Faculty Profile 2016

UNSW Engineering, innovation in action.
Dean’s message

UNSW Engineering is Australia’s #1 engineering faculty, and in the top 50 globally. It also has the most graduates, research impact, staff and facilities.

With more than 500 academics, and expertise across nine schools and 31 research centres, UNSW Engineering is a powerhouse of innovation. It’s no surprise we dominate the annual Top 100 Most Influential Engineers in Australia list, with 22 last year.

But we also stand tall beyond our shores, respected as a pioneer in solar cells, quantum computing, artificial intelligence and bioengineering. We hold the world record for solar cell efficiency of 40%, created the first two qubit logic gate in silicon, have won a record five RoboCup trophies and are recognised leaders in bionic vision.

And that excellence can only improve, with over $1 billion invested in new facilities in the last five years.

A university’s greatness is reflected in the impact of its graduates. We’re #1 in Australia for producing millionaires, and for graduates who create technology start-ups – like Atlassian, a company founded by two UNSW alumni which was floated for $5.5 billion last year. But our graduates also have social impact, working in developing countries to create clean drinking water or building devices to allow the deaf to hear.

With the current national focus on innovation, we are thriving. In December, our quantum computing team attracted almost $50 million, while four UNSW Engineering researchers were named among Australia’s Knowledge Nation 100 ‘rock stars of innovation’.

More successes will come in 2016. But my intention is to soar higher – for us to be ranked in the top 20 internationally by 2020.

Engineering creates real-life solutions, using technology, design and team-work. It requires lateral thinking and a passion for making the world a better place. It’s these skills we instil in our students, and which we rely upon in our staff to not only make the modern world work better, but to create the future world we will all live in.

Professor Mark Hoffman
Dean of UNSW Engineering

Mission: Through world-class education and research, UNSW Engineering brings passion and creativity to meet global challenges.
We do a lot of work on the molecular characterisations of allergens to understand what makes normal, good proteins allergenic. This research will enable us to design processes and foods that reduce allergenicity.

Associate Professor Alice Lee
Co-director, ARC Training Centre for Advanced Technologies in Food Manufacture

Innovative research

From climate change to quantum computing, researchers at UNSW Engineering are making breakthroughs in some of the world’s biggest issues.

Our international reputation attracts a high calibre of researcher and funding from research grants, Cooperative Research Centres and other public sectors, as well as industry donations.

An incredible vision

UNSW Biomedical Engineering researchers Scientia Professor Nigel Lovell and Professor Gregg Suaning are bringing life transforming hope to millions of people around the world who suffer from degenerative eye diseases.

Their breakthrough work on the world’s first bionic eye began in 1997, with an incredible vision to restore sight to people with retinitis pigmentosa and age related macular degeneration. By 2009, Bionic Vision Australia (BVA) was established, attracting an incredible $42 million of ARC funding.

Joining forces in 2012 with a team of elite surgical experts around Sydney, they began pre-clinical work that recently culminated in the successful demonstration of the UNSW Phoenix99 bionic eye system.

A recent NHMRC funding boost of $1.1 million will allow the team to continue their vital work and bring this exciting technology into mainstream clinical practice.

“We hoped to do for vision what the cochlear implant has done for hearing,” says Suaning.

Scientia Professor Nigel Lovell & Professor Gregg Suaning
Co-leaders of the Bionic Eye Implant Project, Australian Vision Prosthesis Group

Research centres
- Australian Centre for Advanced Photovoltaics
- ARC Centre of Excellence for Functional Nanomaterials
- ARC Centre for Quantum Computation and Communication Technology
- ARC Training Centre for Advanced Technologies in Food Manufacture
- Australian Centre for Nano Medicine
- Australian Centre for Space Engineering Research
- Australian Centre for Sustainable Mining Practices
- Australian Energy Research Institute
- Australian Vision Prosthesis Group
- Australian Water Recycling Centre of Excellence
- Centre for Advanced Macromolecular Design
- Centre for Energy and Environmental Markets
- Centre for Infrastructure Engineering and Safety
- Centre for Membrane Science and Technology
- Centre for Interactive Cinema Research
- Connected Water Initiative
- Integrated Materials Design Centre
- National Centre of Excellence for Desalination
- National Centre for Groundwater Research and Training
- National Information Communications Technology Australia
- Research Centre for Integrated Transport Innovation
- UNESCO Centre for Membrane Science and Technology
- UNSW Water Research Centre
- Water Research Australia
- Australia-US Institute for Advanced Photovoltaics

Cooperative research centres
- Capital Markets
- Data to Decisions
- Greenhouse Gas Technologies
- Innovative Manufacturing
- Low Carbon Living
- Polymers

Industry research fellowships

In 2016 UNSW Engineering is offering 25 Industry Research Fellowships here and overseas. The fellowships, lasting for six months full-time or 12 months part-time, offer researchers access to the University’s expertise and world-class facilities as they work on early-stage projects and knowledge transfer.

