

CAREERS WITH STEM™ SCIENCE

DOUBLE ISSUE
FLIP OVER FOR SPACE CAREERS

Meet the physicists fighting COVID-19
p12



PARTICLE PHYSICIST

Career cuisine: food science jobs on the menu p16

Calling all animal lovers – find your dream science job! p20



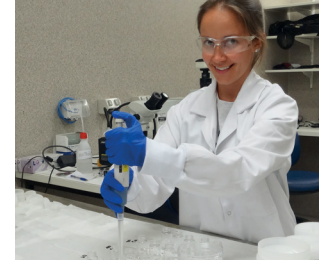
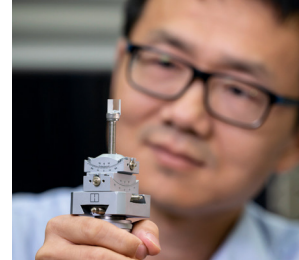
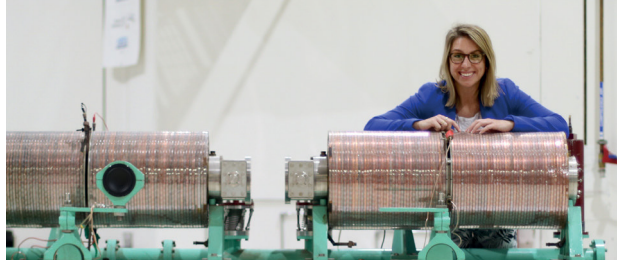
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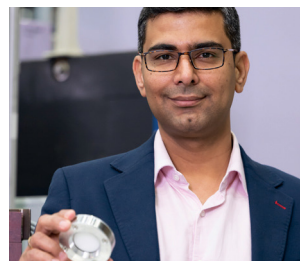
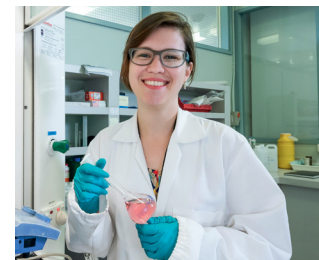
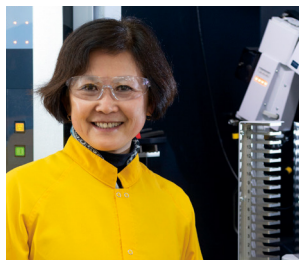
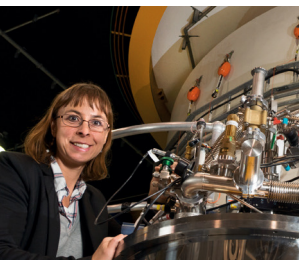
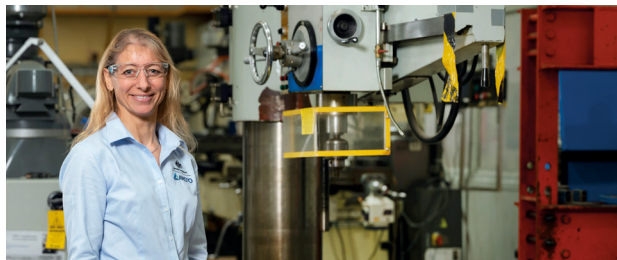
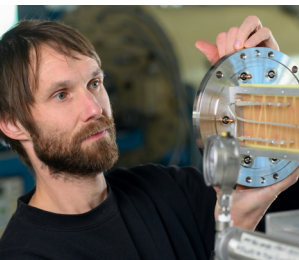




BE INSPIRED.



BECOME INSPIRING.



www.ansto.gov.au/careers

HELP BUILD A BETTER FUTURE WITH STEM

SHAUN JENKINSON
ACTING CEO
ANSTO



A career in science, technology, engineering and mathematics (STEM) offers you a 'seat-at-the-table' to actively bring about real and meaningful change for the human race and our planet.

Scientists and engineers have provided evidence that our world is facing considerable and immediate challenges and equally, scientists and engineers are being called upon to deliver the solutions to these challenges.

From improving human health, to protecting our environment through a better understanding of issues such as climate change or improving advanced manufacturing practices to support industry, STEM graduates will, as never before, play a vitally important role in shaping our future.

