

# Matter of Fact

Newsletter from Science & Engineering and Computing & Mathematical Sciences



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

Autumn 2011

## Explore Science & Engineering's study options this school holidays

*Due to the overwhelming success of Engineering Open Day in recent years, the Faculty of Science & Engineering will this year also offer a Science Open Day.*

Year 11, 12 and 13 students and their parents from around the North Island are invited to attend either one or both full-day events. Numbers for each event are limited and students are encouraged to register early. Registrations close 8 July, 2011.

In addition to learning about the degrees on offer from the Faculty of Science & Engineering, students and their parents will have the chance to dine in one of the University's Halls of Residence, followed by a tour of the hostel's facilities. Attendees will also enjoy interaction with current Science & Engineering students.



Dr Doris Jung guides secondary school students Paul Pfeffer, Patrin Illenberger and Matt Jeffries, through the software engineering lab at the 2010 Engineering Open Day.

### *Science Open Day - Thursday 28 July, 2011*

Science Open Day is a new event which will offer students and their parents the chance to explore the areas of science available to study at Waikato University. Students will take part in hands-on workshops, lectures and lab demonstrations.

Topics covered at Science Open Day will include biological sciences, physics, chemistry, earth and ocean sciences and many of the specialisations and majors within these areas.

The focus will be on the Bachelor of Science and Bachelor of Science(Technology) degrees. Work placements and degree structure will also be discussed.

### *Engineering Open Day - Friday 29 July, 2011*

Engineering Open Day is an annual event when secondary school students and their parents can spend the day on campus discovering the areas of engineering. A number of workshops will cover the specified programmes available for study during a Bachelor of Engineering, including electronic engineering, software engineering, chemical and biological engineering, materials engineering and mechanical engineering. The 2010 event attracted almost 100 budding engineers and involved activities such as making beads from biochemical reactions.

### *Can I attend both events?*

Due to high demand for a limited number of places, it is unlikely that students will be able to attend both Open Days. If a student would like to attend both days, they are asked to indicate their preference on the registration form. A student will be able to attend their second preference only if there are still places for that event when registrations have closed, and all students' first preferences have been filled. .

*To register for either event, please visit [sci.waikato.ac.nz](http://sci.waikato.ac.nz), talk to your science teacher, or email [science@waikato.ac.nz](mailto:science@waikato.ac.nz)*

**INSIDE...**

#### **Graduate profile**

Dylan Harrison talks about his career in chemistry

Page 2



#### **Technology solutions to world problems**

Software to track rodent behaviour

Page 2



#### **Saving lives with biology**

The fight against tuberculosis

Page 3



# "No two days are the same"

*A career in science has become an exciting reality for Waikato graduate Dylan Harrison. The former Te Aroha College student completed a Bachelor of Science(Technology) and a Master of Science(Technology) with first class honours, focusing on chemistry.*



Master of Science(Technology) graduate Dylan Harrison now uses his chemistry skills to implement water treatment programmes.

It was these achievements combined with a number of university scholarships and awards, work placements at two leading New Zealand science companies and a masters research collaboration with Fonterra, which gave Dylan the competitive advantage when seeking employment.

Dylan works for global company NALCO, as a Technical Service Representative. NALCO is a leading provider of integrated water treatment and process improvement services, chemicals, and equipment programmes for industrial and institutional applications.

"My job involves implementing water treatment programmes for companies such as dairy factories, abattoirs, hospitals and food and beverage manufacturers. My main focus is monitoring water treatment programmes on industrial sites, specifically boilers, cooling towers and wastewater treatment plants. For boilers it is important to control corrosion and mineral scale, whereas with cooling towers there are four main factors that need to be controlled, including corrosion, scale, fouling and microbiological control. It is my responsibility to implement treatment

programmes using chemicals, to control these issues.

A typical day would involve travelling to three or four industrial sites. Here I monitor their water treatment programmes and make any changes or recommendations to help optimise the programme based on my onsite test results."

When Dylan is not out in the field working on customer's sites he works from a home office in Hamilton.

"The social aspect of the job and the fact that no two days are the same are the two things that I enjoy the most. Being relatively new to the work force, travelling has also been a highlight. My job has taken me all over the country and also to Australia several times. My current goal is to gain as much experience and knowledge as possible. As for the future, I'd like to move into a management role where I can still use my chemistry background."

