Uni visit a hit with Cambridge digitech students

Lab 5 in R Block at the University of Waikato was a sea of blue uniforms as Year 10 Cambridge High School digital technology students took part in two computer Game Maker training sessions in February.

Cambridge High School teacher in charge of digital technology Colin Wood says it was the first time the school had taken part in computer programming workshops at the university.

"It’s a brilliant opportunity that has enabled students to acquire skills in a new environment, meet university lecturers and maybe open up the idea that this is where they could be studying in a few years’ time."

Computer Science senior tutor Nilesh Kanji ran the workshops and says they play an important role in building a relationship with the high school.

"It has been absolutely awesome," he says. "I really enjoyed it. The students were very enthusiastic and had a lot of fun while learning new skills. This will tie in nicely with the work they will do at school this year."

In the workshops, Mr Kanji took students through the steps involved in creating a Space Invaders-type game using the visual environment in the Game Maker software. The students learnt how to create the various game objects and how to make them respond to the player’s actions during the game. By the end of the session, the students had learnt many of the mechanics involved in creating games in the Game Maker environment.

Mr Kanji has also recently made visits to Hillcrest High School, to offer the Game Maker experience to students in their own school computer labs. Moving forward, he would like to offer other schools the opportunity to come to the university to do the workshops in the university environment.

Game Maker pros: Cambridge High School Year 10 digital technology students Oscar Huston, Seagar Ray, Rebecca Spence and Lily-Rose Johnson in a computer Game Maker workshop at the University of Waikato in February.

Would you like to be part of a Game Maker workshop? School teachers are encouraged to contact Nilesh Kanji to discuss the possibilities. Email: cms@waikato.ac.nz

Science & Engineering Open Days - July school holidays

Spend the day on campus with staff and students and experience hands-on workshops and lab demonstrations.

Both full-day events are suitable for Year 11, 12 and 13 school students, as well as adult learners.

Attend just one event or register your interest for both. Numbers are limited, so register now!

Science Open Day (Wednesday 9 July), covers the Bachelor of Science and the Bachelor of Science(Technology), including the majors of Biological Sciences, Chemistry, Physics, and Earth Sciences.

Engineering Open Day (Thursday 10 July), covers the Bachelor of Engineering (Honours) degree, including the programmes of Electronic Engineering, Software Engineering, Chemical and Biological Engineering, Materials and Process Engineering and Mechanical Engineering.

Register online now: www.sci.waikato.ac.nz

Registrations close: 27 June 2014

Rat trap technology a winner for Computer Science students

Mechanical Engineering graduate brews dream job
Preventing breast cancer, reducing the toxicity of radiotherapy and chemotherapy side effects, and analysing memory function during anaesthesia, were the topics for three students from the University of Waikato, who have recently completed summer studentships.

Laura Bell, Kirsty Mayall and Stephen Evans were each awarded a Waikato Clinical School Summer Studentship worth $5000. Laura and Kirsty have just started their second year of a Master of Science (MSc), while Stephen is in his first year of a PhD. All three students are focusing on biomedical science and will each take their studentship research topic to the next level throughout 2014, as part of their degree.

Breast cancer prevention

Former Hamilton Girls’ High student Kirsty Mayall’s studentship research focuses on breast cancer prevention. She is co-supervised by University of Waikato lecturer and molecular geneticist Dr Linda Peters, and medical research scientist and consultant oncologist Dr Michael Jameson from the Waikato Hospital’s Oncology department.

“Selenium (Se) is an essential trace mineral that has critical roles in maintaining health in humans. Depending on the concentration and type of selenium, it can cause or prevent breast cancer,” says Kirsty.

The aim of this study is to test two different types of selenium at three concentrations each in human breast cancer cells that carry the BRCA1 mutation (an inherited breast and ovarian cancer gene).

“During my MSc I’ll be looking at the different concentrations of selenium on the breast cancer cell lines and what dose is lethal for the cells. From there we’ll investigate what dose is most effective at reducing the levels of DNA damage present in the cells.”