If you choose a career in STEM you'll experience a career that provides new opportunities all the time, keeping you engaged throughout your career.

STEM GRADUATES, AS NEVER BEFORE, WILL PLAY A KEY ROLE IN SHAPING OUR FUTURE"

With the evolving nature of work, it is also now very unlikely that people will end their career in the same field that they started. By studying STEM, you will develop highly transferable skills that can be used in just about any occupation or industry—setting you up for an exciting future where you can make important contributions to society.

So if you have a curious mind, or if you like to solve problems and bring new ideas to life, I encourage you to make your first move towards a career in STEM. One day I may even have the opportunity to welcome you to a job at ANSTO.

Shaun Jenkinson
Acting CEO, ANSTO

FLIP THE MAGAZINE OVER FOR SPACE CAREERS!

What's inside?

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STEM + X = 😊
Combine science (STEM) with your passion (X) to discover your dream career.

Science + ...

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WHY SCIENCE?

As we face challenges from climate change to a pandemic, the crucial role of science is clearer than ever, and in 2020 the Australian government highlighted STEM degrees as a priority based on industry demand, with new incentives for students to choose this pathway.

Our scientists are not only solving global challenges, they're contributing to a prosperous economy through creative innovation and industry partnerships. Scientists don't just work in the lab and field – they collaborate on innovative areas that lead to new industries. Science prepares you for next-gen careers.

In this edition of Careers with STEM, we present the human face of science's contribution using real-life career profiles and case studies.

The magazine also aims to showcase the diversity of career paths in science, and we hope to inspire you to combine science with your passion to create a rewarding career path!



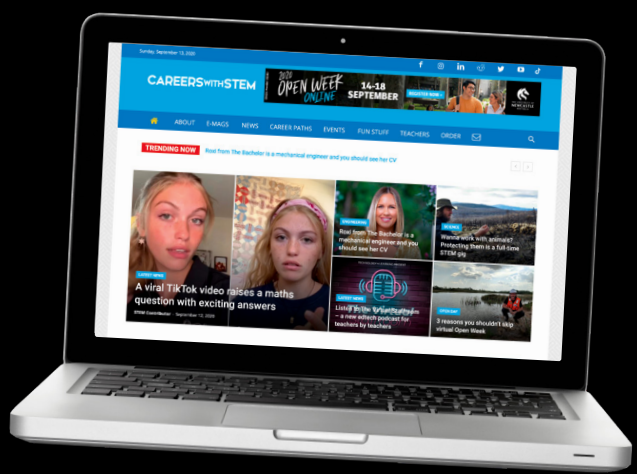
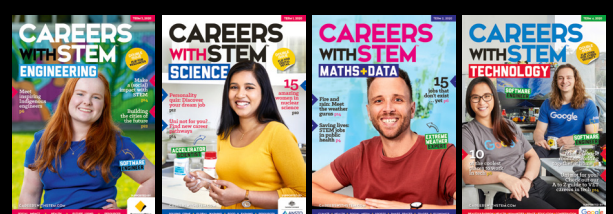
Celebrating Indigenous STEM!
Check out our new issue all about Indigenous people in STEM – throughout history, today and into the future.
[CareerswithSTEM.com/indigistem](https://careerswithstem.com/indigistem)

WHAT IS CAREERS WITH STEM?

The Careers with STEM hub includes a quarterly magazine, posters, videos, events, webinars, quizzes and website to help young people discover the careers of the future. Each year we deliver four magazines across each of the STEM disciplines, plus special editions, like Data Science and Cyber Security.

We believe everyone should have equal access to build a better future. Many of tomorrow's careers will combine STEM skills with other areas. We call it 'STEM + X' – like Technology + Fashion = 3D-printed clothes or Maths + Sport = footy statisticians.

For more Careers with STEM role models, quizzes and STEM + X ideas and inspiration, head to [CareerswithSTEM.com](https://careerswithstem.com)



Follow Careers with STEM online!





Think STEM. Think QUT.

Naomi Paxton has established herself as a talented and driven researcher while still studying at QUT. 'I've always loved science, so when I finished high school I applied for a science degree in physics', Naomi said.

