Waikato River focus for Science Summer School

"Investigating the past and present condition of the Waikato River was the task for 39 top Year 12 students at the University of Waikato."

The week-long action-packed Hill Laboratories Waikato Science Summer School ran from 4-9 December, and gave the students a taste of what it can be like to study science and engineering at a tertiary level.

Exploring the Waikato River

The week kicked off with a visit to the The Mighty River Waikato exhibition at the Waikato Museum, followed by a road trip up the river with stops at Lake Taupo and Tokaanu Power Station, and an overnight stay at Turangi.

The following day the group travelled back down the river, with stops to explore and collect samples at Craters of the Moon, Wairakei, Aratiatia Rapids, Waipapa Dam, Karapiro Stream and the Hamilton Water Treatment Plant.

Learning in the labs

Students spent the remainder of the week in Waikato University’s science and engineering labs, analysing samples and experimenting with the University’s state-of-the-art instruments.

Among other experiments, the labs included examining Waikato River zooplankton under the microscopes in the biology lab, looking at how pumps are used within Hamilton’s water supply system in the chemical and biological engineering lab; analysing water samples taken from the river in the chemistry lab; investigating the hydrology around the river in the earth sciences lab; and building and programming water flow meters in the electronic engineering lab.

Presenting findings

Group presentations by the students brought the week to an end. Topics of focus included the natural, unmodified Waikato River; dam and power generation on the river; the influence of rural land use on the river; and the effects of urban development on the river.

“I was incredibly impressed with the quality of students we had coming through the Science Summer School this year,” says Dr Ian Duggan, Science Summer School Convenor.

The students resided in College Hall during their stay at Waikato University, giving them the opportunity to experience true student life.

Each student applied to their local Rotary club to be in the running to attend the Summer School. The students were then selected by Rotary from a pool of applicants.

Sponsors

The Summer School is an annual event run by Rotary District 9930 and Waikato University’s Faculty of Science & Engineering, with sponsorship from Hill Laboratories.

Hill Laboratories is the country’s largest privately owned analytical testing laboratory specialising in a wide range of environmental, agricultural, food safety, food residue and air quality testing.

A tour of Hill Laboratories was included as part of the week’s agenda.

“Good science is close to our heart, and our strategic plan includes an intention to support young people as they pursue their own interests in science,” says Steve Howse, Hill Laboratories General Manager.

Applications for the 2012 Hill Laboratories Waikato Science Summer School open mid-July for current Year 12 students. Information packs including registration forms will be sent out to schools. Registration forms will also be available online at www.sci.waikato.ac.nz/sciencesummerschool

Turn to the back page of this newsletter or visit the website above for more photos of the week.
Little car completes big journey

Waikato University engineering students successfully drove the electric car they’d built from Auckland to Bluff. It took less than two weeks to cover the 1700kms and apart from a bit of a glitch with one belt not running straight as they headed into Wellington, the car didn’t give them any major problems.

“We averaged about 270 kilometres a day, travelling at about 80ks an hour,” says student Matt Kershaw. “The batteries need recharging every 150 to 200 kilometres and businesses along the way were great about letting us plug into their mains when we needed to stop.”

The students, their supervisor Dr Mike Duke and electronics technician Ian Honey stayed at camping grounds and slept in tents along the way. Matt says they didn’t rush the journey and were happy to make detours to take in the scenery. “For BEV, the hardest part of the trip was going into Dunedin – the big hills were a challenge.”

BEV (battery electric vehicle) was built by the students over two semesters. It’s a single-seater commuter vehicle powered by a bank of 10 lithium-ion batteries. Building and getting BEV roadworthy was a challenge for the students who were working to tight deadlines and completing other papers in the final year of their degrees. They quickly lost count of the hours they spent on the car.

Dr Duke says there have been many New Zealand electric cars converted from typical petrol engine cars and a few that have used the chassis of existing cars. “But the students have achieved an amazing result by designing and building completely from scratch the first ever fully certified electric car in New Zealand.”

Matt Kershaw says BEV handled a bit like an old mini. “And the noise; it was like driving at speed with two windows down.” But he says the car withstood the hundreds of kilometres extremely well and the road trip was a fantastic way to wind up his four-year Bachelor of Engineering degree.

