

Matter of Fact

Newsletter from Science & Engineering and Computing & Mathematical Sciences



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

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Why chemistry is good for your health

Research by a University of Waikato postgraduate student is behind a new health drink being launched in the health-conscious Asian markets by a Hamilton-based company.

Developed by New Zealand Yacon Ltd (formerly NZ Biotechnologies), the probiotic drink is a mix of blackcurrant juice and syrup made from yacon, a tuber originating from South America that has proven digestive health properties.

Waikato student Maria Revell spent a year working with New Zealand Yacon analysing the particular sugar that gives the tuber its probiotic properties as part of her masters degree in chemistry.

Her work was funded by a \$20,000 TechNZ government scholarship designed to boost R&D capability in businesses.

"The sugar found in yacon is called a fructooligosaccharide or FOS sugar," explains Maria. "It's a natural prebiotic, and even diabetics can have it, as only a tiny proportion is actually digested by the body -- the rest stays in the gut and is metabolised by the 'good' bacteria there."

FOS sugars aren't particularly sweet to taste, and Maria's main task was to see what happened when yacon syrup was combined with blackcurrant juice under different storage conditions.

"It was a lot of work," she says. "My findings are commercially sensitive, but we can say that blackcurrant juice and yacon syrup together provide a health benefit that they don't separately."

Her research earned her first-class honours for her masters, and has led to a whole new product for New Zealand Yacon.

The company's director Robert Welch says they're now working on packaging and marketing serving-sized portions of the new health drink,

and will initially target the Korean and Japanese markets where yacon is very popular.

"Yacon is one product where if you have a gut problem you feel a benefit," he says. "Maria's work has been hugely helpful in identifying the best mixes and how to store them so they retain maximum biological activity."

Dr Welch says New Zealand Yacon has worked closely with University of Waikato scientists and students for some years now.

"The TechNZ scholarships are invaluable for start-ups like us. We've repositioned the whole company thanks to R&D work by Waikato research students like Maria. When we started, we were just supplying yacon juice; now we're moving into supplying complete products."

Visit www.sci.waikato.ac.nz/research to read more about the groundbreaking research underway at Waikato University.



Super tuber: Dr Robert Welch of New Zealand Yacon Ltd, Associate Professor Marilyn Manley-Harris and TechNZ researcher Maria Revell with yacon in its raw state.

Could chemistry be for me?

Chemistry is about using your knowledge to solve problems and make a difference in society.

As a first-year chemistry student you will learn the core aspects of chemistry, which over the course of the year will provide a solid foundation for your degree. Practical lab sessions each week ensure hands-on learning, with small class sizes guaranteeing a quality learning experience.

Recent graduates have found themselves developing anti-cancer treatments in Switzerland, working on cures for the kiwifruit PSA virus in Hamilton, and researching ways of limiting pollution from power stations in Wales.

A chemistry major can be taken within a Bachelor of Science which involves three years full-time study or a Bachelor of Science(Technology) which requires four years full-time study, including several work experience placements.

Visit www.chem.waikato.ac.nz for more information.

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Student Michael Walmsley has created a game that makes NCEA study easy

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Searching for diamonds

Graduate scores job with global mineral and mining company

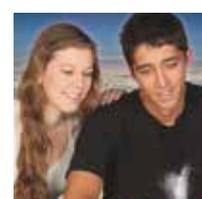
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Waikato researchers turn up the heat at NZ IceFest

A team of University of Waikato Antarctic researchers joined nearly 100 exhibitors and around 100,000 visitors at the NZ IceFest held in Christchurch in October.

The first biennial festival celebrated the Christchurch-Antarctic relationship and showcased the massive role that New Zealand and Christchurch play in Antarctic research and expeditions.

Staff and students from the University of Waikato's Antarctic institute, the International Centre for Terrestrial Antarctic Research (ICTAR), joined forces to get kids excited about Antarctica through hands-on activities.

