

# Success! Science's Tip-Top Performance in HSC First Preference Applications

Adapted from the article 'Sydney the university of choice for the majority of NSW students'

*Once again, the University of Sydney has increased its lead in the competition for New South Wales first preference applications, according to figures released by the Universities Admissions Centre in mid January.*

The University of Sydney's first preferences have increased by 5.8 per cent with the University attracting 19 per cent of all first preference applications lodged in the state, significantly more than our closest competitor. Sydney has also attracted the largest share of first preferences for recent school leavers with 20.4 per cent, an increase of 1.4 per cent from 2005.

The Faculty of Science performed extremely well in the First Preference Applications, maintaining its position as market leader in New South Wales. Despite the addition of places for the new Bachelor of Science & Technology, the UAI for our flagship degree, the Bachelor of Science still experienced an increase of two UAI points, a reflection of the continuing demand for this broad-based course offering students the opportunity to study subjects ranging from Anatomy to Zoology, with a reputation for producing highly skilled and adaptable graduates.

The Faculty has also witnessed strong demand for combined courses by students typically with multiple interests who are looking to diversify their tertiary education portfolio.

The growth over consecutive years in the Faculty's Talented Student Program is further testament to the success of the Faculty in attracting the top science students from across the state. In 2006, 115 new students have been invited to participate in the program. To be eligible for the TSP students must achieve a UAI of 99.00 or higher. Advanced science and TSP students promote a challenging and cohesive learning environment for all science students to engage in.

Commenting on Sydney University's success, Vice-Chancellor Professor Gavin Brown said: 'Once again the brightest and best have chosen the University of Sydney as their preferred destination. For the seventh consecutive year, more students

have said Sydney is their first preference above any other university in the state. This year we have seen a 5.8 per cent increase in first preference demand for 2006 undergraduate entry, an indication that the complete university experience offered at Sydney is of importance to students.'

## Results of the Gifted & Talented Qualifying Exam 2005

Results for the exam have now been distributed to the coordinating science teacher of each school along with certificates for all students that participated. A huge congratulations to everyone that sat the exam! It was as always very difficult and the standard achieved by all students is extremely encouraging. Of the 1000 students that sat the exam, the top 10% of students have been invited to participate in the program and we look forward to meeting them at the April Workshop. For those of you with students that were not successful in gaining a place in the program this year, we would encourage you to participate again at the end of the year and in the meantime take advantage of the many wonderful programs and events that run as part of Science Alliance.



# Spotlight on IT Dancing in a Virtual World

By Kate Rossmanith

*In an unlikely collaboration, a gifted 19-year-old IT student at Sydney has found himself in the world of contemporary dance.*

Matthew Chen, who is studying for a science/law degree, is offering choreographers and dancers innovative ways in which to portray worlds onstage. For a young man previously unfamiliar with the arts, Matthew describes the project as 'completely new and immensely satisfying'.

Working closely with a choreographer, dancers and the University's Visualisation and High-Performance Computing Laboratory (VISLAB) in the School of IT, Matthew is implementing a computerised 3D environment that dancers can incorporate into their productions. It allows them to manipulate and interact with the technology so that the audience watches 3D projections of worlds seen from the prospective of one dancer.

'The dancer is able to move in a 3D environment proportionate to his own movements, much like being in a first person shooter game except the dancer controls the actions and therefore the position and movement within the world,' explained Matthew.

The dancer's position is determined using infrared lights and a camera suspended from the roof. The light is reflected off infrared reflective markers on the dancer and is captured by a camera. The information from the camera is sent to a computer that generates a projection of the 3D world from the dancer's perspective.

For the past six months, Matthew has been involved in the creative development stage of choreographer Fiona Malone's latest dance piece. 'I learnt about the computerised tracking

system and I spent time with the dancers discussing their needs and then how I could work with VISLAB to achieve technical solutions,' said Matthew.

The initial results allow a dancer, outfitted with sensors, to 'move through' a 3D maze projected on to the stage. 'The technology has huge implications for creating story and metaphor' said Fiona Malone. 'A dancer in my show plays a man with dementia who is trapped in a labyrinth in his mind. The audience gets to see his confusion as he fumbles through space.'