After commencing her studies with research into astrophysics, Naomi was inspired by a presentation that introduced her to the field of biofabrication. She applied for a PhD in biofabrication and has never looked back.

'My research aims to help patients who have lost bone as a result of accidents, birth defects

or diseases such as cancer. We are developing solutions to 3D print bioresorbable scaffolds containing the patient's own cells.'


As an enthusiastic science communicator, Naomi is determined to inspire others to take the pathway into STEM careers, with a particular focus on young women.

Naomi not only lives and breathes her profession, she puts her heart and soul into supporting her passion in the real world.



HUMANITIES TO STEM

Humanities and STEM can go hand-in-hand! Discover how to connect your humanities passion with STEM subjects to build a dream career



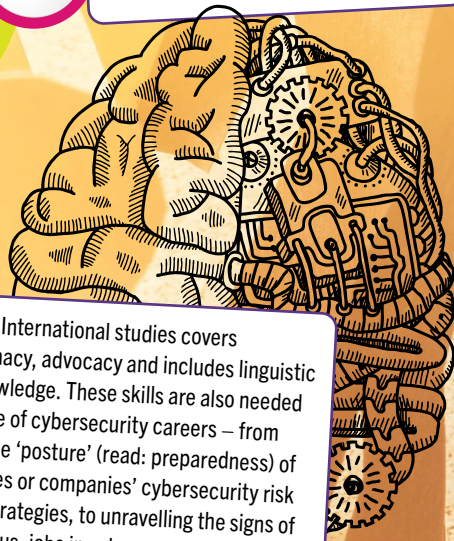
Geology. Study rocks and fossils and understand the truly ancient history of how the Earth formed, how life began, what makes the landscape the way it is and how knowledge of past processes can reveal what's happening around us today (think: climate change!).

Try

If you're into
Ancient history

Or add

Data science. Understanding how to process huge amounts of information is an analytical process not unlike delving into theories of ancient cultures. You need to be able to trawl through the data and make decisions about what's important, and then find new ways to communicate this to modern society.




Environmental studies. Global cooperation is essential to mitigating climate change. Studying international policy, economics, law, ethics and the interaction between the natural and built environment is a complex and rewarding task.

Try

If you're into
International studies

Or add

Cybersecurity. International studies covers business, diplomacy, advocacy and includes linguistic and cultural knowledge. These skills are also needed in a diverse range of cybersecurity careers – from understanding the 'posture' (read: preparedness) of different countries or companies' cybersecurity risk awareness and strategies, to unravelling the signs of a cyber attack. Plus, jobs in cybersecurity are set to boom with 17,000 new jobs to fill by 2026.



Science + Innovation. Some unis (like University of Newcastle and University of Technology Sydney) are offering a combined degree, adding a Bachelor of Innovation and Entrepreneurship (or Creative Intelligence and Innovation) to a Bachelor of Science degree. Your career goal? Invent the industries and technologies of tomorrow. From quantum computing to the green economy, science is basically about creating the future.

Try

If you're into
Architecture or design

Or add

Computer science. Being able to manipulate things in 3D, understand data and visualise how people move through and use infrastructure can all be done better if you understand the technology behind the tools.



If you're into
Straight up science

Try

Science + Gaming/Business/Communications/Engineering/IT/Creative Industries/Built Environment...

There are so many options when you first start studying. Although STEM careers are growing 1.9 times faster than other jobs, getting a great job and being employable means following your passion -- because if you love what you do, you'll be better at it. By combining STEM with your passion (or 'X') you can open yourself up to the careers that haven't even been invented yet.

