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Cutting edge engineering is child's play.



Teaching others is a great way for children to develop their hand writing skills, so QUT Engineering graduate Deanna Hood taught a robot to learn. Children gain confidence as they teach their robotic friend, making their own learning a pleasure.

At 23, Deanna is working at the forefront of global robotics and completed a Masters of Computer Vision and Robotics at École Polytechnique Fédérale de Lausanne in Switzerland.

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Find out more at qut.edu.au/engineering

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JUMP IN!

Science and engineering give you the perfect platform to leap into any career. Ben Skuse reports

The next big ideas are likely being hammered out at a student union cafe rather than in a boardroom. Just as Snapchat, Facebook and Google started as student projects, so too could your contribution to the world – through a science or engineering degree.

What links everyone in science and engineering is an inquisitive nature.

“If you find yourself fascinated by the cool science and engineering you see in the media, you’ll enjoy turning your interest into skills,” says Jeff Shimeta, senior lecturer in the School of Science at RMIT University.

You could learn anything from advanced mathematics to using complex lab equipment or taking an engine apart.

Plus, a science or engineering degree offers a raft of transferable skills applicable to almost any career.

“All scientists and engineers learn how to analyse data, understand it and present it effectively,” says Jeff.

Senior lecturer Will J Grant from the Australian National University agrees. “You’ll pick up skills like high-level problem solving and critical analysis.”

About 75% of the fastest growing occupations require STEM skills,

according to a report by the Australian Industry Group.

“STEM grads have a strong starting toolkit for joining the workforce,” says Executive Dean John Beynon, from the Faculty of Engineering, Computer & Mathematical Sciences at the University of Adelaide.

A survey for the Office of the Chief Scientist of Australia found that, even if a job doesn’t directly need STEM skills, more than 82% of employers would value them in an applicant.

“STEM skills set you up to attack a great variety of problems,” says Will.

Being able to solve a range of problems will be crucial in the future workforce, as many of the careers of tomorrow don’t exist today.

Given that almost half of employers are expecting they will need a growing number of STEM-skilled workers over the next five years, having the agility to be able to switch careers, grasp new opportunities or even start a business will stand you in good stead.

So do you need to know what career you want to go into before starting your degree? “Not in today’s world,” says Jeff. “Start uni with an open mind, discover new passions and pursue opportunities as they arise.”

**SCIENCE AND
ENGINEERING
DEGREES
SET YOU UP
TO ATTACK
A GREAT
VARIETY OF
PROBLEMS.**





COLLIDING PATHS

A degree in engineering can take you anywhere.

Laura Boness reports

Engineers work in a wide range of industries in Australia, including telecommunications, pharmaceuticals, mining and information technology. Engineering was traditionally divided into four broad groups – chemical, civil, electrical and mechanical – but sub-groups, like environmental, mining and software, are emerging as the profession evolves.

Christine Chen, recipient of the 2015 Sydney Young Professional Engineer of the Year award from Engineers Australia, works as an electromagnetics and radio frequency engineer at electronics and systems group Thales Australia. She supports multiple projects, such as designing radios for the military and developing radar for warships and tanks.

Christine loved physics and maths in high school and applied to study architecture, engineering and medicine at university. She was accepted into all three courses but chose engineering because of the flexibility – she says you can work in a startup or multinational company, in a range of industries such as software programming, telecommunications and defence.

“It’s a profession that’s very mobile, found in different countries around

the world. It’s unique because science and technology are universal.”

Engineering is not only evolving all the time, it can also lead to other careers – Christine has seen engineers who, after finishing their undergraduate degree, have become investment bankers or editors.

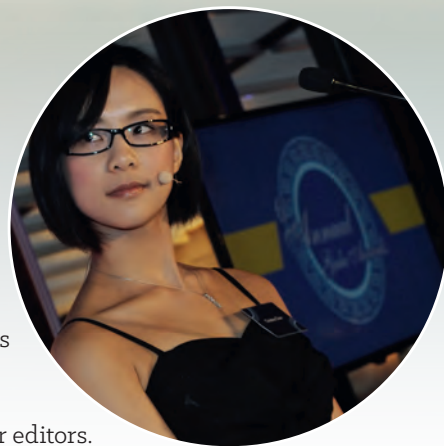
“It’s a flexible career that is always evolving, so it’s important to have a keen interest in learning and advancing yourself,” she says.

“You’re not just being trained to be an engineer, you’re also being trained to become a good problem-solver, and many industries appreciate that.”

Christine says it’s important to be mentally prepared to work hard for this career, as studying engineering is a full time job, sometimes with long hours.

“It’s a very challenging and interesting career, but you know that you’re building something with a purpose, to improve people’s lives, and you’re working at the forefront of technology,” she says.

The requirement for a professional engineer is a four-year Bachelor of Engineering course, available at most major universities in Australia.



SHUTTERSTOCK



LIFE IN THE FAST LANE

MONASH ENGINEERING STUDENTS ARE RACING TO THE TOP

The Monash Motorsport team is set to compete in Europe after racing their way to a seventh consecutive Australasian Formula SAE win in December 2015. Team leader Areeb Hassan says the group designs, builds and tests all their vehicles from scratch, and they are "really fun to drive".

Unlike a highway, the tracks are tight and packed with slaloms and hairpin turns. "We need to make a car that's not necessarily super

fast in a straight line but can corner quickly," she says.

The Monash Unmanned Aerial Systems team created an autonomous plane in 2014 to find a dummy (posing as a lost bushwalker), confirm its GPS coordinates and drop it a bottle of water – all without human intervention.

The group was the highest ranking university team in the international open competition.

Whatever your interests, clubs can give you valuable experience in management, manufacturing and teamwork.

"When we go overseas, we get industry exposure and connections. A lot of us get jobs through meeting people at competitions," says Areeb. "It's an awesome experience." – Michelle Wheeler

TO GET THERE:

Bachelor of Engineering (Hons),
Monash University bit.ly/1T7LXWL



ENGINEER A WORLD OF DIFFERENCE

Engineering plays a crucial role in our modern world. It lays the foundations of our life, from building and maintaining societies, to developing better, safer and cleaner ways to live.