Reducing toxicity of radiotherapy and chemotherapy

Stephen Evans is supervised by Dr Jameson and Waikato University’s Dr Steve Bird, with additional support from Dr Peters and Dr Ray Cursons.

His study will also focus on selenium, but instead of cancer prevention, he will look at reducing the negative effects of cancer treatment.

“High doses of selenium have been shown to reduce chemotherapy and radiotherapy-induced toxicities towards blood forming stem cells in both animal and human studies. My project examines the effects of selenium on the growth of such cells when they are exposed to these toxic cancer treatments,” says Stephen.

Memory function during anaesthesia

Laura Bell was originally inspired to study biology by her Year 12 Hillcrest High School science teacher. Her research focuses on the effects of general anaesthetics on a patient’s memory and is supervised by Dr Peters alongside Dr Logan Voss from the Anaesthesia Department at Waikato Hospital.

“The mechanism by which anaesthetics disrupt memory is not well understood, but is likely to involve an interruption to gene expression and protein synthesis pathways,” says Laura.

Laura explains that previous studies have focused on the effect of anaesthetics in the hippocampal area of the brain. However, the cerebral cortex is also an important site for memory and this is the area that she will be investigating.

“In this study we will investigate anaesthetic effects on genes related to memory in the brain. In particular, we will determine whether general anaesthetics alter expression of genes related to signalling mechanisms.”

Collaboration

The projects provide further collaborative research links between staff from the University of Waikato and Waikato Hospital, which Dr Peters says is exciting for the development of biomedical science research at the University.

Biomedical Sciences at Waikato

Do you want to get into a career where you can use your science smarts to help others and potentially change the world?

An undergraduate degree oriented towards biomedical sciences is an ideal way to prepare for a career in medical research.

At Waikato University, the flexibility of the Bachelor of Science and Bachelor of Science (Technology) degrees means you can mix a combination of biochemistry, microbiology, genetics, molecular biology, physiology and zoology papers to focus your studies. As the students in the story above have done, you can then go on to a Master of Science to specialise in your desired field.

With technological advances moving forward in leaps and bounds, the next decade will be essential for biomedical research. From finding a cure for diseases such as cancer and alzheimers, to developing vaccines that can keep up with the ever-changing superbugs, it’s an exciting time to be part of the biomedical research industry.

Find out more about study within the Faculty of Science & Engineering.

Visit: www.sci.waikato.ac.nz
A conservation management system designed by University of Waikato computer science students has won a major prize at the New Zealand finals of the Microsoft Imagine Cup.

Jourdan Templeton, Nathan Holland and Stephen Quale call their management system Ohiti – the watchful eye on wildlife. It involves a small transmitter being connected to a trap that records each time it is triggered. That data is relayed in real-time to a base unit. It is then uploaded to a server on the internet and processed.

The Waikato students entered the Imagine Cup in the innovation category where they were runners up, winning $2000 and some job offers too.

“We had to make a formal presentation in front of five judges and then run a showcase, like an expo, which generated a lot of interest,” says Jourdan. “There were a lot of people who came and talked to us and were keen to get involved with the project. We were really happy with the result.”

The management system provides valuable information. “We can collect a wide range of data every time a trap is activated and use that data to provide information about the environment and the impact of pests in the area. For example, Ohiti can alert you when an area of forest has more pest activity than normal. Knowing this, we can target these areas immediately. We can become more proactive than reactive,” says Jourdan.

The third-year students trialled their system in the Hamilton Gardens, setting up a chain of three Goodnature A24 rat traps roughly 50m-70m apart in a gully area.

“Our goal was two-fold. First, we wanted to make it easy to maintain the traps without sending people on a hike to check each one and secondly we wanted to provide a portal that would enable conservationists to be more proactive in protecting native species.”

The actual traps are designed by Wellington company Goodnature. The humane traps are now being used by the Department of Conservation to kill possums, rats and stoats. “They’re self-reloading and don’t use poison, but rather a CO₂ gas-powered pneumatic bolt which fires killing the animal instantly,” says Jourdan.