"During the three days we exhibited we had over 250 kids directly involved with our soil sampling activity and 120 kids and adults get dressed up in Antarctic gear for photos. On top of that there were countless others who came and chatted with us during the week. Many people were surprised to learn that Waikato not only has an active but a very successful Antarctic programme," says Waikato PhD student Stephen Archer.

Stephen has been to Antarctica twice during his time as a student at Waikato University, with Antarctica being the focus of both his masters



Chilling out: University of Waikato students (L-R) Eric Bottos, Josh Scarrow, Stephen Archer and Kristi Bennett encouraged kids to get excited about Antarctica at the NZ IceFest.

and PhD research. He will visit the continent again this January.

Antarctica New Zealand held their conference during the Ice Fest, which featured an entire session on Antarctic research at the University of Waikato. During the conference Stephen was awarded second place for his research poster, while fellow PhD student Chelsea Vickers won second place for her oral presentation.

"The ICTAR team and I are passionate about fuelling interest in Antarctica and we would like to encourage Hamilton schools to contact us via our website to discuss potential school visits," says Waikato University academic and ICTAR Director Professor Craig Cary.

For information about Antarctic research at the University of Waikato please visit <http://ictar.aq>

Fast cars and a degree on top



It's not every first-year uni student who gets flown in and out of race car meets during the weekend, but then 22-year-old Michael Paaymans isn't just any student.

He was the MTA's 2011 Apprentice of the Year and a former New Zealand race car champion, and he's now embarked on a mechanical engineering degree at the University of Waikato.

"It took me a while to get used to sitting and studying again," he admits. "But I can follow most of the theory. And I'm looking at working on the WESMO race car project next year, if my

motorsports commitments give me time."

WESMO – the Waikato Engineering Formula SAE Team – competes in an international competition where students must design and build their own car. Competitions are held in Australia, the United Kingdom and Japan.

Michael got the racing bug early. Originally from Hawke's Bay, he raced mini stockcars from the age of 12 to 16, building the race cars together with his father, who's a structural engineer.

"I was New Zealand junior stockcar champion in 2006, and then I moved to Hamilton to do the

introduction to motorsports course at Wintec. I worked for John MacIntyre Racing at the first Hamilton V8s in 2008, and that's how I got my apprenticeship with Lodge Auto Centre in Hawke's Bay, as they're heavily involved in motorsports."

As MTA Apprentice of the Year last year, he won a trip to Australia to work with Greg Murphy's Supercar team at Sandown, a cash prize and a study grant.

He now juggles uni with being head mechanic for John MacIntyre Racing in Taupo – and spends his weekends fixing and fine-tuning race cars.

His aim after graduating is to work for a motor racing team overseas, and then come back to New Zealand and design high-end performance automotive products for export.

"I'll look to pick up some management papers at uni on top of my engineering degree, maybe during summer school," he says.

"It's important to get qualified; I've met a lot of people who wish they'd gone on to study but left it too late. I didn't want to make that mistake."

Visit www.eng.waikato.ac.nz for more information about studying engineering at Waikato.

Cracking the code on addictive NCEA study

The new NCEA programming and computer science achievement standards in digital technologies came into effect last year. University of Waikato PhD student Michael Walmsley was trying to help his brother come to grips with Level 1 programming, but his brother kept ditching the learning for computer games which he'd spend hours playing.