Discover your STEM + X with Careers with STEM
[CareerswithSTEM.com/quizzes](https://careerswithstem.com/quizzes)



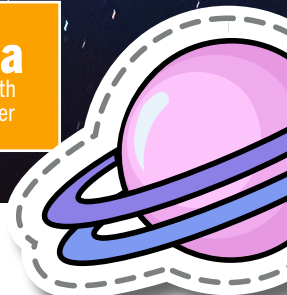
THE PERIODIC TABLE OF SCIENCE CAREERS



Study this epic careers list and score some extra credit with your careers advisor

Love science but not sure which career path to head down? Take your fave science-related subject and suss out the corresponding job opportunities. Yep, a periodic table totally worth pulling an all-nighter for! – Cassie Steel

C Chemical Engineer	Con Conservator								
Fs Forensic Scientist	Che Chemistry Teacher								
Msc Materials Scientist	Rsc Research Scientist	Gen Genetic Engineer	Te Test Engineer	Dsc Data Scientist	Inf Information Architect	Ten Telecomms Engineer	Cla Cloud Architect	Wan Web Analytics Developer	
Geo Geochemist	Bc Biochemist	Las Laboratory Assistant	Pr Physics Teacher	Ga Game Developer	Se Software Engineer	Ude UX Designer	Ds Decision Scientist	Ust UX Strategist	
Tot Toxicologist	Hw Hazardous Waste Chemist	Ne Nuclear Engineer	Qat Quantitative Analyst	Sde Software Developer	Map Mobile App Developer	S Systems Analyst	Pr Programmer Analyst	Id Interaction Designer	
Pha Pharmacologist	Pe Perfumer	N Nano Technologist	IT IT Consultant	AI AI Specialist	SS SEO Specialist	Sa Security Administrator	Uxp UX Product Manager	Jd Java Developer	
	An Analytical Chemist	Cse Cybersecurity Analyst	DA 3D Animator	Wd Web Developer	Mte Marketing Technologist	Ss Statistics Specialist	Fd Front End Developer		
	Pe Process Engineer	Ins Information Systems Engineer	Eh Ethical Hacker	P Penetration Tester	Dar Data Architect	Gha Growth Hacker			





KEY

Chemistry

Physics

Computer science

Biology

Space

Environmental science

Health science

Food science

Animal science



Sc
Sustainability
Consultant

Ee
Environmental
Engineer

Se
Seismologist

P
Physician

Nut
Nutritionist

Cr
Crop Scientist

Ssci
Soil Scientist

H
Horticulturalist

Au
Audiologist

Mrs
Medical
Research
Scientist

Ft
Food
Technologist

Ast
Agronomist

B
Biologist

Ar
Academic
Researcher

Pst
Pharmacologist

Esc
Environmental
Scientist

Oer
Oceanographer

Pht
Pharmacy
Technician

P
Psychologist

Qam
Quality
Assurance
Manager

Fsci
Food
Scientist

Ec
Ecologist

Zst
Zoologist

Vn
Veterinary
Nurse

Ae
Agricultural
Engineer

Mst
Marine
Biologist

Rt
Radiation
Therapist

Ch
Chiropractor

Fm
Food
Microbiologist

Fi
Food
Inspector

Bst
Biotechnologist

Gco
Genetic
Counsellor

Ast
Astrophysicist

As
Atmospheric
Scientist

Ert
Emergency
Response
Technician

Ber
Biomedical
Engineer

Pst
Physiotherapist

Fe
Food
Engineer

Flc
Flavour
Chemist

Bt
Biology
Teacher

Apt
Anatomical
Pathology
Technologist

Aer
Astronomer

Hyd
Hydrologist

Vst
Volcanologist

Po
Podiatrist

Mim
Medical
Imaging
Technologist

Fc
Food
Chemist

Bio
Biosecurity
Researcher

M
Microbiologist

Nst
Nano
Technologist

Aen
Aerospace
Engineer

Cs
Conservation
Scientist

Mst
Mineralogist

Spt
Speech
Pathologist

Occ
Occupational
Therapist

Ss
Sensory
Scientist

Se
Satellite
Engineer

Wtt
Wind Turbine
Technician

Bi
Biostatistician

Par
Paramedic

Die
Dietician

Fpd
Food Product
Developer



BECOME A BUSINESS-SAVVY SCIENTIST

Science isn't all research and academia – commercially minded scientists are turning their inventions and discoveries into real-world products and successful businesses all the time

When you think of science, you probably envision someone with crazy hair in a white lab coat, asking mind-bending questions about the nature of the universe (um, thanks movie stereotypes). And when you think “entrepreneur” or “startup”, you might picture: new apps and digital technology, rather than biology, physics and chemistry.