If you have an interest in improving the world, whether it be through building, creating, measuring, solving or analysing, we invite you to explore where Engineering at Monash could take you.

study.monash



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timeshighereducation.com



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Zero waste

Skills in science and engineering will be needed for tech advances in green manufacturing and management of e-waste. Carl Williams reports

Did you know making one desktop computer uses the same amount of chemicals, water and fossils as a mid-sized car?

Although most components of technology can be recycled, levels of 'e-waste' – unwanted electrical appliances and technology entering the waste stream – are rising.

The Australian Bureau of Statistics estimates that the number of televisions and computers reaching the end of their useful life is expected to reach 44 million by 2027–28, and will weigh over 181,000 tonnes.

As e-waste increases, so does the concern that the demand for materials like copper and silver found in electronic devices is likely to exceed supply.

This concern is driving a 'green manufacturing' revolution to ensure Australia's manufacturing industries stay profitable and their activity causes the least harm to the environment.

"Natural resources are being depleted at an unsustainable rate," says Professor Veena Sahajwalla, Director of the Centre for Sustainable Materials Research and Technology (SMaRT) at UNSW Australia.

"Industries are beginning to recognise the cost-effectiveness of reusing materials."

SMaRT connects researchers across science, engineering and the built environment with industry to collaborate and develop innovative, sustainable materials and processes.

By developing skills in science and engineering at university, the next generation of students will drive tech advances in green manufacturing.

According to Veena, they will require a holistic understanding of the issues in managing e-waste, and will be "discovering novel green manufacturing solutions".

Engineers working in partnership with other disciplines and industries, says Veena, will be central to the creation of new knowledge and technologies.

According to Australia's Future Workforce, a report published in 2015 by the Committee for Economic Development of Australia (CEDA), around five million jobs will likely be automated by 2030, putting nearly 40% of Australian jobs that exist today at risk.

"Australia, and the world, is on the cusp of a new industrial revolution. It's important that we plan now so our economy doesn't get left behind," says Professor Stephen Martin, CEO of CEDA.

Veena believes this new and evolving industrial landscape, based on green manufacturing principles, presents excellent opportunities for students who consider degrees that combine science and engineering.

"Graduates with knowledge and skills across a number of subjects, like engineering, science, business and communications, will be in high demand as society attempts to address big world challenges," says Veena.

GET INTO ENG + SUSTAINABILITY!

Check out some work and study options...

CAREERS

Environmental science communicator, electronics/electrical engineer, sustainability design engineer, sustainability manager, industrial engineer, materials science engineer, manufacturing engineer + more!

BACHELOR OF...

Engineering (Environmental Engineering) (Hons), **Murdoch University** bit.ly/1QFItqs

Associate Degree of Engineering (Environmental), **University of Southern Queensland** bit.ly/1R0rUrx

Materials Science and Engineering (Hons)/Commerce, **UNSW Australia** bit.ly/20j9t1N

Electronic and Communication Engineering, **Curtin University** bit.ly/1KW4JYT

Engineering (Hons)/Design, **Monash University** bit.ly/1o4LEi9

Engineering (Hons), **Griffith University** bit.ly/1NPbqM5

AUSTRALIA AND THE WORLD IS ON THE CUSP OF A NEW INDUSTRIAL REVOLUTION.



LIGHTING UP

ENGINEER AND ENTREPRENEUR MONIQUE ALFRIS IS MAKING A DIFFERENCE

Roughly one in six urban residents in India lives in the slums, according to a 2013 census. The dwellings are overcrowded and dilapidated, with poor lighting and sanitation.

Monique studied photovoltaic and solar energy engineering at UNSW Australia, where she experienced how solar energy projects were helping people in the developing world. "I lived with villagers in Nicaragua who had no access to electricity or clean water, and applied my skills to help them," she says.

In 2012, Monique co-founded Pollinate Energy, which aims to bring electricity to the estimated 1.2 billion people globally that live without it.

Studying at UNSW Australia has been positive for Monique in other ways too.

"One of the best things about being a female graduate is showing other young women that engineering is a rewarding career choice, where you can help solve the world's greatest challenges." – Carl Williams

TO GET THERE:
Bachelor of Engineering (Photovoltaic and Solar Energy Engineering) (Hons), **UNSW Australia**
eng.unsw.edu.au

REBUILDING ENGINEERING

HIT THE GROUND RUNNING WITH THIS UNIQUE DEGREE

Charles Sturt University (CSU) built their engineering course for 2016 from the ground up.

Lectures and exams are replaced with everything industry needs from graduates – business savvy, work experience and communication skills.

The first 18 months of classes are in the university's state-of-the-art engineering building in Bathurst, and each semester focuses on a different engineering challenge.

Students then start paid work experience placements, so they can graduate workforce-ready. "The goal is to get students thinking about the



TO GET THERE:
Bachelor of Technology/Master of Engineering (Civil Systems),
Charles Sturt University bit.ly/1UxZA0u

impact of their work so they can make a difference in the real world," says CSU Foundation Professor of Engineering, Euan Lindsay.

"Industry wants graduates with good communication who understand finances and entrepreneurship. We're building a unique type of graduate with a different view of the world."

Euan says the five-and-a-half year Masters level program includes four one-year paid industry placements,

supported by online learning.

"Employers give them tasks, so it's real engineering," he says.

The degree is already popular with industry, described as "the most exciting development in engineering education in Australia at this time" by Stephen Finlay, general manager of Engineers Australia in Sydney.

"There's no other program like it offered at any other Australian university." – Michelle Wheeler

Making magic

Design thinking puts people at the centre of product creation. Adrian Regan reports

Most new cars today have built-in screens, which can connect to the internet.

But how could we improve this technology? And as we travel, should apps be customised for each place we use them?

These are the types of problems that Patrick Hofmann, senior user experience designer at Google in Sydney, works on with the rest of the Google Maps team.

For two years, they've been working on a version of Google Maps for cars.

"It isn't just a map; it's about the data behind the places that you select," says Patrick.

The challenge, he says, is to understand what people want and need, and then build the maps in a way that will "make the product magical".

One of the team's biggest challenges was to make a version of Maps that gives people the information they want in a way they can safely access while driving.