*Read more Science & Engineering graduate success stories in the Faculty's new brochure 'The Grad Files'. Email [science@waikato.ac.nz](mailto:science@waikato.ac.nz) with your name and address to request a copy.*

## Innovative technology solutions to world problems

*Two teams of computer science students from the University of Waikato recently attended the finals of the Microsoft Imagine Cup in Auckland, to present software they've created to tackle some of the world's most pressing problems.*

Teams were challenged to come up with an innovative and workable solution to an issue related to the UN's Millennium Goals on hunger relief, poverty, education, disease control, healthcare and the environment. Both teams received great feedback from the judges, but unfortunately were not selected in the top four.

Team Taiao – Jess Champion, Michelle Clark and Michael Fowke – chose to focus on environmental protection for their project. Working with the Maungatautari Ecological Island Trust, the team has developed image recognition software that can 'count' the number of mouse tracks on the tracking cards used by conservationists in sanctuaries such as Maungatautari.

Tracking cards are inked cards that can be placed in strategic locations to monitor the activity of predators such as rodents. If a mouse crosses the card, it leaves ink tracks. Team Taiao's device photographs the tracking card and is able to distinguish mouse tracks from other marks on the card, and record the number of tracks.

"We process approximately 4,000 cards a month – sometimes up to 4,500," says Rod Miller of the Maungatautari Ecological Island Trust. "It takes one to three years to train people to read these cards consistently, so it's quite a drain on resources." The Taiao software automates this process, minimising the delay between collecting and reading the cards, and allowing for a quicker response when pests are detected.

Team Taiao have demonstrated their software to potential users, and are looking to extend the software to other species to help protect New Zealand's unique biodiversity.

The other Waikato team is called Bookie Monster, and their project aims to bolster literacy by



Michelle Clark and Jess Champion of Team Taiao with one of the rodent tracking cards their software can 'read'.

automating a proven method for learning to read, dubbed "repeated reading". Ashley Steel, Luke Bjerring and André Meister have worked with a curriculum co-ordinator in Switzerland and primary teachers in New Zealand to develop the software, which allows each student to work with a dedicated reading "tutor".

# Saving lives with biology

*For many school students considering tertiary study in science, learning how to help people and save lives is a key career goal. What most students don't realise is that a degree in medicine is not the only answer. Two Waikato University biologists have learnt this first hand.*

It was the desire to help others which led Joanna McKenzie and Emma Littlejohn to Waikato University's Department of Biological Sciences. The two talented PhD biology students are completing ground breaking research that could help in the fight against tuberculosis. Organisms belonging to the Mycobacterium tuberculosis complex (MTBC) cause the disease in humans, which usually affects the lungs, and can lead to death if not treated appropriately. Both students recently received 2011 Claude McCarthy fellowships, which awards them \$4000 each towards their study.

Joanna and Emma are looking at how proteins within the bacteria responsible for causing tuberculosis regulate the bacteria's growth, which may hold the key to combating the deadly disease. One-third of the world's population are carriers of Mycobacterium tuberculosis, but treatment of tuberculosis is difficult due to the capacity of this bacterium to enter a dormant state.

It is very rewarding to be working on a project that will contribute to our understanding of this disease and thereby improve treatment for patients, they said.

"My research has found certain proteins in M. tuberculosis that possibly regulate the bacterium's metabolism by cleaving ribonucleic acid (RNA), the molecule which is the blueprint for proteins. This slows the bacterium's growth, allowing it to conserve energy and survive under adverse conditions," says Joanna.

Emma researches proteins that unwind RNA so that other proteins, like those Joanna is researching, can cleave it more efficiently. "We're just in the first stages of understanding how this bacterium operates. Understanding how M. tuberculosis enters this dormant state would enable better treatment of the disease and possibly future drug development," says Emma.



From left to right Waikato University biologists Joanna McKenzie and Emma Littlejohn are helping in the fight against tuberculosis.

*Visit [waikato.ac.nz/study/subjects/biol.shtml](http://waikato.ac.nz/study/subjects/biol.shtml) to find out more about Biological Sciences at Waikato University.*

## Exciting labs and great prizes at Uni Open Day



Students at a previous Open Day enjoy the excitement of the Department of Chemistry's pyrotechnics display. The image on the left shows a balloon filled with hydrogen gas, while the image on the right shows the balloon exploding, after coming into contact with a flame.

The University of Waikato's annual Open Day is coming up soon on Friday 13 May, 2011.

The Faculty of Science & Engineering have a number of interactive lab displays and interesting mini-lectures for you and your friends to attend. Visit the Chemistry lab and see demonstrations using liquid nitrogen and liquid oxygen. Explore the Earth & Ocean Sciences lab which showcases displays on volcanic eruptions, earthquakes, tsunamis and climate change. The Biological Sciences lab will include a display of all creatures great and small, while Engineering will showcase the Formula SAE car and electronics.

The Faculty of Science & Engineering and the Faculty of Computing & Mathematical Sciences also have a special surprise in store, which will give students the opportunity to 'walk on water'. Look out for us on the day!