Apply for an Industry Research Fellowship: unswe.to/EngIndustryResearchFellowships
Dynamic staff
UNSW Engineering employs 810 staff including 530 academics and 280 professional staff. Our faculty is designed around the world-leading researchers and teachers who:

- Collaborate with industry, business and the wider community
- Win international and national awards
- Secure funding from around the globe
- Are regularly published in peer-reviewed journals
- Sit on professional and academic bodies
- Serve on standards committees and industry advisory boards
- Consult on significant local, national and international projects

Turning the light on polymers
UNSW polymer chemist, Cyrille Boyer, won the 2015 Malcolm McIntosh Prize for Physical Scientist of the Year, one of the Prime Minister’s Prizes for Science, for his innovative work using light to create complex, functional polymers.

An Australian Research Council Future Fellow and associate professor of Chemical Engineering at UNSW, Boyer has been developing a more sustainable process that uses light to build chains of small, repeating molecules known as polymers.

“Light allows us to precisely manipulate and control the polymer properties,” says Boyer.

Using near-infrared light to penetrate a wider range of materials, including human skin, means that non-toxic polymers will be able to be made inside the body, for things like tissue engineering and wound healing, and in implant surgeries.

His work is also focused on intelligent nanoparticles which can deliver antibiotics in combination with carbon monoxide to help in the fight against antimicrobial resistance – a growing international problem that could have catastrophic consequences. This could also yield new treatments for different types of cancer, and improve medical imaging and diagnostics.

Malcolm Turnbull, Prime Minister:
Universities should collaborate or crumble


“We’ve demonstrated for the first time quantum calculations on a silicon chip working with the one and two qubit calculations essential to making quantum computers a reality. Despite our modest investment as a nation, our researchers are leading the way in quantum computing.”

Scientia Professor Andrew Dzurak
Director of the Australian National Fabrication Facility at UNSW
Inspired students

Our undergraduate students are the brightest sparks, with passion and drive to succeed.

Students can choose from 25 engineering specialisations, and numerous dual-degree options. Built around a practical focus, students are taught to think like engineers from day one.

They each undertake a major research project and 60 to 80 hours of on-the-job training during their degree, plus have many opportunities to participate in hands-on projects such as those listed on this page.

UNSW graduates are so inspired and challenged, they were recognised as more employable than any other graduates by LinkedIn’s 2015 top 30 most in-demand employers.

Women in Engineering

At UNSW the focus on Women in Engineering is stronger than ever. Female enrolments have jumped to an all-time high of 22%, keeping us on track for our 2020 goal of 30%. Our commitment for 2016 includes:

- Six new industry-sponsored WIE scholarships
- Outreach activities for school-aged girls including engineering days and week-long WIE camp
- Mentoring and development opportunities for female undergraduate engineering students
- Annual awards recognising the achievements of female graduates

To find out more, visit unsw.to/WIE

Hands-on projects

UNSW Engineering student-led projects are broad ranging, sophisticated and successful. Nowhere else can students be part of career-shaping experiences like these:

- Redback Racing: create and race an open-wheeler racing car
- BLUEsat: space technology, first hand
- sUNSWift: the world’s fastest solar sports car aiming for roadworthiness in 2016
- RoboCup: autonomous robots designed and built by students compete with university teams from across the globe

“I chose Mining Engineering because I love the outdoors, travelling and being active. Here, I can combine that with problem-solving, innovation, creativity and my childhood interest in geology. One day I’d like to share my passion for the mining industry with people from all walks of life.”

Annette Au
5th year BE (Mining)
Successful alumni

With UNSW recently being awarded ‘Most Employable University’ in Australia*, you don’t need to look hard to find our Engineering graduates impacting the way we live at home and around the globe.

*2016 Top 100 Future Leaders Awards, Australian Financial Review and GradConnection

Chris Jenkins
BE (Mechanical Engineering)

CEO of Thales, Chris Jenkins has been thanked personally by soldiers returning from Afghanistan for his company’s role in creating the Bushmaster personnel carrier – which has saved up to 300 lives.

Involved in the defence industry since 1981, Chris joined Thales almost 20 years ago, becoming CEO in 2008. About 75% of Thales’ work in Australia is defence-related but is also involved in many other systems-based projects. Chris has been a keen mentor to UNSW Engineering students on the engineering design of the Sunswift solar car project.

Vicky Binns
BE (Mining)

Vicky Binns is a member of the senior leadership team at BHP Billiton. Influential in the mining sector since her graduation from UNSW in 1986, she led large teams of mining analysts at Merrill Lynch before moving to BHP Billiton where she leads a geographically diverse team of engineering and marketing professionals.