Patrick says it's about putting the needs of people at the centre of his work – it's a creative approach that's referred to as 'design thinking'.

"Putting the user experience first is critical," he says. "If people have a terrible experience with your

product, they'll share this online and never use the product again."

Design thinking can also lead you to invent things that people are excited to use, and will make a positive impact on their lives.

Biochemist Dr Kastoori Hingorani implements design thinking in the field of biotechnology. She completed a PhD at the Australian National University and is working on artificial photosynthesis – recreating the way that plants harness the Sun's energy.

Once it reaches the market, this discovery has the potential to replace fossil fuels with clean energy, which could help solve some of the world's biggest challenges.

"My work is solution-based, and that's what I think of as design thinking," she says.

In her role as a business development consultant in the engineering faculty at the University of Sydney, she solves problems by connecting scientific exploration with a commercial mindset.

"I've always had a passion for the business side of science," she says.

Innovators – like engineers, biotechnologists and computer scientists – are driven by design thinking.

It gets people like Patrick and Kastoori thinking about how their work can make a real difference.



GET INTO ENG + DESIGN THINKING!

Check out some work and study options...

CAREERS

Biochemist, business analyst, industrial designer, nanotechnologist, science communicator, user experience designer + more!

BACHELOR OF...

Innovation and Design, **Swinburne University** bit.ly/1PlQio8

Science (Nanotechnology)/ Science (Applied Sciences), **RMIT** bit.ly/1ncApDA

Commerce (Mechanical Systems Sequence), **University of Melbourne** bit.ly/1PrVUH9

Creative Industries, **QUT** bit.ly/1Qibrwm

Mathematical and Computer Sciences, **University of Adelaide** bit.ly/1KtW2Vn

Engineering (Hons)/Creative Intelligence and Innovation, **University of Technology, Sydney** bit.ly/23hZ22R

THE CHALLENGE IS TO UNDERSTAND WHAT PEOPLE WANT AND THEN BUILD THE PRODUCT IN A WAY THAT MAKES IT MAGICAL.

Mega toys

Hands-on learning is a critical part of next-generation civil engineering

Students in QUT's civil engineering course have exclusive access to a unique teacher that offers them an opportunity they won't find at any other university in Australia. They get to ask a building how it is feeling.

QUT's Science and Engineering Centre is Australia's most advanced self-monitoring building, rigged with sensors to show how its materials respond to stresses and strains.

This 'living laboratory' is the brainchild of Professor Tommy Chan from QUT's School of Civil Engineering and Built Environment, who's at the forefront of a field called structural health monitoring (SHM).

Pioneered in bridges, SHM enables civil engineers to monitor the health of their creations, assessing their responses to stresses like traffic loads, or natural occurrences like earthquakes and cyclones.

"There are a few big bridges near Hong Kong Airport that I consider my 'toys'. I've placed sensors and done a lot of tests on them," says Tommy.

The Science and Engineering Centre's system was turned on in late 2013, and it's already had an exciting life: last year it detected magnitude 5.3 and 5.4 earthquakes, which struck about 300 km from Brisbane.

Predicting an earthquake's impact typically relies on assumptions about how they affect structures. Tommy and his collaborators can now test these assumptions against real data from the Science and Engineering Centre.

The SHM technology used on the Centre is being integrated into the civil engineering course at QUT. Tommy considers this direct feedback to be a vital part of students' understanding of engineering principles.

"When the student jumps on the footbridge, they can see the building's response, which excites them," says Tommy.

QUT graduate Genevieve De Michele appreciates this hands-on education.

"The practical approach to learning was one of my favourite things about the course. We built projects in our first year, and were encouraged to think outside the box and experiment," she says.

Since graduating in 2013, Genevieve has leapt into a career in construction with infrastructure firm E3 Advisory, where she's been involved in large-scale projects like the upgrade of Kingsford Smith Drive and the construction of the Legacy Way road tunnel in Brisbane.

"I had big input into how things went into the ground. Today, we drove through the tunnel, and it's really nice to know that I was a part of its construction," she says.

A big reason Tommy loves working and teaching in civil engineering is that his skills are realised in a tangible way.

"If you teach something you cannot see, touch or feel, it will be just philosophical thinking. That's not my style," says Tommy.

"To have a connection with real things is the most enjoyable part." – Brett Szmajda

TO GET THERE: qut.edu.au

POWER ON

FIRST PRIZE IS JUST THE START FOR ALICE BECKETT

Recent graduate Alice powered through her Engineering degree at La Trobe University, honing her interests in robotics and telecommunications and making the most of extracurricular competitions.

She encourages more girls to get involved in engineering.

“Engineering isn’t as much of a ‘boy’s club’ as it seems. Girls should totally give it a go,” she says.

In 2013, Alice made her mark in the Telstra Machine-to-Machine (M2M) Challenge, winning first prize in the 10-week competition requiring her team to design an innovative product using Telstra’s NextG communication network.

“We built Home Guardian, a device that monitors motion in the homes of elderly or disabled people and alerts family members via text message when there’s a lack of motion.”

The win also opened doors to careers with Telstra. “We were fast tracked through Telstra’s employment system. I started my grad job with them in February,” says Alice.

Alice’s career goals aren’t necessarily about the hype of creating something entirely new, but rather to “make people’s lives better and easier, and make the world more connected”.

– Guy Fenton

TO GET THERE:

Bachelor of Engineering (Hons),
La Trobe University bit.ly/1nvjzQ5

TWISTED LOGIC

TAKE A MIXTURE OF LOGIC AND SCIENCE AND ADD A CREATIVE TWIST

Working on site is just one exciting benefit Carina Pirozzi enjoys as a graduate process engineer at CSBP, the chemical and fertiliser arm of Wesfarmers Chemicals, Energy & Fertilisers. "I get to look inside the equipment and get a real understanding of what's going on," she says.

Carina works on a plant that produces ammonia, a chemical used in fertilisers and an ingredient in the production of ammonium nitrate, used to make explosives for the mining industry.

She completed a Bachelor of Engineering (Chemical Engineering) at Curtin University; a degree that she says is a great pathway into commercial engineering roles.