“Knowing what I know now, I’d love to start from scratch and build the car all over again.”

However he won’t be doing that. He and team mates Tim Mason, Greg McPherson and Dale Oswald all have jobs to go to in the New Year.

Interested in mechanical engineering? Visit www.sci.waikato.ac.nz/engineering to discover the opportunities available at Waikato University.

Software written by a University of Waikato computer science student has found its way to Google and NASA and is being used at the Johnson Space Center.

Computer science doctoral student Paul Hunkin’s software ClusterGL was created for the University’s display wall in 2008 and joins multiple computers together to make one huge display screen.

After catching the eye of Google earlier this year, the program is now being used around the world.

Paul says there are five computers behind the Waikato display wall, with each computer controlling four screens. ClusterGL turns a display wall into one giant screen, by letting a single program on one computer control all monitors.

While the Waikato display wall is relatively small, ClusterGL can scale to let you have a display wall made from a handful to hundreds of monitors.

“I was talking to Google about another project I was working on and happened to mention ClusterGL. They have these curved display walls and thought ‘this will be brilliant for what we want’.”

Google offered Paul a Summer of Code internship where they paid him to further develop the software for their own curved display walls.

“ClusterGL was designed to work on a flat wall like the one we have at the University. Google’s involvement was to make ClusterGL better and work on a curved geometry.”

After releasing the software to the public, NASA saw the program and are now using it in the Johnson Space Center.

“NASA saw one of Google’s curved display walls and bought one of them. I was pretty surprised to hear they were using it considering it started out as something that I put together one rainy Sunday afternoon,” says Paul.

Bid Bot, another program created by Paul which drew global media attention last year, works by scouring TradeMe every evening looking to bid on and buy newly-listed items for $1. After scouring TradeMe, Bid Bot would pick the rarest item and after a successful auction, tweet what it had bought.

Visit www.scms.waikato.ac.nz to find out more about studying computer science with the Faculty of Computing & Mathematical Sciences.
Engineering students excel at annual show

Former Cambridge High School student Sam Cameron was just one of the talented young engineers who won a prize at Waikato University’s Engineering Design Show last October.

Sam’s design project was an electronic arm controlled by sensor pads placed on a person’s bicep. The project was titled ‘Control of a robot arm through electromyography’, and won him an ArborGen Merit Award, worth $100. He is in his final year of a Bachelor of Engineering majoring in electronic engineering.

The Carter Holt Harvey Pulp & Paper Engineering Design Show on October 18 and 19 gave Waikato University engineering students from years two, three and four the opportunity to showcase their prototypes. The students also presented posters detailing their designs and gave short talks on their research projects which were marked by Waikato University lecturers.

A big winner on the day was fourth-year mechanical engineering student Graeme Adriaens, who won prizes totalling $700. Adriaens won an excellence award of $500 sponsored by ArborGen for his design project which focused on making a draft tube platform for Mighty River Power. He also won a merit prize of $200 sponsored by Carter Holt Harvey for an oral presentation he gave on his research project on the impact of titanium produced by powder consolidation.

Other winning projects on show included a prototype of a single seat battery electric car, from a group of fourth-year mechanical engineering students. See story opposite.

“The Engineering Design Show has become bigger and better every year, and this fifth annual show has continued the trend. The attendance from the public and interested companies increased, and more design projects were presented,” says Associate Dean of Engineering Professor Janis Swan.

“The support from the sponsors for the various prizes was very much appreciated: Carter Holt Harvey Pulp & Paper, ArborGen, TetraPak, Stainless Design, Platts DriEvap Engineering Ltd, and WaikatoLink, as well as prizes offered by the Student Engineers New Zealand (SENZ) and the Mechanical Engineering group of IPENZ. Engineering at Waikato is becoming recognised for its excellence.”

This year’s Design Show will be held from 24-25 October. The show is open to the public, and secondary school students are welcome to attend. To view photos from the 2011 event and to keep up-to-date with details for this year’s event, visit www.sci.waikato.ac.nz/engineeringdesignshow

Developing anti-cancer drugs in Switzerland

Developing anti-cancer drugs in Switzerland is an exciting reality for former Thames High School student Kelly Kilpin.