Modern performance forms have an established relationship with technology, from digitalised screen projections to sound and light sensors attached to performers. Matthew's virtual game world project, however, is one of the first of its kind to be implemented in dance.

The opportunity to undertake a lengthy research project was presented to Matthew as part of his involvement with the University's Talented Student Program. Students who do exceptionally well in the HSC – with a UAI of 99.00 or above – are invited to participate in this prestigious program. The TSP is tailored to meet the needs of each student however typically allows students to enrol in subjects or combinations of subjects not normally available within a particular degree and to conduct research, an opportunity usually reserved for undergraduate students in their honours year. The program also incorporates academic mentoring by senior Faculty of Science staff.

'I enjoy receiving the special individual supervision by academic staff that is part of the TSP. It really enriches my learning,' said Matthew.

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## What is ViSLAB?

ViSLAB is the Visualisation and High-Performance Computing Laboratory funded by the University of Sydney and other partners (GrangeNet and the Australian Centre for Advanced Computing and Communications: AC3). ViSLAB excels at the provision of scientific visualisation services. ViSLAB is also actively engaged in academic research to advance hardware, software and visualisation technologies. It has been used by hundreds of researchers statewide in disciplines ranging from Astrophysics, Chemistry, Mathematics, Engineering and Medicine, to Archaeology, Visual Arts, Economics and Meteorology.

**For more information visit [www.vislab.usyd.edu.au](http://www.vislab.usyd.edu.au)**

## Sydney Science Forum 2006:

If you've enjoyed forums in the past, please join us again in May 2006. Our next lecture forum will be from science media personality Dr Clio Cresswell. Dr Cresswell has appeared on Triple M breakfast radio, The Panel, The Glasshouse, Beauty & the Beast and was one of Who Weekly's 25 Most Beautiful People. Dr Cresswell is sure to entertain with her talk 'Mathematics & Sex'.

Look out for the Forum postcards!

# The 2006 SIEMENS Science Experience:

By Cath Brown

*115 students from across NSW took time out from their summer holidays and descended on the University of Sydney campus for three jam-packed days of fun, frivolity and scientific discovery at the SIEMENS Science Experience, January 11-13.*

Coordinated by the Science Schools Foundation Inc and sponsored by the good people at SIEMENS, the program aims to excite students about science, so that more might continue to pursue science throughout their education and career. The program is conducted on thirty-one campuses of participating universities throughout Australia.

The 2006 University of Sydney SIEMENS Science Experience was centered on the theme of forensics and all things related. The theme played on the success of the hit US TV show 'Crime Scene Investigation' and the interest this has stimulated in high school students to pursue forensic science at tertiary level and indeed as a career. Whilst the increased interest in science is encouraging, there are legitimate concerns about the message being sent to school students in terms of what forensic science is and the accuracy of its portrayal on the show, what has been referred to as one aspect of the 'CSI Effect'.

It was our intention in developing the program to harness the interest expressed by students towards forensic science and direct it towards a three-day program of hands-on activities, lectures and demonstrations related to the theme of forensics but designed to give students greater exposure to all areas of science. The program was aimed at dispelling some of the CSI myths, for example that forensic scientists specialise in multiple areas and are able to move seamlessly from conducting DNA analysis to examining trace evidence such as gunpowder residue. It was also designed to educate students about the relevance of generic science skills which can be applied to a number of areas



Students get hands-on and make a glow in the dark solution in the Chemistry practical.

including forensic science, the diverse applications of forensic science and employment prospects in the area.

The 2006 program placed students at the scene of a crime and assigned them the role of forensic investigator (either pathologist, odontologist, anthropologist or toxicologist) for three days as they made their way through a series of hands-on activities in Biology, Physics, Anatomy & Histology and Chemistry all linked to evidence collected from the crime scene and suspects and designed to assist the investigative process. During the Physics session, students measured the diameter of suspects hair using a laser, cleaned a voice recording left by Suspect B, Josie the seedy gardener, measured the long/short sightedness of spectacles. In the Biology and Anatomy & Histology session students compared casts of human and animal remains and performed blood typing,

## Comments from students:

*'It was a really fun experience which I absolutely enjoyed. There wasn't a dull moment and all the staff involved should be congratulated on their efforts!'*

Leah Saul, Catherine McAuley High School

*'Really cool program! I made lots of great friends, saw cool things and it helped me unravel my future.'*

Dilshan Seneviratna, Baulkham Hills High School

DNA analysis (interpretation of gel electrophoresis) and fingerprint analysis.

