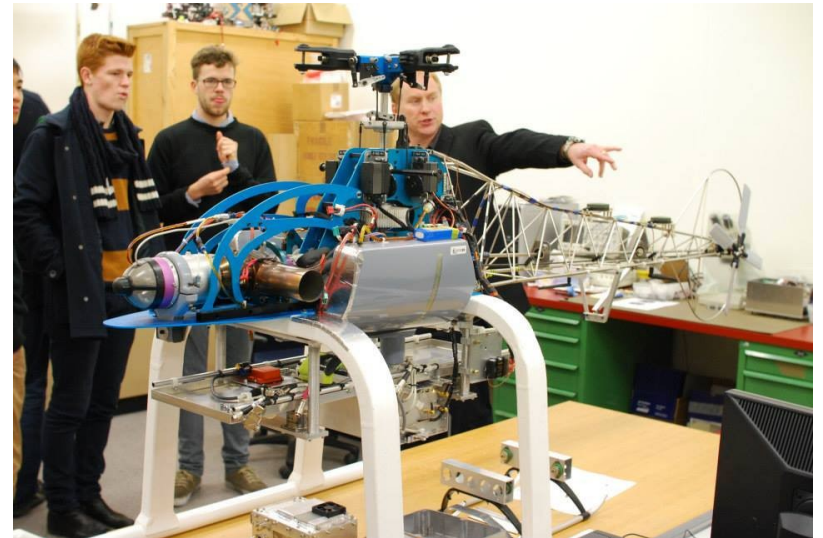
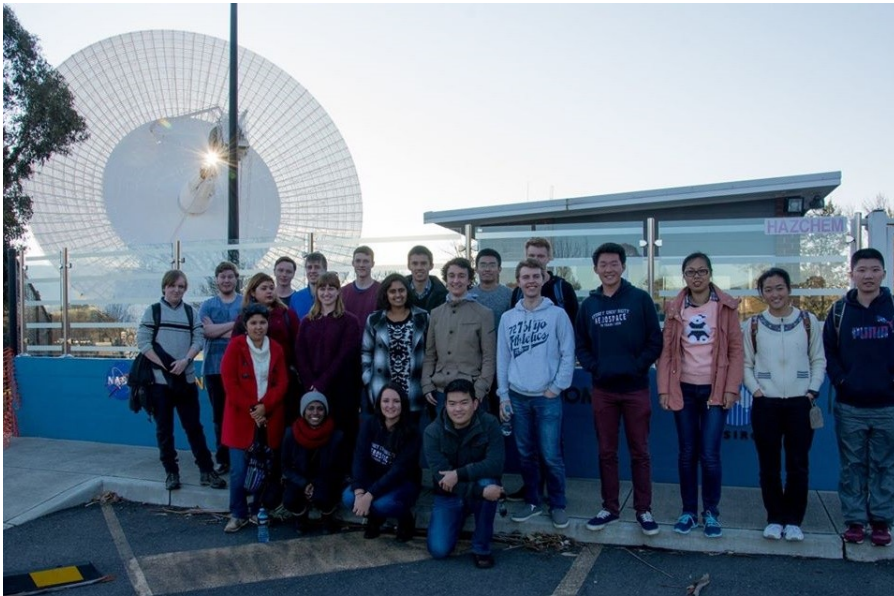
- Aerospace Futures
  - Scholarships & International Opportunities
- Student Paper Conferences (AIAA 2014 conference was run at USyd!)





# Tours and Site Visits: Canberra Tour

- Biennial Canberra Tour
  - Mt Stromlo Observatory
  - CSIRO NASA Deep Space Tracking Center
  - Australian Transport and Safety Bureau
  - Defence Science Technology Group



# Tours & Site Visits: Qantas Jet Base



## Common Questions.

### How do I enrol in Space Engineering?

If you put 511734 as your 1<sup>st</sup> preference and have an ATAR 99+ then you will be made an automatic offer.

If you put 511734 as your 1<sup>st</sup> preference and your ATAR is close to 99 then put in a Flexible Entry application, if places are available you will be made an offer.

If your ATAR is below 99 put Aeronautical, Mechanical or Mechatronics as your 1<sup>st</sup> preference, if your ATAR meets the cut off for the selected program then you can transfer to the Space Engineering major in 2<sup>nd</sup> year by getting a 75% average in the first year of a standard program.

### How do I enrol in Space Engineering with a combined degree?

Put the UAC code for the combined degree as your 1<sup>st</sup> preference, put Space Engineering as your 2<sup>nd</sup> preference. At enrolment your ATAR will be used as described above to ascertain eligibility for Space Engineering.

# Getting a head start: [sydney.edu.au/engineering/high-school](http://sydney.edu.au/engineering/high-school)

## Winter holiday programs

- Explore Engineering Workshop (years 9 and 10)
- Project Management Winter Camp (years 10-12)

## Women in Engineering event

- 24 January 2017. (years 9 and 10)

## National Computer Science School (NCSS) Summer School [www.ncss.edu.au](http://www.ncss.edu.au)

- week-long residential computer programming summer school for years 11 and 12

## NCSS Challenge

- five-week online competition for high-school students

## Girls' Programming Network

- one-day workshops run by girls, for girls

## Summer and Autumn Schools

Engineers Australia Summer School and Autumn School

[sydney.edu.au/engineering](https://sydney.edu.au/engineering)

[sydney.edu.au/aeromech/future](https://sydney.edu.au/aeromech/future)



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