The School’s third year engineering practice course has been re-designed to make students more innovative and ‘industry ready’.

Course coordinator Associate Professor Adrian Russell has been the driver for a renewed focus on creativity and innovation in the School’s curriculum. “There is so much more to engineering design than just following standards and design codes,” he says. “Creativity and innovation are skills absolutely vital for engineers in the 21st Century.”

“As engineers we are all being urged to be innovative,” he says, “but not taught how. Innovation and creativity are not such mysterious skills — they can be taught and learnt, certainly actively encouraged and supported.”

To build his course Russell harnessed the expertise of creativity lecturer Associate Professor Kerry Thomas, from UNSW’s Faculty of Arts and Social Sciences; industry colleagues James Glastonbury from Laing O’Rourke and Michael Quinnell from Advisian; and Creativity Consultant, Melinda Hodges.

“Ultimately, creative and innovative engineering design will lift Australia’s productivity and competitiveness, something that is high on the national agenda at present,” Russell says. “By offering this course we are giving our students a head start in the new engineering world.”

This is the first semester the course has been taught but so far the results have proved to Russell that all his efforts have been more than worthwhile.

In one project students were asked to design a new type of shaking table. Shaking tables are used in laboratory testing to mimic earthquake loading on large models of infrastructure. This mirrors a real-life project that School academic staff are currently working on — funded by the ARC – and including four other university partners.

Students were asked to not only design a new model but also to build a physical model, demonstrating the mechanisms — and were actively encouraged to innovate. It was only a short 2 week exercise — but the results were astonishing.

“Our students were awe-inspiring,” Russell says. “I was amazed at how creative and diverse the models were. Using a variety of materials and energy sources - batteries, hydraulics, syringes, Lego and meccano, wood, and 3D computer animations to create their models, our students imagined and delivered new and radical ways of solving this problem. Uninhibited by how things ‘should’ be done, they were freed up to really explore, create and innovate.”

Head of School Professor Stephen Foster is also delighted with the outcomes. “We have 120 academic and research staff — who all do marvellous work — but we also have 2,000 undergraduate students. Unleashing their creativity, energy and enthusiasm brings new powers to the School and the profession.”
A Wealth of Talent

Congratulations to all our amazing staff involved in yet another successful round of Australian Research Council (ARC) Discovery Project Grants, announced on 1 November by Federal Education Minister Simon Birmingham. The School has obtained six Discovery grants and one DECRA (Discovery Early Career Researcher Award) to the value of 32.5 million in Cat A research funding.

Head of School Professor Stephen Foster congratulated all those who were successful and thanked all those staff who submitted. “We all know how competitive these grants are,” he said, “with a success rate of just 17.8% across the country in Discovery and 16.7% for DECRA. So well done to all!”

School staff involved in the successful Discovery projects include Dr Hoori Ajami, Dr Richard Collins, Prof Stephen Foster, Dr Ali Homed, A/Prof Stuart Khan, Dr Lucy Marshall, Prof Chris Rizos, Prof Binan Uy, Prof David Waite, and A/Prof. Jinkang Wang. Dr Taha Rashidi received the DECRA.

UNSW itself received more Discovery Project grants than any other institution in the country – 88 DPs worth $32 million. Prof Nicholas Fisk, Deputy Vice Chancellor (Research) at UNSW, congratulated the University’s researchers not only on securing the most grants in this round but topping the overall research funds awarded by the ARC this year. "These results are a real testament to the wealth, breadth and depth of talent here," Professor Fisk said.

It has been another excellent year at the School and, as usual, it has been a difficult task choosing which of our many engaging stories to share with you. Staff at the School are active on so many fronts - from teaching our 2,000 undergraduates and 660 postgraduate coursework students, to working with over 200 PhD students and 75 full time research staff through eight research centres and hubs. The School is always seeking to expand, refine and innovate engineering knowledge, as well as to share our knowledge and expertise with industry, government and academic colleagues around the world.