After receiving the CSBP Women in Engineering Scholarship in her third year, Carina did a CSBP vacation placement, a part-time cadetship, and then earned a spot

TO GET THERE: Bachelor of Engineering (Chemical Engineering), Curtin University bit.ly/1PJsJDV

as a full-time employee in their graduate program for 2016.

Chemical engineering is her passion because she loves solving problems. "It's a mixture of logic and science, with a creative twist."

At CSBP, Carina works closely with the production process team.

"It's a really diverse workforce. I've worked with mechanical and electrical engineers, as well

as fitters, electricians, and operators," she says.

Carina also completes projects independently, like investigating and trialling ways to reduce costs and improve safety.

"That's probably the best feeling ever, that you're improving something based on knowledge and hard work."

– Cheresse Sonkkila



Take a step in the right direction with Science, Technology, Engineering & Maths (STEM) subjects

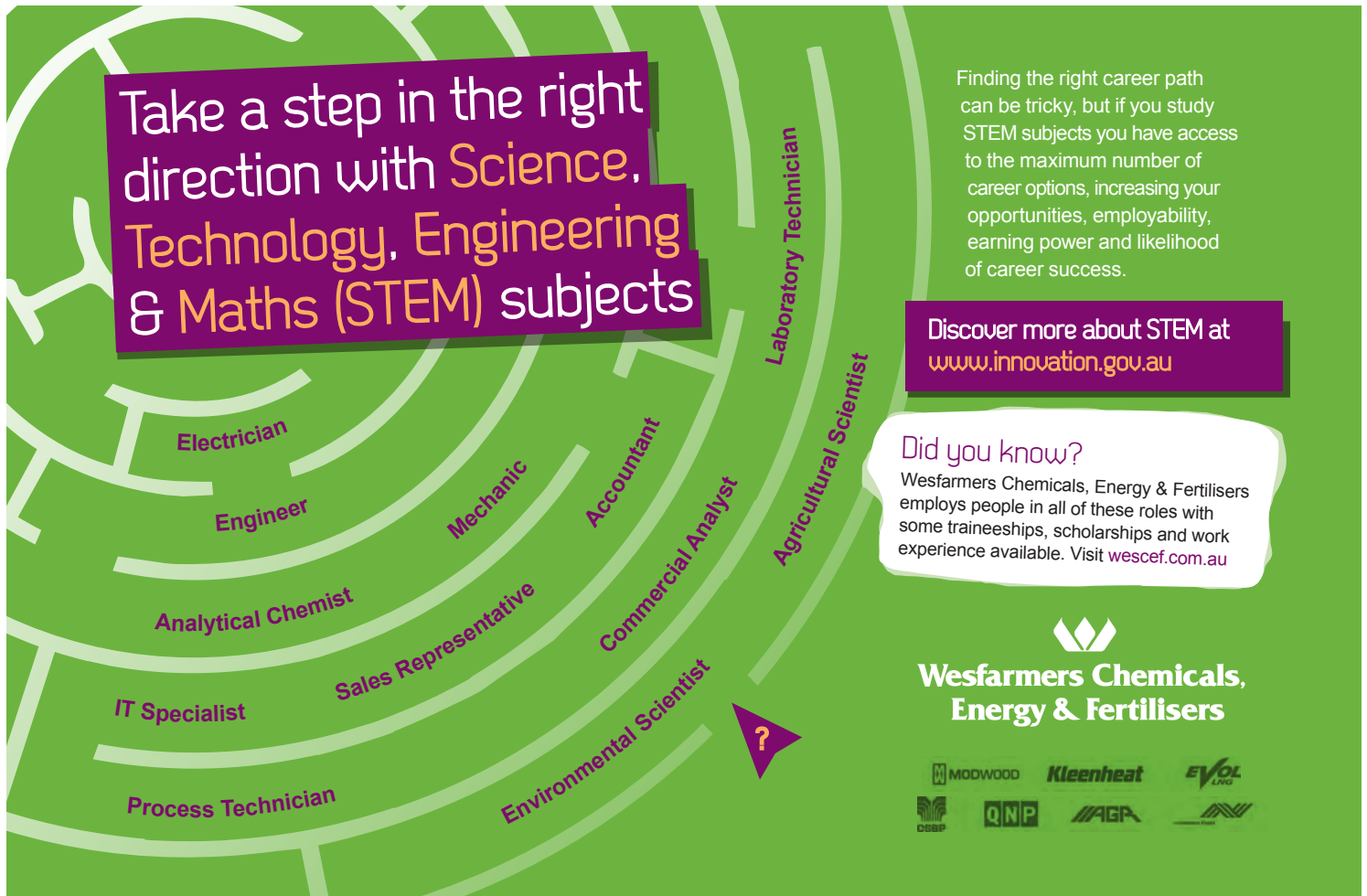
Finding the right career path can be tricky, but if you study STEM subjects you have access to the maximum number of career options, increasing your opportunities, employability, earning power and likelihood of career success.

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Shape the future

Engineers create amazing solutions to big problems – from predicting earthquakes to improving cancer surgery. Fran Molloy reports

Some engineers take on huge endeavours like the International Space Station, while others work on a molecular level. Some build robots that assist surgeons, and others use chemical processes to trap carbon emissions. But all of them solve problems by applying their skills and ingenuity.

Australian engineers are at the top of the game. At Monash University, materials engineer Professor Xinhua Wu led a team that 3D-printed a gas turbine jet engine. Chemical engineer Professor Graeme Jameson, from the University of Newcastle, created an efficient way to extract substances from water, which is used to process minerals in industry and to remove environmental pollutants.

Environmental engineer Liz Roder spent two years working in East Timor, where she helped develop a sanitation system. Seismology engineer Dr Kevin McCue, from Central Queensland University, set up Papua New Guinea's earthquake database, as well as Australia's first earthquake and tsunami relational database, and first digital network of strong motion recorders. These technologies help authorities develop emergency response plans to prepare for future disasters and save lives.

Medical engineer Robert McLaughlin was part of a team awarded WA Innovators of the Year after developing a microscope small enough to fit inside a needle.

It helps breast cancer surgeons see if they've removed all of the cancerous cells in an operation.

"One in four breast surgery patients have to go back for more surgery, because the surgeon didn't get all of the cancer," says Robert.