For the Imagine Cup, entrants are required to create an original technology project, coming up with the idea, developing a plan, building the project and submitting it in the competition.

“We didn’t win the big prize – a trip to the world finals in Seattle in July - but we’re still pleased with our result and can see potential to develop it further,” Jourdan says.

Find out more: www.cms.waikato.ac.nz

Rat trap technology a winner

Science Summer School - applications open soon

Applications for the 2014 Hill Laboratories Waikato Science Summer School will open 23 June 2014.

The Summer School will run 30 November - 5 December 2014. The event is open to Year 12 students within Rotary District 9930, who have an interest in science, and who will be going on to study at Year 13 level in 2015.

In 2013 the journey began with a full-on two day field trip during which students explored the areas of Kawhia and Waitomo. The group searched for fossils at Puti Point, collected zoo plankton samples at the Kawhia jetty and enjoyed a walk through the Ruakuri Caves.

The remainder of the week was spent in Waikato University’s science and engineering labs, analysing samples, conducting experiments and building prototypes to better understand the environmental and social changes the local coastal and cave environments have undergone over time.

Applications must be lodged through your local Rotary Club. Participants will be chosen based on high academic achievement, intention to pursue science as a career, a well-rounded personality, a good attitude and work habits, and wide community interests.

Details will be sent to secondary schools in Rotary District 9930 and will be available online from 23 June.

www.sci.waikato.ac.nz/sciencesummerschool
Graduate’s globetrotting science career

A kayaking adventure in Vancouver is just one of the experiences Waikato University graduate James Blyth has enjoyed in his job as a mining consultant.

University of Waikato Earth Sciences graduate James Blyth is living the dream, working on mining projects around the world.

James holds a position as a mining consultant in the Mine Water Management division of SRK Consulting in Brisbane.

“A typical day at work involves hydrological and environmental analysis of a range of mining projects overseas. This can include water balances, peak flow assessments, flood, environmental and water quality modelling, sediment and erosion plans, groundwater investigations, ArcGIS topographic analysis, reporting, client presentations and project management,” says James.

South Africa to Thailand

Within just the last year James has spent two weeks in South Africa running a water balance training course, six weeks in Vancouver working on water management studies for mines, and time in Laos and Thailand working on a major water balance/quality project.

“As well as enjoying the variety of work, I have also managed to make the most out of each overseas trip. Recently I participated in an amazing two-day safari in South Africa, and went hiking, sturgeon fishing and on a three day kayak adventure into the inlets and coves around outer Vancouver.”

Earth Sciences focus

The former Tauranga Boys’ College student completed a Bachelor of Science (BSc) and a Master of Science (MSc) with first class honours at Waikato University, majoring in Earth Sciences and focusing primarily on environmental sciences, hydrology, soil science and geochemistry.

“Undertaking my MSc allowed me to gain the Masters Research Scholarship, a $12,500 grant, and also a fully funded research thesis by the Department of Conservation (DOC). Having a grant from DOC provided me with the backing to manage a large and detailed study, where the great results led to a co-authored paper with my two supervisors, Dr David Campbell and Professor Louis Schipper.”

Future goals

As for the future, James’ goal is to become a well-rounded scientist in hydrology and environmental science. “Eventually I’d like to become a senior consultant, and potentially open my own consulting firm in hydrology, environmental science and possibly, renewable energy.”

Find out more: www.sci.waikato.ac.nz/study/student-profiles

Engineering grad brews dream job

A job sampling beer and designing craft brewery systems may sound too good to be true, but for University of Waikato engineering graduate Matt Dromgool, this is his reality.

Matt is a development engineer for Waikato-based company Natural Brew Inc. His primary task is to work on the mechanical design and development of an automated pub-scale micro-brewery system, dubbed the Smartbrew.

Two existing prototypes of the Smartbrew are in use in breweries in Waitomo and Taupo. “I work with these existing clients and the prototypes to provide technical support and develop a better understanding of refinements and improvements required for the production model,” says Matt.