Demand for our teaching programs has never been higher. The same is true for our research capacities. Each year we work with over one hundred industry and government organisations on specific industry related projects. Each year we win millions of dollars in highly competitive Australian Research Council grants – and this year has been no exception.

We are currently ranked as the number one school in Australia not just by the QS World University Subject Rankings, but also by the Academic Ranking of World Universities (ARWU). You can be assured that, far from resting on any laurels, the good work of the School – our research and teaching, our social engagement and global impact – will continue.

Our students are certainly busy expanding their and our horizons – our cover story shares some of this excitement, as does our story about the student-led social justice project of computer reUse.

What can we do about injustice?

The students discovered that only 10% of the 4 million computers sold each year end up being recycled in Australia. The rest will become e-waste, the world’s fastest growing waste stream discarded as landfill or exported to other countries, potentially causing severe environmental and public health damage in developing nations.

At the same time, they learnt that almost 20% of Australians do not have access to a computer at home, and it is most likely those with lower incomes.

The aim of eReuse Inc. is to save UNSW computers from landfill to refurbish and then recycle them for those people who lack access to computers – which have become almost a pre-requisite for full participatory citizenship in the contemporary world.

Civil engineering/commerce student Rohan Pala steered the group through into incorporated status, and registered e-Reuse as not-for-profit organisation.

The School was the first UNSW group to sign up for e-Reuse. Moreover, valuable funding and support for the development process was provided throughout 2016 by the Head of School Professor Stephen Foster and the School’s Teaching and Learning Committee.

In September 2016 an agreement to recycle and re-use UNSW IT equipment was signed between UNSW and ARC, UNSW’s student union, with the pilot program developed by eReuse Inc., to be trialled as a UNSW program and implemented at a UNSW-wide level.

Socially enterprising


Out the year Environmen tal engineering student Charlotte Wang has been volunteering her time and skills to assist others since high school. Her question as a child had always been a pretty big one, “Why is there injustice and what can we do about it?” At high school she had excelled in history and legal studies as well as maths, but when it came to choosing a university course, Charlotte chose to follow her social justice interest not into the humanities or law, but into so-called ‘applied’ engineering.

“Engineering has a direct impact on our lives. I wanted in the end to study something not just to analyse or understand ideas, but to have the tools to create and change things,” Charlotte hasn’t waited for graduation to make her impact! At UNSW she joined the local branch of ENACTUS where she met a group of like-minded students and the idea of eReuse was born.

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ALUMNI PROFILE: MARK COMBE BE CIVIL ’87, MIE, MIPENZ, RPEQ – ENGINEERING INNOVATOR

Mark Combe has a passion for getting things done. He also has a passion for engineering entrepreneurship and innovation. His taste for adventure is combined with rigorous research, both in-house and in partnership with universities – such as James Cook University and UNSW. In 2015 his company Fibercorp won a prestigious Shell and Australian Department of Industry, Innovation & Science Innovation Challenge Award for its development of a recyclable, macro-plastic fibre reinforcing made entirely from industrial plastic wastes. The polypropylene (PP) fibres can reinforce concrete in footpaths, cycleways, shotcrete and small precast elements.

In 2016 Mark was acknowledged as one of Australia’s most innovative engineers – being included in Engineers Australia Create noted, “there are few professions whose creativity has greater transformative potential.”

And yet, “The construction industry is not nearly as innovative as it could be,” Mark Combe says, “despite the fact that our future depends upon it. It tends to stick with what it knows, and what has worked in the past. Under-standable, perhaps, but no longer defensible.”

Concrete represents the second most used construction material by humankind, second just to water, with an annual use of 24 billion tonnes of concrete globally. At the same time, global plastic production every year is more than 360 million tonnes, out of which only 5% is currently being recycled.

“Plastic fibres in concrete have been around for twenty years” Mark says, “what is new about our product is that it is 100% recycled. As well as reducing global plastic pollution, use of this recycled plastic fibre contributes towards sustainable development by reducing the consumption of steel in concrete.” His process is suitable for large-scale commercial production. “We all need to play a role in reducing the carbon footprint of construction,” Mark says.