The team, including engineering professor David Sampson and breast surgeon professor Christobel Saunders, have tested the tiny needle with a camera and showed it has the potential to hugely improve the effectiveness of cancer surgery worldwide.

Robert completed a Bachelor of Engineering and Information Technology at the University of Western Australia, then a PhD in Electronic Engineering.

Today, Robert is part of a multidisciplinary collaboration of engineers, surgeons, pathologists, radiologists and physiologists who are working on better ways to treat cancer. The team has won the Australian Innovation Challenge and have twice been finalists for Australia's major science award, the Eureka Prize.

Georgia Sonter, who has just started a Bachelor of Technology/Master of Engineering (Civil Systems) degree at Charles Sturt University, says she wants to put her strengths in maths and science to practical use in her career.

"I like the idea of using knowledge to help people, like designing buildings for people of low socioeconomic status, which is one focus of this course."

Georgia's degree runs for five years and six months, but includes four years of paid work placement with industry partners.

"I'll have the chance to figure out where I want to work and what I want to do while I'm still doing the degree," she says.

GET INTO ENG + A BETTER WORLD!

Check out some work and study options...

CAREERS

Communications engineer, medical devices engineer, seismology engineer, civil structures engineer, shelter project manager, water or wastewater engineer + more!

BACHELOR OF...

Technology/Master of Engineering (Civil Systems), **Charles Sturt University** bit.ly/1PeZPeA

Engineering (Chemical), **Curtin University** bit.ly/1ZXXX0S

Civil Engineering (Hons), **La Trobe University** bit.ly/1SdQDrU

Engineering (Mechanical) (Hons)/ Science (Biological Sciences), **University of Wollongong** bit.ly/1RgOrjK

Civil Engineering with Architecture (Hons), **UNSW Australia** bit.ly/1WpvjzZ

I REALLY LIKE THE IDEA OF USING KNOWLEDGE TO HELP PEOPLE.

SHUTTERS TOCK

3D-PRINTER ENGINEER

TRINA MAJUMDAR IS ENGINEERING A BETTER WAY FOR BONES TO HEAL

People can have bone problems that require a titanium-based replacement joint that is surgically implanted into the body to replace the old one. But what if this new joint could also help kickstart the body's healing mechanisms?

Although titanium alloys do a good job in hip replacements, very active patients or ageing patients often require revision surgery to fix a hip replacement that hasn't interacted well with the bone, preventing it from healing.

Trina, a postgrad student at Monash University in Melbourne, is learning how to design 3D-printed implants that fuse with bone more effectively.

"I'm looking at how to make the implant communicate better with the bone, so the bone grows around the implant and locks in place more effectively," explains Trina.

"We can make customised implants using 3D printing that are designed around the patient's own body specifications."

Trina's interest in biomedical research was ignited during her final year research project studying biomedical science and engineering at Monash.

"I love the process of exploring a subject and thinking deeply about it," she says. – *Carl Williams*

TO GET THERE: Bachelor of Engineering (Hons)/Bachelor of Biomedical Science, Monash University bit.ly/1VcJffK



TINA SMIGELSKI



STUDENT-LED SUCCESS

ENGINEERING PROJECTS AT UNSW AUSTRALIA ARE EXPLODING TO NEW HEIGHTS



TO GET THERE:

Bachelor of Engineering, UNSW Australia
eng.unsw.edu.au

UNSW Australia offers student-led projects in areas like artificial intelligence, electronics and manufacturing.

New ideas for projects often come from the students themselves. Kate Stead, a UNSW Australia project officer for student-led activities, says there's been an "explosion of interest" in the past five years.

"If you want to get involved in a real-world project like solar racing or space engineering, there are so many different clubs at UNSW – like Sunswift or BLUEsat," she says.

Students in Sunswift design and build solar-powered vehicles that go on to compete in the international World Solar Challenge. Sunswift project manager Simba Kuestler says this helps young engineers learn crucial skills for life after uni – and put theory into practice.

"I'll never forget the team of amazing people I've met and achieving world-firsts," he says.

The BLUEsat group has several endeavours going: developing a satellite, a Mars rover and a satellite ground station, and launching stratospheric balloons.

BLUEsat president Thomas Dixon joined after hearing about the society at an engineering internships night organised by a student group.

"There aren't many similar opportunities out there to work on space engineering projects," he says. – Laura Boness

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Never Stand Still

Engineering



UNSW AUSTRALIA



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*2015 ARWU SJTU rankings



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Apply for over \$3million in engineering scholarships yearly.



Student societies

Get involved with 30+ student societies, clubs and teams.



MAKE IT YOURS

ENGINEERING AT ANU OFFERS A FRESH PERSPECTIVE ON THE FIELD

Developing something completely new is no mean feat, but ANU student Thomas Larkin is doing just that as part of his Bachelor of Engineering (Research and Development). He's in the process of working on a strong new conductive material that could be used in cars, aeroplanes or any machinery that needs strong components that also transfer electricity and heat.

Engineering at ANU focuses on systems engineering, giving students knowledge in several disciplines like mechanics, electronics and computing.

"Companies are looking for people who can manage other specialised engineers, and a systems engineer is someone who can perform this role," says Thomas.

The exciting projects and extracurricular opportunities at ANU make it a vibrant place to study. In his second year, Thomas worked on a project investigating the use of tiny fibres in regenerative medicine.

He is also the Director of Research on the Fifty50 team in the ANU College of Engineering and Computer Science, a group of students dedicated to improving gender equality in their field.

"ANU has given me the broadest possible taste of what university life should be about," says Thomas.

– Cheresse Sonkkila



TO GET THERE: Bachelor of Engineering, ANU bit.ly/1PgIkLO



Australian National University



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- > Mechanical and Material Systems
- > Mechatronic Systems
- > Photonic Systems
- > Renewable Energy Systems
- > Sustainable Energy Systems

Find out more

cecs.anu.edu.au/modernengineer

Create and capture

By combining engineering and computer science skills, you can generate and use visual information in amazing ways. Guy Fenton reports

From detailed pictures of bones to the pics on an Instagram feed, visual information is being created and analysed constantly. New visual technologies are revolutionising art, astronomy, medical diagnostics, security, communication, and emergency rescue operations.