“A typical day involves traveling to sites, where I troubleshoot mechanical issues and sample beer in order to make sure the machine is producing a top quality product. When not on site I work from home on my latest project, a Smartbrew system for local brewery, Good George, which involves liaising with automation and electrical contractors to improve the design.”

He was offered the position with Natural Brew Inc. two months before finishing his final year of engineering at Waikato last year.

“The mechanical engineering programme set me up ideally for this position, as it included sufficient coverage of the materials and process engineering at the heart of the brewing process as well as the mechanical design and modelling required to develop a machine which automates tasks in a process environment.”

Matt also credits the work placements he completed during the Bachelor of Engineering (Honours) (BE(Hons)) as instrumental in building networks within the industry and gaining exposure to real world practice. The BE(Hons) includes 800 hours of work experience and provides assistance from a dedicated group of cooperative education staff to ensure placements are a good fit for both the student and the company.

Find out more: www.sci.waikato.ac.nz/study/student-profiles
Waikato PhD student looking for breakthrough in titanium manufacturing

The sky’s the limit for a University of Waikato PhD student undertaking research into the manufacturing and advancement of titanium metal composites.

Ben Jackson, based at the Titanium Industry Development Association (TiDA) in Tauranga, is the first mechanical engineering doctoral student to study in the Bay of Plenty. He is researching whether he can create a new titanium composite material using selective laser melting (SLM) that will be stronger, lighter and more resistant to very high temperatures than titanium alone.

SLM is a manufacturing process of powder metallurgy, and uses laser technology to turn metal powder into solid 3-D shapes. The technology is able to develop products with intricate and innovative designs which cannot be made by machining processes.

Ben says because SLM is a relatively new manufacturing process there is still a lot of research to be done. He will take New Zealand’s titanium research a step further by exploring whether titanium ceramics – some of the planet’s very hard natural materials – can be manufactured using the SLM process.

“I’ll work with different combinations of elements to try and cause a reaction between the titanium and the other components of the powder during the SLM process. If it works, the resulting material should be lightweight, very hard and highly heat resistant,” he says.

Many titanium ceramics are already used in surface treatments on machined parts, however creating them through the SLM manufacturing process is a relatively new concept. If successful it will allow far more complex parts to be designed and will open up a much wider range of potential markets.

Ben is excited about the potential applications of his research, with his eyes set on the aerospace, motorsport and energy industries.

“I’m really interested in the applications of the final product, so if it works, the sky’s the limit on its potential use. If I got to say that there was a spaceship up there because of a part or material that I made, that would be great.”

Ben is undertaking his research at TiDA, which aims to help New Zealand companies develop ground-breaking titanium products for the international market. Titanium is gaining global notoriety because it is lightweight, corrosion resistant, non-magnetic and has the highest strength-to-weight ratio of all metals and TiDA is producing a range of products including medical devices, sports equipment, aircraft and marine components.

While studying towards his Bachelor of Engineering (Honours) at the University of Waikato in Hamilton, Ben, a former Tauranga Boys’ College student, completed a summer work placement at TiDA in 2012. On completion of his degree, in which he graduated with first class honours, he was offered the opportunity to undertake a PhD through TiDA. Ben aims to complete his PhD research by December 2016.

Software engineer on the right track

Recent University of Waikato Computer Science graduate Kerry Arts, is enjoying his role as a Software Engineer for Smartrak Ltd in Hamilton.

Smartrak is a GPS tracking and fleet management provider. Vehicle activity can be visualized on an online map, and analyzed using various reports.

“A typical day for me at Smartrak entails maintaining existing software and working with the development team to create new solutions. I work evenly between the frontend mapping website, and a few of our back end systems.”

“One of the most interesting projects I have worked on is integrating with the New Zealand Transport Agency (NZTA) to automatically pull in details about a vehicle’s current WOF and registration. This allows the system to send out automated email reminders to clients when their vehicles services are about to expire.”