***Explore the labs and win with Science & Engineering!***

While you're exploring the labs, take our quiz, answer the questions correctly and go in the draw to win a Fujifilm Finepix AV150 Splash Pack. The pack includes a 14 megapixel digital camera, underwater camera case, 2GB SD card and a Fujifilm case.

## Another year of exciting student research

Using chicken feathers to make bio composite materials and studying Antarctic aquatic microorganisms are just two of the exciting topics which will be supported by Waikato University's Masters and Doctoral Research Scholarships this year. Twenty-three Waikato University Faculty of Science & Engineering students were awarded research scholarships

towards their studies at either masters or doctoral level. Most students who received an award has a Grade Point Average (GPA) of 8.0 or better, which is equivalent to A/A+. Each masters scholarship winner will receive up to \$12,000 over a period of a year and a contribution towards enrolment fees for that year. Winners of Doctoral Research

Scholarships (both domestic and international) will receive living costs of up to \$22,000 per annum for up to three years and an amount equal to their annual tuition fees.



## Student wins scholarship second year running

Waikato University PhD engineering student Jim Bier has been selected as a co-recipient of the Pukehou Pouto Scholarship for the second year in a row. The scholarship of \$10,000 will support Jim in his studies towards a PhD in Materials & Processing. His research on thermoplastic protein aims to replace petroleum derived plastics used in agriculture with materials produced from blood meal, an agricultural by-product. "I chose to study at Waikato after meeting several academic staff from the School of Engineering, seeing their passion and enthusiasm, and learning about their interesting research projects," says Jim.

## Waikato University student scores top Statistics NZ award

Bachelor of Science student Debbie Muller has been awarded the Statistics New Zealand Undergraduate Prize for the top undergraduate statistics student at Waikato University.

Debbie was chosen by her professors for her aptitude across the board and her potential for success in her chosen field.

"Statistics was my favourite subject at school, so a statistics degree seemed like the best choice for me. I chose Waikato University because it had the option of studying statistics as a science major with a

specialisation in economics. This is something that other universities don't offer. It also meant I could remain close to my family and friends," says Debbie.

Following the completion of her degree in June this year, the former Te Awamutu College student plans to put her prize money towards travel to Europe, where she hopes to find a job.

"My dream job would be anything with numbers, so I'm looking forward to seeing where this degree takes me. Because I'm studying statistics with economics, I will probably lean towards a career in the banking/finance sector."

## What's on

13 MAY

### University Open Day

The University of Waikato Open Day is an invitation to the public to come on campus and experience a taste of university life. The free open day offers visitors a chance to attend mini-lectures on a wide range of topics, get involved with interactive displays and view a range of fun activities and entertainment.

7-8 JUNE

### Waikato Experience Biology Days

Come along to the Department of Biological Sciences' WEB Days for year 13 biology students and teachers. Seminars and lab work cover topics including DNA technology, human evolution, biotechnology, and animal behaviour/plant responses to the environment. Contact [biology@waikato.ac.nz](mailto:biology@waikato.ac.nz)

15 JUNE

### NZIC Analytical Chemistry Competition

Teams of year 13 students are set an analytical task, requiring accurate and careful analysis of an unknown substance. The results are judged and prizes and trophies are awarded on the day. Contact [chemistry@waikato.ac.nz](mailto:chemistry@waikato.ac.nz)

30 JUNE - 1 JULY

### Osborne Physics and Engineering Days

Upper secondary school students and teachers are invited to lectures and demonstrations relevant to the physics curriculum and current research. Contact [engineering@waikato.ac.nz](mailto:engineering@waikato.ac.nz)

28 JULY

### Science Open Day

Science Open Day is a new event this year which will offer students and their parents the chance to explore the areas of science available to study at Waikato University. See the front page story for more information.

29 JULY

### Engineering Open Day

Interested in Engineering? Spend the day on campus with staff and students and experience engineering through hands-on workshops. See the front page story for more information.

For a full list of events, visit [events.waikato.ac.nz](http://events.waikato.ac.nz)

## Contact us

### Science & Engineering

Phone +64 7 838 4625

Fax +64 7 838 4218

Email [science@waikato.ac.nz](mailto:science@waikato.ac.nz)

Toll free 0800 438 254

[sci.waikato.ac.nz](http://sci.waikato.ac.nz)

### Computing & Mathematical Sciences

Phone +64 7 838 4322

Fax +64 7 838 4155

Email [scms@waikato.ac.nz](mailto:scms@waikato.ac.nz)

[scms.waikato.ac.nz](http://scms.waikato.ac.nz)