“I’m not sure if you could call it a planned career,” he loughs, when asked to reflect upon his thirty year career “at times it was more a wild ride.”

“Maybe it’s because I come from the Riverina in NSW, and my people have always been hands-on, but one thing I know I left UNSW with my engineering degree. I did not want to work at a desk in a high rise office all day. In my working life I have worked as project engineer on construction sites, and in mining in Australia and overseas. I have travelled all over Australia and gone to places such as New Guinea, Vanuatu, Samoa, the Torres Strait. Some of these remote places have a fairly tough lifestyle but also provide some amazing experiences.

There were some difficult times in the 90’s as companies went bust. But my people, my workmates that I have been working with for over 30 years have always been hands-on, but one thing I know is that it is not nearly as innovative as it could be. The construction industry is not nearly as innovative as it could be. The construction industry is not nearly as innovative as it could be. The construction industry is not nearly as innovative as it could be.

“Fancy thing is I have been more involved with UNSW than I expected, working with Professor Steve Foster and Emeritus Professor Ian Gilbert on the Australian Standard AS5100 Chapter 16 – Fibres in Concrete Section. UNSW has also conducted some testing and research on our other fibres, Steel and Macro Plastic. It really is a serendipitous world.”

History maker

NARELLE UNDERWOOD

is the newly appointed Surveyor General of New South Wales. She is NSW’s 25th Surveyor General since Augustus All was appointed to the position in 1787 before his arrival with the First Fleet. Narelle is the first female Surveyor General in any Australian state and at age 32 is the youngest to take the role in NSW in 200 years.

NSW Department of Finance, Services and Innovation Secretary, Martin Hoffman, announced the appointment on 2 September. “Ms Underwood is a leader in her profession working as an advisor to the Board of Surveying and Spatial Information and Chair of the Surveying Mapping and Industry Council (SMIC),” said Mr Hoffman.

“She has also played a significant role in promoting and developing the survey profession, particularly in the tertiary sector and with young professionals.”

While at UNSW, Underwood won the Dean’s Award twice and the University Medal on graduation. She also contributed to the Surveying Student Society, serving as both treasurer and president and is currently a member of the School’s Industry Advisory Committee.

Since her graduation Underwood has won a total of nine industry awards for her innovation and commitment to quality outputs, including the Asia-Pacific Spatial Excellence Awards Young Professional of the Year in 2011.

As NSW’s 25th Surveyor General, Narelle Underwood will serve as President of the Board of Surveying and Spatial Information (BOSSI), chair of the Geographical Names Board of NSW and Electoral Boundaries Commissioner. She will bring her expertise to improve urban planning, community services and infrastructure, and help keep surveying standards consistent nationwide.

Narelle Underwood is not daunted by the ever changing technological landscape of the surveying industry; she is excited by it. “Merging new and traditional technologies continues to be one of my greatest joys. Combining data drawn from different sources allows surveys to be much richer and more useful,” she says.

Technological innovation can ensure the expansion of public infrastructure in the future. Narelle hopes that her appointment will serve as an example for women and young people looking to enter a career in surveying. “This is a time of great opportunity and change for the spatial and surveying sector. I hope to be a role model for all surveying and spatial professionals, ensuring the profession embraces that change and capitalises on the opportunities available.”

Narelle is working with the NSW Surveying Task Force to encourage more graduates to consider a career in surveying – without whom the construction industry could very well grind to a halt. Enrollments in surveying degrees in NSW have been a rollercoaster, but that is, admittedly, from a low base. In 2017 surveying and geospatial undergraduate student enrolments are expected to number 120.

“The there is a severe shortage of Registered Land Surveyors in Australia so we’re working to lift the profile of the profession,” Narelle said. “With technology changing so rapidly, we really don’t know what will be happening in five or ten years, what people will need and how data and information will be used. It’s an open book, which makes this profession extremely exciting.”