A former Matamata College student, Kerry was keen to study programming and web design. He says he chose Waikato because of the great reputation of the Computer Science department and the wide array of fields on offer.
Earth and computer sciences collaboration a success

When Earth Sciences student Gemma Johnson embarked on a University of Waikato Summer Research Scholarship, she didn’t expect to come out of the experience with her first research collaboration under her belt.

Under the supervision of Dr Shaun Barker, Gemma worked with Waikato University Computer Science student Anthony Barr-Smith to create software that optimises the manufacture of terrain models created by a 3D printer.

3D printing

Before 3D printing, models were commonly made from wood and were costly and time consuming to build.

“My project involved researching how to use the 3D printer to create different methods of displaying Earth sciences related information, such as topography surfaces through contour data, geological fault and fold models, geological maps and so forth, for 3D printing in first-year labs,” says Gemma.

Collaboration the key

Due to the lack of appropriate existing software, Gemma and Anthony collaborated to develop software, dubbed ‘3DTM’ (3D Terrain Maker), which models elevation data from any area around the world and converts it into a 3D model format which can be then printed.

“I applied for the scholarship because I had Tess as a lab demonstrator during some of my undergraduate papers and I admired her hard working personality. I could also relate to Tess’s life and her decision to change from a career in IT to study science, which was similar to my recent decision to come back to study to complete an honours year,” says Bridgette.

Bridgette’s honours research project will focus on two unrelated aspects of conservation biology; kiwi breeding and deterring pests. She says that the research could potentially be beneficial for endangered species recovery programmes and aid in management of predator proof sanctuaries.

“For me, being able to support native wildlife in a practical way is a really important part of the overall goal of my studies, so to have an impact on conservation management, would be a great end result.”

After graduating with a BSc in 2010, Bridgette worked in a microbiology research laboratory, before travelling abroad for six months, working with horses. Following a diploma in German at the University of Vienna, she discovered that she thoroughly enjoyed being back in a learning environment. It was then that she chose to return to Waikato for graduate study.

Preparation for further research

“This scholarship experience was hugely beneficial as I learnt so much about the ups and downs of research, which I'm sure will be great preparation for next year when I start the research component of my masters,” says Gemma.

Gemma, a former Waiuku College student, completed a Bachelor of Science (BSc) majoring in Earth Sciences, with supporting papers in Materials and Processing, and began a Master of Science (Research) this year. She originally chose to study at the University of Waikato due to the "flexibility of the BSc degree, the beautiful campus and top-notch facilities".

A former Tauranga Boys’ College student, Anthony has a few papers towards left before he completes a Bachelor of Science (Technology) majoring in Computer Science. He is currently taking a year out to work for ISO at the Port of Tauranga, in a position that he describes as “almost the perfect job” for him. Here, he is working on automating processes and providing data applications for reporting and logging.

Find out more: www.sci.waikato.ac.nz

Conservation focus for scholarship

University of Waikato Biological Sciences student Bridgette Moffat has been awarded the 2014 Tess Embling Memorial Scholarship.

The $1500 scholarship was established to commemorate the spirited life and achievements of Tess Embling, who, after establishing a successful career in IT, made a brave move to pursue her love of nature through a science degree at the University of Waikato. She lost a battle with cancer in 2010.

“I applied for the scholarship because I had Tess as a lab demonstrator during some of my undergraduate papers and I admired her hard working personality. I could also relate to Tess’s life and her decision to change from a career in IT to study science, which was similar to my recent decision to come back to study to complete an honours year,” says Bridgette.

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“Challenges like this interest me so I created a model generating program that lets you select coordinates and creates a model to your selected detail level. This means anyone could now generate a model, even if they have no experience in modelling software.”

Earth Sciences student Gemma Johnson and Computer Science student Anthony Barr-Smith collaborated to develop 3D printer software.

Instant jewelery: the 3D printer created this plastic bracelet in a matter of minutes.

“The software I developed with Gemma was similar to something I was developing in my spare time for game creation, using real data pulled from the cloud. The software basically automated a repetitive process that before now was being done by hand,” says Anthony.