In reality, science is a hotbed of innovation, with the products of bright ideas and discoveries being commercialised by business-savvy scientists all the time. In fact, according to a 2016 report by the Office of the Chief Scientist, more than a quarter of Australia's economy can be attributed to advances in science over the past 20 to 30 years.

And our big science institutions are all over this potential, offering ways to connect startups and small businesses with their facilities and research expertise – there's nandin Innovation Centre at

ANSTO, CSIRO Kick-Start and D.Start at Defence Science and Technology (DST).

“Australia has world-class research capability and the potential to lead in future industries like advanced manufacturing, hydrogen, space and quantum technologies,” says Dr Cathy Foley, CSIRO chief scientist and newly appointed as Australia's chief scientist.

“We can also lead in new industries created by advances in science research in climate, biology and agriculture-related technologies.” – *Gemma Chilton*

START YOUR CAREER HERE

SCIENCE+INNOVATION STUDY

Bachelor of Science / Bachelor of Business, Griffith University
 Bachelor of Science / Bachelor of Innovation and Entrepreneurship, University of Newcastle
 Bachelor of Science and Business, UNSW

SCIENCE+INNOVATION JOBS

Entrepreneur: Commercialise your idea or invention and start a biz. You could be earning an average salary of around \$70K* (in Australia) – but really, the sky's the limit!

*Source: salary according to payscale.com



Are you a future entrepreneur?
 Take our online quiz
bit.ly/cws-entrepreneur-quiz

INNOVATION LINGO 101

ENTREPRENEUR: SOMEONE WHO STARTS A NEW BUSINESS, TAKING ON RISK IN THE HOPE OF FINANCIAL REWARD

STARTUP: A SMALL, NEWLY ESTABLISHED BUSINESS BRINGING A NEW, UNIQUE IDEA TO THE MARKET

SPIN-OFF: A STARTUP CREATED FROM ANOTHER ORGANISATION, SUCH AS A UNIVERSITY OR RESEARCH INSTITUTE

INTELLECTUAL PROPERTY (IP): PROPERTY THAT YOU OWN, WHICH COMES FROM YOUR PERSONAL CREATIVITY AND IDEAS, SUCH AS AN INVENTION

INCUBATORS AND ACCELERATORS: ORGANISATIONS THAT HELP STARTUPS AND INNOVATORS GROW AND EXPAND TO BECOME SUCCESSFUL

BIG-PICTURE THINKER

INDUSTRIAL DESIGN GRAD, INNOVATOR AND ENTREPRENEUR SHANSHAN WANG IS TACKLING SOME MEGA HEALTH SCIENCE PROBLEMS

So many innovations start with a problem. For ShanShan Wang that problem was “what on earth am I going to write my thesis on?”

The answer came in surprising form – she spotted a mother and young child, tugging around a large cylinder, which she later learned was for the supply of pure oxygen. After some research, ShanShan realised there hadn’t been much improvement to this method of delivery for a long time, despite many people needing to use O2 tanks daily. “I saw a problem, and I wanted to solve it,” she says.

ShanShan started her STEM journey by learning how to code in high school. Later, an arts and design tour at the MoMA gallery in New York exposed her to industrial design. ShanShan knew she wanted to make things that people would love to use, which led her to study industrial design at UNSW Sydney.

ShanShan launched Roam Technologies – and a plan to convert air to O2 on demand, in

TRY TO FIGURE OUT IF YOUR IDEA IS A NEED OR A WANT. IF IT'S A NEED, IT WILL HAVE A BIGGER IMPACT ON THE WORLD"

BACHELOR OF INDUSTRIAL DESIGN, UNSW

INDUSTRIAL DESIGNER, FORCITE HELMET SYSTEMS

STRATEGIC INNOVATION, SPHERE HEALTHCARE

FOUNDER AND CEO, ROAM TECHNOLOGIES



SHANSHAN WANG
INDUSTRIAL DESIGNER

a small, easy-to-transport device – the year after she graduated from university. She has since won more than five international design, entrepreneurship and innovation awards.