Combining data drawn from different sources allows surveys to be much richer and more useful.

Sustainable innovation

ALUMNI PROFILE: NARELLE UNDERWOOD, BE HONS 1 SURVEYING AND SPATIAL INFORMATION SYSTEMS, ’09 - NSW SURVEYOR-GENERAL

While at UNSW, Underwood won the UNSW School of Civil and Environmental Engineering Newsletter 2016 Award for her innovation and community services and infrastructure, and help keep surveying standards consistent nationwide.

Combining data drawn from different sources allows surveys to be much richer and more useful.

Sustainable innovation

ALUMNI PROFILE: NARELLE UNDERWOOD, BE HONS 1 SURVEYING AND SPATIAL INFORMATION SYSTEMS, ’09 - NSW SURVEYOR-GENERAL

The tradition continues – UNSW School Survey Camp at Berry.
**INSPIRING LEADERSHIP**

**ALUMNUS PROFILE: ATHENA VENIOS HAS WON THE 2016 JUDY RAPER AWARD FOR LEADERSHIP IN ENGINEERING.**

Athena Venios has been a significant figure in the engineering world, with her work spanning numerous projects and roles. She has been a recipient of the 2016 Judy Raper Chair of CVEN Industry Award for her outstanding leadership in engineering.

Athena worked on major projects in water and transport, holding leadership roles in transport and infrastructure programs for major sporting events, including the Sydney and Athens Olympic Games, the Melbourne Commonwealth Games and the Melbourne Grand Prix. She founded and chaired the NSW Women’s Professional Engagement Group, has been vice-chair of Engineers Australia’s Women in Engineering Sydney Division and is currently a member of AECOM’s Diversity & Inclusion Committee.

Driven by a vision for a better world, and immensely proud of her profession, Athena balances nurturing with challenging her teams. She supports not only her people but also others in her organisation. Likewise she has remained actively engaged with UNSW since graduation, revealing a keen determination to remain part of its community, and is a very valued member of the School’s Industry Advisory Committee. “What has always impressed has been Athena’s generosity, her passionate commitment to task and her ability to deal with others gracefully without sacrificing confidence,” says Dr Mary Binns, vice president for Copper Marketing at BHP Billiton, a portfolio director for managed services at Ericsson, and Dr. Mehreen Faruq, Greens Upper House MP, New South Wales Parliament.

On receiving her award, Athena said: “As an engineer I have been fortunate to be involved in some truly transformational projects, working with some of the individuals here in Australia and overseas. I’m honoured to accept the Judy Raper Award. For me leadership is about inspiring and lifting the capability of those around you, enabling them to achieve their true potential.”

**A superb role model for any undergraduate but especially for aspiring female engineers**

**MAKING MATHS COUNT**

**AN INTERVIEW WITH IAN MCINTYRE: CHAIR OF CVEN INDUSTRY ADVISORY COMMITTEE**

Q: What can be done about this? And by whom?

A: It seems to us that the problem is unlikely to be solved without a larger number of teachers at both primary and secondary levels who are confident and capable in imparting the excellent insights of mathematics. A good teacher can have their students buzzing. Teachers have an enormous influence. As the recipient of this illustrious award, Athena Venios joins an elite group of female influencers with past winners of this award.

Another issue is misinformation about how difficult maths is and this shows that the myth is not correct. It seems to us that the problem is more attractive than appears currently for these reasons. The disciplines of logical analysis, rigorous reasoning, hypothesis testing, problem formulation and proof are not peculiar to mathematics, but development of these generic skills is more difficult through the absence of experience in mathematics that goes beyond the learning of formulae.

Q: Why is it important for students studying mathematics?

A: The CVEN Industry Advisory Committee became concerned about the increasing numbers of students finishing secondary school in NSW without having studied mathematics at an advanced level, specifically Extension 1 and 2 levels.

Q: Why is participation in higher level HSC mathematics dropping?