“Challenges like this interest me so I created a model generating program that lets you select coordinates and creates a model to your selected detail level. This means anyone could now generate a model, even if they have no experience in modelling software.”

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Find out more: www.sci.waikato.ac.nz
Andrew Bell
Percussionist
Bachelor of Computing & Mathematical Sciences

Andrew Bell was accepted into the Sir Edmund Hillary programme for his musical talents as a percussionist.

Andrew, a Christchurch local, has already got another degree under his belt — a Bachelor of Music from Canterbury University.

Andrew has been practising and playing percussion for just over 10 years now, and in that time has appeared as a soloist with the New Zealand Secondary Schools Symphony Orchestra, performed with Placido Domingo, and played for Scottish percussionist Colin Currie as part of a Master Class in Wellington.

"Both computer science and music are a mixture of language and mathematics, and require both creativity and dedication. Computing was something I wanted to do when I took a couple of computer science papers last year as part of my music degree."

Christopher Lord
Axeman
Bachelor of Engineering(Honours)

Former Otorohanga College student Christopher Lord has been woodchopping for the past nine years. He says he enjoys the competition and the physical challenges that come with it.

In the lead up to big woodchopping competitions, Chris says training consists of one night a week chopping four to eight blocks of wood, a few gym sessions and some cardio. He competes in A&P shows and country sports days. Chris has also competed in three U21 trials and two New Zealand men's trials.

"My biggest achievements to date are making the New Zealand Under-21 team and travelling to Australia to compete at the Royal Melbourne and Royal Adelaide shows."

Chris, who is studying for a Bachelor of Engineering (Honours), says, "I want to become a fully qualified mechanical engineer, designing and building products that will help improve everyday life. In my sport I want to become one of New Zealand’s and the world’s top axemen, and I’d like to achieve at the highest levels in rugby as well."

Rachel Curran
Weightlifter
Bachelor of Science

Weightlifter Rachel Curran has already become a champion after having spent less than two years in the sport.

The former Birkenhead College student became involved in weightlifting through her PE teacher at high school.

"My PE teacher was a professional athlete in the discipline of pole vault and had a fair amount of involvement with the high performance coaches at The Millennium Institute of Sport and Health. She suggested to my parents that I would be suited to weightlifting and put them in contact with weightlifting coaches at the institute."

Rachel has competed in a number of competitions, and is currently the North Island champion and the Secondary School National champion in her weight division.

Rachel is studying a Bachelor of Science at Waikato University, with a long term goal of becoming a paediatrician.
School leaver 2014 scholarship recipients

Faculty of Science & Engineering 2014 scholarship recipients celebrated their success recently, at a lunch hosted by the Faculty. Check out these photos of our talented first-year students who won entrance scholarships to go towards their course fees. A selection of masters and postgraduate scholarships were also awarded.

What’s on

10-11 JUNE 2014
Waikato Experience Biology Days
Year 13 Biology students and teachers are invited to attend seminars and lab work covering topics relevant to the school curriculum. Visit www.sci.waikato.ac.nz/webdays

12-13 JUNE 2014
Osborne Physics and Engineering Days
Talks and practical demonstrations focus on applications of physics, and provide students with examples of how the physics they are learning at school can be used in real life. Visit www.sci.waikato.ac.nz/ospendays

18 JUNE 2014
NZIC Analytical Chemistry Competition
Teams of Year 13 students are set an analytical task, requiring accurate and careful analysis of an unknown substance. Visit www.sci.waikato.ac.nz/chemcomp

23 JUNE 2014
Hill Laboratories Waikato Science Summer School applications open
Visit www.sci.waikato.ac.nz/sciencesummerschool

9 JULY 2014
Science Open Day
This event offers students and their parents the chance to explore the areas of science available to study at Waikato University through hands-on workshops. Visit www.sci.waikato.ac.nz/scienceopenday

10 JULY 2014
Engineering Open Day
Spend the day on campus with staff and students, experiencing engineering through hands-on workshops. Visit www.sci.waikato.ac.nz/engopenday

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