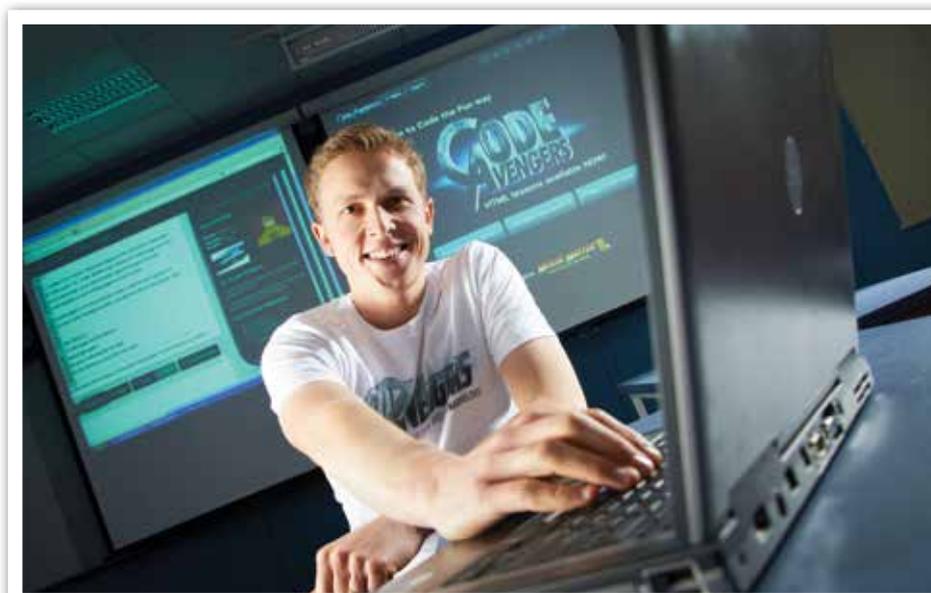
"I could understand why," says Michael. "The tools for learning were nowhere near as much fun as the games. Any good learning sites were pitched at too high a level. So I decided to design a site that taught JavaScript programming and web development skills that were more 'gamified', more addictive.

"I have a big family and they became my guinea pigs. I'd test it on them, then modify, adapt and rewrite to target absolute beginners."

The result is codeavengers.com, and since it went live in April this year, the site has had 45,000 hits from around the world with 150,000 tasks completed.

The Level 1 course covers the New Zealand Year 11 curriculum and is done in 40 short lessons that take about ten hours to complete. Michael says he added variety to the learning with bug finding lessons, a robot challenge, which requires students to write to code to move a robot to its goal, and review quizzes that require you to zap the correct answers as they whiz around the screen.

The system also provides two views that give live feedback on students' progress. "The summary



Code avenger: PhD student Michael Walmsley is developing programs to teach NCEA programming.

view makes it easy for teachers to identify individuals that are struggling. The teacher can sort the list both alphabetically and based on progress."

At present, the Level 1 courses are free, but Michael will charge for Level 2 and Level 3 JavaScript courses that cover the Years 12 and 13 New Zealand curriculum.

Michael says that the hundreds of positive comments received from all over the world helps keep him motivated. Many learners have commented on how fun and easy Code Avengers is for novices in comparison to other sites.

Michael's PhD supervisor Professor Ian Witten is keen to use his framework to create similar teaching materials for other programming languages. For his PhD, Michael is developing a computer program to assist with second language learning.

www.codeavengers.com

Visit www.scms.waikato.ac.nz to find out more about studying with the Faculty of Computing & Mathematical Sciences.

Science graduate scores job searching for diamonds



Sean Jones has landed a job working as a graduate geologist for Rio Tinto.

A University of Waikato Earth sciences graduate is making his mark in the mining industry after getting a job with global mining and mineral corporation Rio Tinto.

Master of Science student Sean Jones is now based in Melbourne working as a graduate geologist in Rio Tinto's technology and innovation business unit.

He works with the exploration arm of the company, operating instruments to analyse the geochemistry of minerals in order to discover new diamond sources.

During his time at university he worked as a research assistant for Professor Peter Kamp, and the skills he learnt working in the University's geochemistry facility helped him land his job.

"The people I met made my time at Waikato very enjoyable and memorable, not only my fellow students, but also the lecturers who were very passionate about what they teach and always provided support.

"The lecturers provided a solid earth science and geology background and doing presentations and reports, essay and thesis writing was a big help – they are all skills you need in the industry."