The practicals were all designed to help the investigators in their quest to gather evidence about suspects in the crime scene and mount a case to argue at the Mock Trial on the last day of activities. All students have the opportunity to assume various court roles and present their findings as part of the Trial. Students themselves develop an argument and conduct the proceedings of the Mock Trial which involves certain students assuming various court roles such as Barrister, Magistrate, Court Officer and presenting their findings on behalf of their group. The Mock Trial was extremely entertaining and some groups were able to mount quite convincing cases although ascertaining the correct perpetrator of the crime eluded all groups.

The students were also treated to guest-lectures and presentations by leading experts in the field such as Chief Forensic Pathologist for the Department of Forensic Medicine Professor Jo Dufrou. Professor Dufrou's expertise is in autopsies; coronial investigation; homicide and other death investigation; aviation medicine and forensic toxicology. Prof Dufrou's presentation both wowed and disturbed the audience as he explored the major causes of death in Australia and the different types of evidence examined during autopsies. He also indulged the audience with tales of his experience as a technical specialist to forensic science tv shows as well as sharing his thoughts on the 'CSI Effect' an issue debated at a recent US Conference he attended.

# CSI Cool Science Investigator

Further to the presentation by Professor Duflou, science media personality Dr Clio Cresswell delved into the world of forensics and mathematics and presented some of the latest research in this area including determining cause of death by body position. The Young Scientists of Australia and Dr Karl Kruszelnicki wrapped up the event with a dazzling science spectacle by YSA followed by a look at the weird, wacky and wonderful world of science by Dr Karl.

At the end of the event students and parents flocked together to discuss tales and lessons learnt from the week that was. The program is an incredible opportunity for high school students to meet and interact with other students from across NSW. Further the opportunity to come on-campus gain access to fantastic University facilities and outstanding staff and experience university life is a most valuable experience. If your students missed out on the opportunity in 2006, watch this space for 2007 information.

For more information please visit:

[www.scienceexperience.com.au](http://www.scienceexperience.com.au)

[www.science.usyd.edu.au/school/siemens](http://www.science.usyd.edu.au/school/siemens)



Prize winner Luke Amour with the sleek geek himself Dr Karl Kruszelnicki at the Closing Ceremony.

## Sydney Science Forum 2006

### Your foray into the exciting world of science

*The Sydney Science Forum 2006 has been very exciting so far. In March the first forum really stirred the pot with an interesting debate on 'Scientific Controversies and Public Understanding: The Stem Cell Debate' from our panel of bioethics experts, Professor Ian Kerridge, Dr Rachel Ankeny and PhD student Tamra Lysaght. Delving into the issues of bioethics today and providing a forum for the public to voice their opinions and concerns about stem cell research ensured a lively discussion. This debate coincided with the launch of the University's new articulated coursework Masters program, the Master of Bioethics, by the Vice Chancellor of the University, Professor Gavin Brown.*

The first week of April saw Sydney Science Forum veteran Dr Karl Kruszelnicki wow crowds once again with his presentation 'Dis Information and Other Wikkid Myths.' The ever-entertaining Dr Karl took the audience on a myth-busting journey, using his scientific expertise to prove that carrots don't really improve your eyesight, and that Santa Claus would have to travel at 3000 times the speed of light to deliver presents in one night! An entertaining and illuminating evening was had by all.

There are still two more forums this year! To make a booking or to find out more:

(02) 9351-3021

[info@science.usyd.edu.au](mailto:info@science.usyd.edu.au)

[www.science.usyd.edu.au/school/forum/](http://www.science.usyd.edu.au/school/forum/)

**Venue:** Eastern Ave Auditorium, University of Sydney

*\*School and group bookings are encouraged so book in now to avoid disappointment!*

#### Lecture 3: Mathematics and Sex

Be prepared for the latest in mathematical research as University of Sydney mathematician Dr Clio Cresswell unravels the equations that explain love, marital bliss, and the number of partners you should have before you should stop playing the field. This presentation is guaranteed to leave you with a rekindled sense of how creative, evolving, relevant and downright sexy mathematics is.