An active promoter of women in mining, Vicky won the 2015 Judy Raper Women in Engineering award for her significant contribution to the sector through leadership, passion and commitment.

Dr Jacqueline Thomas
BSc/BA (Hons), PhD
(Civil and Environmental Engineering)

Jacqueline Thomas spent the last few years in Tanzania trying to understand and prevent the spread of deadly diarrhoeal disease.

She searched for ways not only to reduce the contamination of water supplies, but to treat the faecal sludge to produce safe biosolids for agricultural reuse and dried bricks for burning instead of wood from virgin forests.

Her work is set to make a huge difference to populations not just in Tanzania but around the world.

Simon Blyth
BE (Electrical) (Hons)

Simon Blyth is an electronics entrepreneur. An avid fan of electronics from an early age, after graduating he decided to set up his own embedded systems electronics design house, LXInnovations.

As Managing Director of LX, his work includes a wireless fireworks control system, tsunami alert system, fruit sorting machinery, holographic button interface system, a clarinet playing robot, and a wireless diabetes monitor. Technologies change constantly but for Simon it’s the designing that will never lose its spark.
Extensive programs

We are proud to offer the most diverse degree options in Australia, with the highest entry requirements in NSW, across nine engineering schools.

Undergraduate programs

Bachelor of Engineering (Honours)
- Aerospace Engineering
- Bioinformatics Engineering
- Chemical Engineering
- Civil Engineering
- Civil Engineering with Architecture
- Computer Engineering
- Electrical Engineering
- Environmental Engineering
- Geospatial Engineering
- Industrial Chemistry
- Mechanical and Manufacturing Engineering
- Mechanical Engineering
- Mechatronic Engineering
- Mining Engineering
- Naval Architecture
- Petroleum Engineering
- Photovoltaics and Solar Energy Engineering
- Renewable Energy Engineering
- Software Engineering
- Surveying
- Telecommunications

Bachelor of Science (BSc)
- Computer Science
- Computer Science (Hons)
- Food Science (Hons)

Degree combinations

Bachelor of Engineering (Hons) is offered in combination with:
- Advanced Mathematics (Hons)
- Advanced Science (Hons)
- Arts
- Commerce
- Computer Science
- Engineering Science
- Law
- Music (Hons or Pass)
- Science

Bachelor of Computer Science is offered in combination with:
- Advanced Mathematics (Hons)
- Advanced Science (Hons)
- Arts
- Commerce
- Engineering Science
- Law
- Media Arts (Hons)
- Science

Postgraduate programs

Masters by coursework

Master of Engineering Science (MEngSc) with specialisations in:
- Biomedical Engineering
- Chemical Process Engineering
- Civil Engineering
- Electrical Engineering
- Energy Systems Engineering
- Environmental Engineering
- Food Process Engineering
- Geospatial Engineering
- Geotechnical Engineering and Engineering Geology
- Manufacturing Engineering and Management
- Mechanical Engineering
- Nuclear Engineering
- Petroleum Engineering
- Photovoltaics and Solar Energy
- Project Management
- Renewable Energy Engineering
- Satellite Systems Engineering
- Structural Engineering
- Sustainable Systems Engineering
- Systems and Control
- Telecommunications
- Transportation Engineering
- Water Resources: Catchments to Coast
- Water, Wastewater and Waste Engineering

Master of Engineering (ME) with specialisations in:
- Civil Engineering
- Electrical Engineering
- Environmental Engineering
- Mechanical Engineering
- Telecommunications

Dual Bachelor degrees combining:
- Civil Engineering/Environmental Engineering
- Civil Engineering/Mining Engineering
- Civil Engineering/Surveying
- Materials Science and Engineering/Chemical Engineering

Bachelor/Master dual awards:
- Bachelor of Engineering (Hons) / Master of Biomedical Engineering in Bioinformatics, Chemical, Computer, Electrical, Materials Engineering, Mechanical, Mechatronics, Software and Telecommunications
- Bachelor of Engineering (Hons) / Master of Engineering (Electrical Engineering) (BE (Hons)/ ME (Elec))

Graduate diplomas and certificates

There are Graduate Diplomas (and some Graduate Certificates) for many of the Masters by coursework specialisations listed above.

Research degrees
- Doctor of Philosophy (PhD)
- Master of Engineering (ME)
- Master of Science (MSc)

“UNSW provides numerous career and networking events as well as seminars from both industry and academics which have broadened my knowledge of the space industry in Australia and overseas.”

Tim Broadbent
MEngSc (Satellite Systems Engineering)
"I wanted to be part of the solution to the greatest challenges the world is facing."

Monique Alfris, BE (Renewable Energy)
UNSW graduate and co-founder of Pollinate Energy, an expanding not-for-profit business that provides low-cost clean energy technologies to people without electricity in India.