In 2015, biomedical engineer Melissa Knothe Tate from UNSW Australia, debuted a 'Google Maps for the human body' – a tool that stitches together detailed images of a human body using the technology behind Google Maps.

While technologies like magnetic resonance imaging (MRI) view a large area of the body, this tool can zoom in to see cellular behaviour.

"MRI is the equivalent of looking at the map of the United States or Europe, where you see the individual country borders," says Melissa.

"With this, you see the individual 'inhabitants' within cities. We can identify problems much earlier at the cellular level."

Augmented reality, meanwhile, integrates computer-generated information like video, graphics and GPS with our view of the real world. Professor Mark Billingham, joint director of the Wearable Computer Lab at the University of South Australia, says there are valuable applications for augmented reality in healthcare and emergency services.

"Most augmented reality today is found in handheld devices like the iPhone, but soon there will be a focus on wearable augmented reality devices like glasses or watches," he says.

One of Mark's prototype tools are Empathic Glasses – a pair of glasses that can be remotely accessed to display data to the person wearing them. They're unique because they also track the facial expressions of the wearer, so emotional responses like stress can be measured.

"If a person is engaged in a stressful task like an emergency rescue, the glasses can access remote assistance to help them," Mark explains.

Mark says uni students today are well placed to build augmented reality products, and he encourages creative thinkers to enter the field.

"Other than engineering, you'll need skills in design and programming. These are now being taught in unis, so it's easy for people to get involved."

For example, the Data to Decisions Cooperative Research Centre (D2DCRC) is a research hub that focuses on how we can best use the world's vast amount of data, especially in improving cybersecurity.

D2DCRC offers internship projects for undergrad and postgrad students – for example, finding ways to predict civil unrest events like riots using social media data.

GET INTO ENG + TECH!

Check out some work and study options...

CAREERS

Mechatronics engineer, bioinformatician, biomedical engineer, virtual-reality product developer + more!

BACHELOR OF...

Engineering (Computer) (Hons)/Computer Science, **University of Newcastle** bit.ly/1VuFWkc

Engineering (Hons)/Computer Science, **UNSW Australia** bit.ly/1LAGad5

Engineering (Electronic & Communication Engineering) (Hons)/Computer Science, **RMIT University** bit.ly/1RQiuZS

Information Technology (Computer Science), **QUT** bit.ly/1PJfpkX

Engineering (Computer Systems Engineering)/Science (Computer Science), **Curtin University** bit.ly/1OTFVoj

Engineering (Computer Systems) (Hons), **University of Adelaide** bit.ly/1LZqFvB

MAPPING SUCCESS

ADDING BUSINESS TO STUDIES IN SCIENCE AND ENGINEERING HELPED THIS TEAM CREATE TWO SUCCESSFUL AUSTRALIAN TECH COMPANIES

David Mah began with a Bachelor of Science at the University of Melbourne, with a major in electrical systems. Eight years later, he's already headed up two of the most exciting tech startups in Australia.

The flexibility of the curriculum at the University of Melbourne allowed him to explore areas like business and arts, and in his third year he took a subject called engineering entrepreneurship.

"I really enjoyed business and creating products," he says.

David teamed up with fellow student Nigel Ang to develop UniSquare, an online social diary for students. In 2012, they were accepted into the prestigious Melbourne Accelerator Program (MAP). As one of four inaugural Startup Accelerator recipients, the pair received \$20,000 in seed funding, office space and intensive business training.

MAP is ranked as one of the top 10 university business accelerators in the world, according to the University Business Incubator Global Index 2015. The program funds start-up companies, which since 2012 have attracted more than \$10 million in funding, created more than 120 jobs and generated over \$5 million in revenue.

"MAP introduced us to the big names in the startup world in Melbourne," says Nigel.

UniSquare became hugely successful, but ultimately it wasn't generating enough revenue to be viable. So David and Nigel went on to develop their big breakthrough, BlueSky, which is now one of Australia's top online shopping apps.

In January 2015, David and Nigel founded Kepler Analytics with the idea to use a passive Wi-Fi sensor to track the movements of shoppers via their mobile phones.

"My background in electrical engineering and business development came in quite handy," says David, who co-invented the Kepler's patent-pending sensor. "We now have some of the largest retailers in Australia as clients."

To budding tech entrepreneurs, David says the most important thing is simply to go out there and do it. "A lot of people get stuck with creating theoretical business models," he says.

"Go out there and try things and make mistakes. That's the best way to learn." – Cathal O'Connell



PHOTO CREDIT

TO GET THERE: eng.unimelb.edu.au

VOYAGE OF DISCOVERY

More than just a well-earned break, going overseas during your degree can give you new experiences, skills, and friendships that last a lifetime. Ben Skuse reports

Bradley Thompson went on a semester-long exchange to the University of Illinois at Urbana-Champaign in the USA in his third year of a degree in computer systems engineering at the University of Adelaide.

“The experience broadened my horizons on a global scale,” he says. “Living in a different country does wonders for your personal and academic responsibility, time management, budgeting and maturity.”

In 2013, Rebecca Davies was one of two Australian undergrads awarded Australian Gemini Undergraduate Summer Studentship, which gave her the chance to spend 10 weeks at the headquarters of the Gemini South Observatory in La Serena, Chile.

“I was given some astronomical data and asked to look for interesting trends and features,” Rebecca says. “One year later, I published a paper on my work.”

Rebecca recently completed a Bachelor of Philosophy (Honours) at the Australian National University (ANU), majoring in astronomy and astrophysics.

“Travelling has allowed me to develop networks and contacts in astronomy departments around the world,” she says.

“It shapes your personality and gives you a unique perspective on science, research and the world around you.”

Rebecca will start a PhD this year at the Max Planck Institute for Extraterrestrial Physics in Garching, Germany.

Her experience is just one of an almost limitless number of different ways to immerse yourself in another culture during your degree. But more than just

course credits, studying abroad offers the chance to embrace life and opens up a world of opportunities.

Travelling, working or volunteering abroad can give you a chance to enhance or simply escape study before tackling the business end of your degree.

“Nights in the telescope control room taught me more than textbooks ever could,” she says.