**Date:** Wednesday 17 May

**Time:** 5:30 pm – 6:45 pm

#### Lecture 4: Mirror, mirror, on the wall: Hidden Intelligence in Pervasive Computing

A mirror that becomes your own global communication system and an interactive coffee table that lets you share your digital photos? These are just some of the gadgets being pioneered by the Smart Internet Technology Research Group which has been exploring and rethinking the way humans interact with computers. Take a step into the future at this Sydney Science Forum to learn more about this new field of IT and the latest in computer gadgetry.

**Date:** Wednesday 25 October

**Time:** 5:30 pm – 6:45 pm

# Dr Karl Kruszelnicki's Cockroaches & Radiation

You've probably heard somebody say that come the End of the World, the only survivors would be the cockroaches. Cockroaches have been around for about 300 million years - so they've outlasted the dinosaurs by about 150 million years. They are very tough little critters. They can survive on cellulose and, in a pinch, each other, and they can even soldier on without a head for a week or two - and they're fiendishly fast as well. They have the reputation for being survivors - living through anything from steaming hot water to nuclear holocaust. But at this stage, our grudging admiration has overcome the facts - cockroaches are only a bit better at surviving radiation than we are, and are well and truly outranked in the nuclear holocaust stakes by many other creatures.

Back in 1919, Dr. W. P. Davey did one of the first tests of insect-radiation survivability when he sprayed the Flour Beetle with small doses of X-rays. He was astonished to find that 60 rads seemed to make the flour beetle live longer. Surprisingly, Dr. J. M. Cork found the same result when he repeated the experiment in 1957. A more typical result (ie, that radiation harmed living creatures) was found by Dr. H. J. Muller in 1927, when he used X-rays to cause mutations in the fruit fly.

But there really wasn't a lot of research into the field of Being Able to Survive Radiation until the late 1940s and 1950s. Around this time, three factors had emerged. First, there was the existence of the victims of the two Atom Bombs dropped on Japan, second, there was the start of the Cold War and the nuclear standoff between the Superpowers, and finally, there was the search for peaceful uses for nuclear power. As a result, we discovered that we humans are much more susceptible to radiation than insects, and will die after a dose of some 400 - 1,000 rads. For example, some people as far as 21 kilometres from Ground Zero at Hiroshima received doses of 1,200 rads - and suffered slow and agonising deaths. But insects turned out to be much more radiation

resistant. Wood-boring insects and their eggs were able to survive doses of 48,000 to 68,000 rads with no apparent ill effect. In 1959, Drs. Wharton and Wharton found that it took 64,000 rads to kill the fruit fly, and a colossal 180,000 rads to be sure of killing the parasitoid wasp, *Habrobracon*.

As a result of all this testing, it gradually emerged that the cockroach is, at least in terms of nuclear survivability, a wimp. The two Drs. Wharton had found in 1957 that it took only 1,000 rads to interfere with cockroach fertility. In 1963, Drs. Ross and Cochran found that a dose as low

as 6.400 rads would kill 93% of immature German cockroaches - making cockroaches only six to fifteen times tougher than we frail humans. Sure, cockroaches survive radiation better than we do - but they curl up and die at doses that don't even bother other insects.

So how did cockroaches get this reputation? Well, if you want to have a mean radiation-resistant insectoid villain, a cockroach fits the bill better than a fruit fly. Cockroaches would die close to Ground Zero of a smallish 15 kiloton Hiroshima-class

nuke - and could certainly not survive the larger megaton-range hydrogen bombs in today's nuclear stockpiles.