Visit www.earth.waikato.ac.nz for more information about studying Earth Sciences at Waikato.

Promo posters a hit in schools

Look familiar? A set of four new promotional posters from the Faculty of Science & Engineering were recently delivered to your school. The posters promote four of our Faculty's subject areas: Earth & Ocean Sciences, Biological Sciences, Engineering and Chemistry. Check out the stories behind the posters below. Science teachers and careers advisors can contact science@waikato.ac.nz to request further copies.



Bring study to life

Steven Pratt (left) attended Hamilton's Melville High School before studying at Waikato. For his masters he is investigating the evolution of the plant families Winteraceae and Verbenaceae in New Caledonia, which will have implications for plant conservation. The landscape image was taken at Kai Iwi Lakes in Northland as part of a Biological Sciences field trip.

Take on the world

The Earth & Ocean Sciences poster features current undergraduate students (L-R) Courtney Windsor (Cambridge High School) and Billy Bodger (Taipa Area School). The image behind the two was taken using a weather balloon, built and launched by Earth Sciences students Zac and Josh Lyon (Tauranga Boys' College). All foreground photos on the table were also taken during Waikato field trips.



Engineering a road of opportunity

The Engineering poster showcases BEV, the Battery Electric Vehicle, which was built by Waikato engineering students. The car gained significant media attention last year when the students successfully drove it from Auckland to the Bluff. The students have since been awarded a design excellence award for their work.



Provide solutions to today's problems

Our Chemistry poster presents Chemistry PhD student Megan Grainger, a former Hamilton's Fraser High School student. Megan is completing her PhD in organic chemistry, studying the qualities of Manuka honey. She also has a Bachelor of Science and a Master of Science under her belt, both which she completed at Waikato.



Congratulations

Kudos for Science & Engineering staff

Three Faculty of Sciences & Engineering staff received Kudos Awards at this year's Kudos Hamilton Science Excellence Awards. A champion for Earth sciences, Professor Cam Nelson received the University of Waikato Lifetime Achievement Award. Dr Mike Duke from the University's Engineering School won the Hill Laboratories Science Entrepreneur Award for his work incorporating solar technology into long-run metal roofing. Professor David Hamilton won the Environmental Science Award, for his more than 20 years researching aspects of water quality. Read more: www.sci.waikato.ac.nz/news-events/news

Masters student wins \$5000 towards study costs

University of Waikato masters student Aaron Huesser has been awarded the prestigious Brian Perry Charitable Trust Graduate Scholarship in Science and Engineering. Growing up in rural Taranaki, surrounded by natural energy producers he gained an enthusiasm for the energy industry, which sparked his interest in the Earth sciences. Aaron completed a Bachelor of Science, majoring in Earth Sciences and Environmental Sciences, followed by a Master of Science which he is currently studying towards. Read more: www.sci.waikato.ac.nz/study/student-profiles

Northland scholarship for Earth sciences student

Top grades and family ties to Otamatea have won University of Waikato Bachelor of Science student Courtney Windsor the Kauri Museum Mervyn Sterling Memorial Scholarship. The scholarship, worth \$2000, is offered by the Otamatea Kauri and Pioneer Museum Trust Board to encourage undergraduate study and applied research in New Zealand in the fields of environmental conservation, ecology, natural heritage and Northland history. Courtney is majoring in Earth sciences and, after a year and a half of study, she is maintaining a perfect 'A+' average. Courtney is pictured left in the Earth & Ocean Sciences promotional poster.

Engineering student wins bronze at World Rowing Champs

University of Waikato engineering student Linda Matthews has won a bronze medal at the recent U23 World Rowing Championships. Linda was part of the Quad Sculls team that competed in Lithuania last month, but now has her eyes set on the Rio 2016 Olympic Games. Linda is in her third year of a Bachelor of Engineering specialising in Materials & Process Engineering.

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