Many students who go abroad during their studies do it through their university. Generally opportunities range from a few days at a conference, or a few weeks on a research project, to two semesters at a foreign university.

Many Australian universities have agreements with overseas universities (or have overseas campuses) for one- or two-year exchange programs, and the courses studied can be credited towards your degree back home.

Hillary McArthur recently finished her undergrad degree majoring in medical science at ANU. In her third year she did a six-month exchange with the University of Manchester in the UK.

“It broadened my knowledge through courses like the history of mental illness and developmental biology,” she says.

“I also learnt a lot about cancer, which was useful for my Honours year at ANU.”



**TRAVELLING
GIVES YOU
A UNIQUE
PERSPECTIVE
ON SCIENCE,
RESEARCH AND
THE WORLD
AROUND YOU.**



ON THE MOVE

**QUT GRADUATE
AMY GUNNELL IS UP
FOR ANY CHALLENGE**

During her mechatronics degree at QUT, Amy joined Clenergy TeamArrow – Australia’s premier solar car racing team.

As a team driver, she helped Australia’s first solar car complete the grueling 3000 km Bridgestone World Solar Challenge from Darwin to Adelaide.

“We had to do some running repairs about 24 km out of Adelaide,” says Amy. But this didn’t prevent the team from placing in the top 10 in a very competitive field.

The experience helped Amy develop the confidence to face challenges and keep going even when things get tough.

“Working with the team was amazing. It gave me the chance to travel and gain new life experiences, and I also made some great industry contacts,” says Amy.

Amy’s skills led to her job as mechatronics engineer at Arnott’s Biscuits, where she upgrades the software that controls the production lines as new machinery is added, giving operators greater control over the production process. – *Carl Williams*

TO GET THERE: Bachelor of Engineering (Hons) (Mechatronics), **QUT** bit.ly/1UkU8MI

QUT

Bridging the gap

La Trobe University's new Bachelor of Engineering (Honours) degree provides a pathway between uni and your career

Teodora Raducan faced a problem as high school was ending: what to become – a doctor, lawyer, designer? “It was incredibly hard for me to choose,” she says. She realised she wanted a creative career with the freedom to “think outside the box” and, for her, engineering stood out.

“Being an engineer enables you to create something that can improve the quality of people’s lives,” she says.

Teodora is looking forward to working at the forefront of technology, using things like 3D printers, advanced sensors and mechatronics. “I’ll never get bored because there’s always something new.”

Teodora is in her second year of the new Bachelor of Engineering (Honours) degree at La Trobe University. It’s a multidisciplinary degree, meaning she’s being trained across a broad range of engineering fields rather than specialising from the outset. The aim is to prepare students for modern industry needs, says Eddie Custovic, a senior lecturer.

“Recruiters and organisations are looking for engineers with a mix of skills, who understand business processes and how disciplines work together,” he says.

“This degree is the first of its kind in Australia. “It bridges the gap between

graduating university and entering the workforce.”

The showpiece of the degree is the opportunity for a six-month, \$10,000 industry placement scholarship in the final year.

Teodora is especially impressed that the university tries to place you in the industry of your choice. “The beauty of that is you’ll know before you graduate if the path you chose is right for you,” she says.

Some of the major engineering firms in Australia have already signed up to receive placements, including Telstra, Boeing, Bombardier and NBN Co.

Teodora has already gained some research experience through a summer project with a La Trobe team, designing a new camera that automatically follows players around a sports field to gather data about their performance.

While engineering is sometimes seen as a male-dominated industry, Teodora says she hasn’t felt like an outsider and there are plenty of other girls in her class. “Everybody’s equal and respects each other.”

Rebecca Thorburn, who’s also enrolled in the course, agrees. “No one thinks differently of you because you’re a girl. You’re considered part of the team as an engineer!” she says.

“I’m incredibly lucky to be a student here at La Trobe,” says Teodora. – *Cathal O’Connell*

TO GET THERE: latrobe.edu.au/courses/engineering



BE THE ENGINEER OF THE FUTURE

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latrobe.edu.au

*Work Integrated Learning is guaranteed for students on the Bendigo Campus, limited places are available on the Melbourne Campus. If you don't complete Work Integrated Learning, you can do an industry-based or university-based project and you can take elective units.

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IT STARTS HERE...

Here are just some of the available Bachelor degrees where you can study

ENGINEERING

ENG + WORK IN HEALTH

- >>> **biomedical, pharmaceutical...**
- Australian National University**
 - >>> Engineering (Biomedical Systems)
- Flinders University**
 - >>> Engineering (Biomedical)
- La Trobe University**
 - >>> Engineering
- Monash University**
 - >>> Engineering and Biomedical Science
 - >>> Engineering and Pharmaceutical Science
- QUT**
 - >>> Engineering (Medical)
- RMIT University**
 - >>> Biomedical Engineering
- University of Melbourne**
 - >>> Biomedicine (Bioengineering Systems)/Master of Engineering (Biomedical)
- University of Queensland**
 - >>> Engineering/Biotechnology
- University of Tasmania**
 - >>> Biotechnology
- University of Technology, Sydney**
 - >>> Engineering/Medical Science
- UNSW Australia**
 - >>> Bioinformatics Engineering

- Flinders University**
 - >>> Engineering (Maritime)
- La Trobe University**
 - >>> Engineering
- Monash University**
 - >>> Engineering and Architectural Design
 - >>> Engineering and Design
- QUT**
 - >>> Computer and Software Systems Engineering
- University of Adelaide**
 - >>> Engineering/Arts
- University of Melbourne**
 - >>> Science (Civil Systems)/Master of Engineering (Civil)
- University of Queensland**
 - >>> Engineering/Arts
- University of Technology, Sydney**
 - >>> Engineering/Creative Intelligence and Innovation
- UNSW Australia**
 - >>> Music/Engineering
- Victoria University**
 - >>> Engineering (Architectural Engineering)
- Western Sydney University**
 - >>> Industrial Design

ENG + BE A LEADER

- >>> **business, infrastructure, laws...**
- Australian National University**
 - >>> Engineering (Mechatronic Systems)
- Charles Sturt University**
 - >>> Technology/Master of Engineering (Civil Systems)
- Curtin University**
 - >>> Civil and Construction Engineering/Mining
- Griffith University**
 - >>> Engineering (Civil Engineering)/Business
- James Cook University**
 - >>> Engineering (Civil Engineering)