A: There seems to be an enormous variability in the enthusiasm, ability and effectiveness of mathematics teaching in schools. There are clearly numerous teachers who achieve wonderful results. However, role-learning approaches are present in our school system and are guaranteed to turn students off maths. And there is a reported shortage of properly trained and skilled teachers of mathematics at all stages of schooling, particularly in regional areas. The experience and insight of mathematics needs to be built from the bottom up, without skipping steps or layers. It only takes one year of ineffective teaching to destroy the interest, ambition and ability of students.

Q: What impact does this have on engineering as a profession?

A: It is quite common to hear that you don’t need mathematics at an advanced level to be an engineer in the field. The myth is that you don’t use the mathematics, but actually you do, every day.

Q: What can be done about this?

A: We need to focus on making it worthwhile and rewarding for people to have a career teaching mathematics.

For several years the CVEN School has been reaching out to school students, their parents, their teachers and their careers advisors to increase their understanding of the nature, role and value of civil engineering, apparently with considerable success. Perhaps a similar approach to attract, retain and support students to mathematics teaching and then keeping them in the profession might also have a positive effect.
STAY IN TOUCH
Please stay in touch with the School: we’d love to stay connected with you.
Register online at http://www.engineering.unsw.edu.au/civil-engineering/alumni-registration

MESSAGE FROM CEVSOC

UR MAIN student society CEVSOC had a transformational year in 2016 with four major sell out social events and meaningful progress in encouraging diversity and inclusion within the society. Our alumni are such a wonderful pool of guidance and knowledge, CEVSOC would relish the opportunity to keep you in touch and engaged.

CEVSOC is eager to create more opportunities in 2017 for alumni to reconnect with each other and with current students through a variety of events such as industrial training information night, international student information night, sports events, Third Year Camp weekend, and a fourth year thesis and design practice night – students are interested in hearing your personal and professional work story.

If you would like to be kept up to date about CEVSOC’s Alumni opportunities, please email the External Relations Manager Dr Mary O’Connell at m.oconnell@unsw.edu.au

VALE RAY LAWTHER
1945 - 2016

ANY ALUMNI will be saddened to hear that Dr Ray Lawther passed away in April this year. Ray taught at UNSW for over thirty years – and was a School legend well before his retirement in 2005.

In paying tribute to Ray, Head of School Professor Stephen Foster recalled, ‘Ray was a great colleague and friend to many of us over many years. Ray both educated our students and mentored staff in computations. There was little that Ray did not know about computational methods – the paper I most remember was where he related the theory of bracing of structures to Einstein’s special theory of relativity.

He is remembered as a great teacher by his students and by colleagues as an excellent researcher.

Ray was not just a colleague but a personal friend and I know this is the sentiment of many in our School who had the opportunity to work and study with him.’

KOUROSH KAYVANI

ONGRATULATIONS to School alumnus and member of our Industry Advisory Committee Dr Kourosh Kayvani, (MEngSc ’92, PhD ’97), FIEA who has been awarded the 2016 John Connell Gold Medal.

The Award is presented annually by the Board of the College of Structural Engineers to an outstanding Structural Engineer who has made a significant contribution to the profession of both national and international significance, and who is widely recognised to be of eminent standing within the profession.

Kourosh Kayvani is Global Director of Excellence & Expertise at Aurecon. In his 28 years in the industry, he has played key roles in the engineering of many innovative, complex and award winning structures across the globe, including Wembley Stadium in the UK, West Kowloon Terminus in Hong Kong and in Australia: ANSTO OPAL nuclear reactor, the Sydney Hockey Stadium, Brookfield Place, Civic Tower, 5 Martin Place, Liberty Place and Melbourne Star Observation Wheel.

He specialises in long-span structures, tall buildings, stadium structures, seismic design and forensic engineering. Kourosh is a Visiting Professorial Fellow at UNSW, a Director of the Australian Steel Institute, and the President of the Lightweight Structures Association of Australasia.