IMPACTFUL HEALTH

ShanShan says that looking at the big picture of a problem is vital for innovation. So, for her, one of the most exciting parts of this project was combining the device with data and closing the loop between hardware, software, and those working in the medical industry.

“It’s impactful health,” she says. “And this year, COVID-19 has exacerbated a lot of problems that we’re trying to solve, so it’s more important than ever.” She and her team are accelerating development of the device for regulation approval, before it is released to the wider market.

And it’s not the only health-based project ShanShan has been working on, either. This year she participated in a few hackathons, resulting in the creation of Elavo which is an integrated infection control system (see p12).

ShanShan’s advice for the next generation of innovators? “Try to figure out if your idea is a need or a want. If it’s a need, it will have a bigger impact on the world. As Steve Jobs said, make a dent in the universe.” – Cassie Hart

CLEAR THE AIR

SHANSHAN WANG
INDUSTRIAL DESIGNER

Particle physicists at ANSTO teamed up with tech professionals to help fight the spread of COVID-19

DR MITRA SAFAVI-NAEINI
PHYSICIST AND RESEARCHER



@MitraJoon

IF YOU CAN
MINIMISE THE NUMBER
OF PATHOGENS YOU
WOULD, RIGHT? IT'S
A NO BRAINER"

BACHELOR OF ENGINEERING,
UNIVERSITY OF TORONTO

PHD IN MEDICAL RADIATION PHYSICS,
UNIVERSITY OF WOLLONGONG

RESEARCH FELLOW,
UNIVERSITY OF WOLLONGONG

FACILITY FELLOW,
NATIONAL IMAGING FACILITY

IMAGE QUANTIFICATION
RESEARCH LEADER, ANSTO

ANSTO's innovation centre

Sometimes called a 'people collider', **nandin** is a place where startups and small businesses can connect with researchers and facilities at ANSTO to come up with innovative solutions to challenging problems.

The word '**nandin**' means '**look ahead**' in the local Dharawal language.

In March 2020, a woman unknowingly infected with COVID-19 spread the disease to 71 other people after taking a solo trip in a lift.

Enclosed public spaces with recirculated air, like lifts, are high-risk for spreading disease. But what if there was a way to purify the air and keep the space free of virus particles? A group of scientists from ANSTO – one of Australia's biggest public research organisations and Australia's centre for nuclear expertise – teamed up with tech professionals from its innovation centre, nandin, for NASA's Space Apps COVID-19 Challenge, to try and solve that problem.

The NASA hackathon lasted 48 hours, and the ANSTO/nandin team, including industrial designer ShanShan Wang (pictured, and on p11), started by calculating how much air in a lift is exhaled from other passengers – around 2%, or 48 litres. "That's like 24 2L milk bottles hanging from the ceiling," explains team captain Dr Mitra Safavi-Naeini, a particle physicist and cancer researcher from ANSTO.

Inspired by space

They also looked at how COVID-19 cases in New York City compared with public transport use, and found a strong correlation. Around 75% of the air was recirculated, meaning that if more than 20% of a train carriage is occupied, airborne pathogens (disease particles) could be circulating.

"There is a question of how much one has to breathe prior to getting infected, but if you can minimise the number of pathogens, you would, right? It's a no-brainer," says Mitra, who also leads research into human health at ANSTO.

The solution they came up with, called Elavo, draws inspiration from the International Space Station (ISS). First, a titanium dioxide cartridge – used on the ISS to inactivate pathogens in the air – would be fitted into the recirculation system. Then the empty lift or train carriage would be exposed to ultraviolet light to inactivate pathogens on surfaces. Finally, acoustic sensors could detect coughs and sneezes and increase airflow through the system when needed.

The project won the Best Use of Technology prize against 1400 other teams. It was the ANSTO/nandin team's third hackathon, and their third win. The prize for Elavo includes an invitation to see the next NASA rocket launch.