Kelly completed a BSc, MSc and PhD at Waikato University, all in chemistry and loved the hands-on experience she got due to the close-nit chemistry department.

Following her PhD she worked on postdoctoral research at the University of Otago, followed by a Postdoctoral Fellowship award, which gave her the opportunity to work at the Ecole Polytechnique Fédérale de Lausanne in Switzerland for two years.

“My postdoctoral research focuses on the design and synthesis of ruthenium anti-cancer drugs. We’re trying to develop new drugs which eliminate some of the problems associated with drugs that are currently used in clinics today.”

Waikato’s Department of Chemistry covers a wide range of specialist areas including analytical chemistry, geochemistry, environmental chemistry, forensic science, industrial chemistry, biochemistry and materials chemistry.

Read more Science & Engineering graduate success stories at www.sci.waikato.ac.nz/study/student-profiles

Graduate Profile

High School: Thames High School
Degree: BSc, MSc(Hons), PhD, Waikato Major: Chemistry
Job: Postdoctoral Researcher
Employer: Ecole Polytechnique Fédérale de Lausanne, Switzerland

Man power: Fourth-year Electronic Engineering student Sam Cameron uses electromyography to control a robotic arm. Photo: Natalie Guest
Te Awamutu students win ChemQuest

Te Awamutu College has taken out the top prize at the Waikato University ChemQuest, finally taking the top spot from St Paul’s Collegiate, who have won the competition the last two years in a row.

First place went to (from left) Hayden Berkers, Liam MacKintosh and Matt Harker from the Te Awamutu team called ‘Tie-Tins’. The students were awarded the James and Wells trophy, $150 and a gold medal each.

The annual chemistry quiz gives Year 12 chemistry students the chance to put their chemistry knowledge to the test in a pop quiz-style challenge.

‘Like’ us on Facebook to keep up-to-date with what’s happening in biology, chemistry, earth sciences and engineering.

www.facebook.com/WaikatoScienceEngineering

Hill Laboratories Waikato Science Summer School 2011 Photos: Natalie Guest

What’s on

11 MAY
University Open Day
Spend the day at Waikato University, and get a taste of student life. Attend mini-lectures, take part in lab demonstrations, and enjoy the range of fun activities and entertainment on offer.
Visit www.sci.waikato.waikato.ac.nz/openday

12-13 JUNE
Waikato Experience Biology Days
Year 13 students and their teachers are invited to attend our annual biology event. Lectures and lab work cover topics such as DNA technology, human evolution and animal behaviour.
Visit www.sci.waikato.waikato.ac.nz/webdays

14-15 JUNE
Osborne Physics and Engineering Days
Upper secondary school students and their teachers are invited to attend lectures and demonstrations relevant to the physics curriculum and current research.
Visit www.sci.waikato.waikato.ac.nz/ospendays

20 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 awarded on the day.
Visit www.sci.waikato.waikato.ac.nz/chemcomp

11 JLY
Science Open Day
Experience a day in the life of a science student at Waikato. Attend labs and lectures on chemistry, biology, physics, earth sciences and Waikato’s workplace programme. Registration is essential as numbers are limited.
Visit www.sci.waikato.waikato.ac.nz/scienceopenday

12 JLY
Engineering Open Day
Spend a day at Waikato University learning about the exciting world of engineering. Participate in hands-on workshops and discover the study options available. Registration is essential as numbers are limited.
Visit www.sci.waikato.waikato.ac.nz/engopenday

Contact us
Science & Engineering
Phone +64 7 838 4625
Fax +64 7 838 4218
Email science@waikato.ac.nz
Toll free 0800 438 254
www.sci.waikato.ac.nz
www.facebook.com/waikatoscienceengineering

Computing & Mathematical Sciences
Phone +64 7 838 4322
Fax +64 7 838 4155
Email scms@waikato.ac.nz
www.scms.waikato.ac.nz
www.facebook.com/waikatoscienceengineering