ENG + MAKE A SMARTER FUTURE

- >>> **aerospace, automation, energy...**
- Australian National University**
 - >>> Engineering (Renewable Energy Systems)
- Curtin University**
 - >>> Chemical Engineering and Chemistry
- Edith Cowan University**
 - >>> Aviation
 - >>> Engineering (Instrumentation, Control and Automation)
 - >>> Engineering (Electrical Power)
 - >>> Engineering (Marine and Offshore Systems)

- Federation University**
 - >>> Civil and Environmental Engineering/Business
- James Cook University**
 - >>> Biotechnology
- La Trobe University**
 - >>> Engineering
- Murdoch University**
 - >>> Engineering (Chemical and Metallurgical)
 - >>> Renewable Energy Engineering
- Monash University**
 - >>> Engineering and Commerce
- QUT**
 - >>> Business/Engineering
 - >>> Process Engineering
- RMIT University**
 - >>> Adv Manufacturing and Mechatronics Engineering
- Southern Cross University**
 - >>> Engineering in Mechanical Engineering
- University of Melbourne**
 - >>> Science (Electrical Systems)/Master of Engineering (Electrical)
- University of Newcastle**
 - >>> Technology (Renewable Energy Systems)
- University of Tasmania**
 - >>> Engineering (Computer Systems)
 - >>> Engineering (Renewable Energy)
- University of The Sunshine Coast**
 - >>> Engineering (Mechanical)
- UNSW Australia**
 - >>> Aerospace Engineering
 - >>> Photovoltaics and Solar Energy Engineering
 - >>> Renewable Energy Engineering

- Federation University**
 - >>> Civil and Environmental Engineering
- La Trobe University**
 - >>> Engineering
- Murdoch University**
 - >>> Environmental Engineering
- QUT**
 - >>> Engineering/Science
- RMIT University**
 - >>> Environmental Engineering
- University of Adelaide**
 - >>> Engineering (Civil and Environmental)
- University of Melbourne**
 - >>> Science (Civil Systems)/Master of Engineering (Environmental)
- University of Queensland**
 - >>> Engineering/Commerce
- University of Tasmania**
 - >>> Engineering (Civil and Environmental)
- UNSW Australia**
 - >>> Engineering/Engineering Science (Environmental/Civil or Civil/Environmental)
 - >>> Food Science

ENG + GET INTO TECH

- >>> **biotechnology, robotics, systems...**
- Australian National University**
 - >>> Engineering (Electronic and Communication Systems)
- Charles Darwin University**
 - >>> Network Engineering
- CQUniversity Australia**
 - >>> Engineering Technology (Specialisation)
- Curtin University**
 - >>> Electronic and Communication Engineering/Computer Science
- Deakin University**
 - >>> Mechatronics Engineering
- Edith Cowan University**
 - >>> Engineering (Computer Systems)/Computer Science

- >>> Engineering (Mechatronics)/Technology (Motorsports)
- Flinders University**
 - >>> Engineering (Computer Network and Systems)
 - >>> Engineering (Robotics)
- James Cook University**
 - >>> Engineering in Electronic Systems and Internet of Things
- La Trobe University**
 - >>> Engineering
- Macquarie University**
 - >>> Engineering (Wireless Engineering)
- Murdoch University**
 - >>> Engineering (Industrial Computer Systems)
- QUT**
 - >>> Engineering (Information Technology)
 - >>> Engineering (Mechatronics)
- RMIT University**
 - >>> Computer and Network Engineering/Computer Science
 - >>> Electrical and Electronic Engineering
- University of Canberra**
 - >>> Engineering in Network and Software Engineering
- University of Melbourne**
 - >>> Science (Computing and Software Systems)/Master of Engineering (Software)
- University of Newcastle**
 - >>> Engineering (Software)
- University of South Australia**
 - >>> Engineering (Electrical and Mechatronic)
- University of Tasmania**
 - >>> Engineering (Electrical and Communications)
- UNSW Australia**
 - >>> Engineering/Computer Science
 - >>> Mechatronic Engineering
- Western Sydney University**
 - >>> Engineering (Robotics and Mechatronics)

Disclaimer: Every effort has been made to ensure the accuracy of degree names at the time of publication. This is by no means an exhaustive list; there are plenty of other great degrees available, including straight Science and Engineering degrees. To find out more, visit careerswithSTEM.com

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This issue went to press on 30 March 2016.
Printed in Australia by BlueStar Web.

Cover images by: Lauren Trompp (Science) and Tina Smigajski (Engineering)

Produced & published by Refraction Media

Publisher: Karen Taylor-Brown

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Digital Editor: Elise Roberts

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La Trobe University
 >>> Engineering
Macquarie University
 >>> Engineering (Telecommunications Engineering)

Monash University
 >>> Engineering and Commerce Specialist

>>> Laws and Engineering

Murdoch University
 >>> Engineering (Instrumental and Control Engineering)

QUT

>>> Electrical and Aerospace Engineering

>>> Engineering/Mathematics

RMIT University

>>> Civil and Infrastructure Engineering

University of Melbourne

>>> Commerce (Chemical Systems Sequence)/Master of Engineering (Chemical with Business)

University of Newcastle

>>> Engineering/Mathematics

University of Queensland

>>> Engineering/Business Management

University of South Australia

>>> Engineering (Mechanical and Advanced Manufacturing)

University of Technology, Sydney

>>> Engineering/Arts (International Studies)

UNSW Australia

>>> Civil Engineering

>>> Engineering/Surveying

>>> Geospatial Engineering

>>> Mechanical and Manufacturing Engineering

>>> Petroleum Engineering

Western Sydney University

>>> Construction Management

ENG + BE CREATIVE

architecture, design, software...

Australian National University

>>> Engineering/Art

CQUniversity Australia

>>> Building Design

Curtin University

>>> Chemical Engineering and Extractive Metallurgy

Deakin University

>>> Civil Engineering

ENGINEERING

ENGINEERING...
BUT NOT AS YOU
KNOW IT

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