At the moment, the real King of Radiation is a foul-smelling reddish bacterium called *Deinococcus radiodurans*, or Conan the Bacterium by its admiring researchers. It was discovered growing happily in canned meat that had gone bad, even though the meat had been sprayed with radiation to preserve it - a nice example of evolution. This bacterium frolics happily in background levels of 1,500,000 rads of radiation - and seems to be able to survive twice as much again, when frozen. So cockroaches are roughly as vulnerable to nuclear attack as the rest of us - but I don't think that knowing that, makes the cockroach more lovable...



# Schools Outreach - What's on the Agenda

## Science Teachers' Workshop 2006

New to teaching physics? Been at it since Newton was a kiddie? Don't know quarks from quasars? Or PFAs\* from TLAs\*\*? Can't recall the last time you were so excited about physics that you climbed up onto the desk?

Perhaps its time to reignite your excitement for physics with the Science Teachers' Workshop 2006!

This two-day Science Teachers' Workshop will focus on the NSW Physics syllabus, giving you a chance to improve your understanding of physics, share classroom tips and tricks and learn new ways to get your students excited. STW2006 includes a lecture series covering physics concepts and ideas, including sessions for new physics teachers, while hands-on sessions will provide practical ideas and classroom resources.

Dates: 15 & 16 June 2006

**For more information visit:**  
[www.physics.usyd.edu.au/foundation/](http://www.physics.usyd.edu.au/foundation/)

## 2006 Australian Museum Eureka Schools Prizes For Students

**\$11,000 University of Sydney Sleek Geeks Science Eureka Schools Prize**

This prize encourages secondary school students with a passion for science and for communicating ideas to emulate the Sleek Geeks (Dr Karl Kruszelnicki and Adam Spencer) and tell a scientific story via a short video piece. The idea is to communicate a scientific concept(s) in a way that is accessible and entertaining to the public as a whole while painlessly increasing their science knowledge or, as the Sleek Geeks like to say, 'learn without noticing'. Entries are to take the form of a 1-3 minute video piece and a 250-word description of the video content and may be produced by an individual student, or a group of up to 6 students.

Entries close Friday 5 May 2006 so encourage your students to start thinking about it now!

**For more information visit:**  
[www.amonline.net.au/eureka](http://www.amonline.net.au/eureka)

## 2006 Olympiad Training Programs

Interested in competing in the Olympiad? The University of Sydney offers Biology, Chemistry and Physics Olympiad Training Programs to help give you the winning edge in the National Qualifying Exam. Past students who attended the training programs with us have been selected for the National Team and gone on to become medal-winning Olympiad scholars.

For more information visit:  
[www.science.usyd.edu.au/school/olympiad](http://www.science.usyd.edu.au/school/olympiad)

## Australia Day Honours List – Accolades for Sydney University Staff

A number of prominent University staff including the Vice Chancellor of the University Professor Gavin Brown and two members of staff from the School of Physics, Dr Karl Kruszelnicki and former Head of School, Professor Harry Messel were made officers of the Order of Australia (AO) in the Australia Day honours.

Professor Brown's award recognised his 30 years of service to tertiary education in Australia and commitment to promoting excellence both at home and abroad in particular through the establishment of strategic links with overseas institutions. In addition the award recognised his significant contribution to mathematical research.

Professor Messel was appointed head of the School of Physics at 29 and held the position for an unprecedented 35 years. In 1954 he established the Science Foundation for Physics to support science education, research and training within the School of Physics and to promote science to the broader community. Amongst his many achievements he:

- pioneered the introduction of computers in Australia.
- made major contributions to high school education
- influenced Australian science policy through his advice to Government and his service to Australian Government bodies.

One of the key initiatives implemented by Professor Messel still in existence today is the Professor Harry Messel International Science School for Year 11 and 12 students, now approaching its 34th year. The school was established to reward talented senior high school students and to encourage them to pursue careers in science. It has now taken on an international flavour with students from the UK, Japan, USA, Malaysia, Singapore, Thailand and China attending the School. An incredible 3,500 scholars from around the world have attended the School since it was established.

Science media personality, Ig Noble Prize winner for ground breaking research into belly button fluff, best-selling author and Julius Sumner Miller Fellow in the School of Physics Dr Karl Kruszelnicki, was also recognised for his work as a science communicator, 'promoting greater understanding of the application of science to daily living'.