The Elavo team is also already in discussions with potential investors and business partners that could make the technology a reality. – *Chloe Walker*

ALL THE SMALL THINGS

FAILING FIRST-YEAR CHEMISTRY DIDN'T STOP DR ELEANOR CAMPBELL FROM LANDING HER DREAM JOB AT ANSTO'S AUSTRALIAN SYNCHROTRON

If you want a 3D view of the molecules in a protein, a virus, or some DNA, you're going to need some specialist technology – and someone to help you use it. That's where scientists like Eleanor can help. She looks after two pieces of technology at ANSTO's Australian Synchrotron – a pair of macromolecular X-ray crystallography (or MX) beamlines – and helps visiting scientists use them for their research.

"My job is primarily to keep the X-rays coming smoothly," she says. "Our day-to-day work is making sure the equipment is working to the highest quality it can, so that other researchers get the best data from their experiments."

Eleanor first encountered the MX beamlines while working on her PhD in chemistry at the Australian National University (ANU). For a few weeks at a time, she would travel from Canberra to Melbourne and use the machines to map the molecular structures of enzymes to see how they change under different conditions. By manipulating the chemistry of enzymes, we can engineer them to do useful things – in Eleanor's case, breaking down harmful pesticides.

MY ADVICE IS. DON'T FEEL LIKE ANYTHING IS A WASTE OF TIME"

Chemistry wasn't always Eleanor's first choice – the daughter of an air force pilot, she always loved physics. Eleanor only signed up for chemistry in first year to keep a friend company in class, and ended up failing her exams. But her interest grew as she went deeper into the subject, and she ended up completing a double major and then a PhD.

"My advice is, don't feel like anything is a waste of your time," Eleanor says. "The more diverse your background and interests, the more you're going to be able to bring to roles."

After finishing her PhD, Eleanor continued her enzyme research at the University of Cambridge in the UK. Then the job at the Australian Synchrotron came up. Eleanor got the job, moved back to Australia in January 2020 – and then the pandemic hit. Melbourne went into lockdown, and suddenly Eleanor was working from home in a new city.

Equipment at the Synchrotron was also suddenly in high demand for research into the coronavirus. Eleanor has assisted a number of researchers who are trying to develop drugs to combat COVID-19.

Despite the strange start to her new job, Eleanor wouldn't trade it for the world. "I love everything about my job," she says.

"I cannot imagine ever being bored here because there's so much happening all the time." – *Chloe Walker*



DR ELEANOR CAMPBELL
SCIENTIST

BACHELOR OF SCIENCE (CHEMISTRY)
WITH HONOURS, ANU



PHD IN CHEMISTRY,
ANU

POSTDOCTORAL RESEARCHER,
UNIVERSITY OF CAMBRIDGE



BEAMLINE SCIENTIST, AUSTRALIAN
SYNCHROTRON/ANSTO

Bill of health

A career in Australia's healthcare sector will save lives – and set you up for life

When you think of a job in healthcare, you probably think of a doctor or a nurse – but there's a huge range of roles out there dedicated to saving lives and improving wellbeing.

According to the government's Job Outlook website, healthcare and social assistance is the largest industry in Australia, employing more than 1.5 million people. It's also growing due to the government's National Disability Insurance Scheme (NDIS), our ageing population and an increase in chronic disease. And that's not to mention the pandemic that 2020 decided to throw in the mix! So demand isn't going away any time soon. – *Gemma Chilton*

START YOUR CAREER HERE

SCIENCE+HEALTH STUDY

Bachelor of Biomedical Science (Honours),
Australian Catholic University
Bachelor of Health Science, Edith Cowan University
Bachelor of Health and Medical Sciences,
The University of Adelaide

SCIENCE+HEALTH JOBS

Biomedical scientist: \$41K–\$98K

Immunologist: \$68K–\$370K

Physiotherapist: \$54K–\$89K

Prosthetist: \$50K–\$112K*

*Source: salaries according to payscale.com

A TO Z OF HEALTH JOBS

WONDERING WHERE A HEALTH SCIENCE OR RELATED DEGREE COULD TAKE YOU? KICK OFF YOUR CAREER RESEARCH WITH THIS A TO Z LIST – WHICH BARELY EVEN SCRATCHES THE SURFACE OF ALL THE HEALTHCARE JOBS OUT THERE!

Audiologist

Identify, assess and manage hearing and balance disorders

Biomedical scientist

Do lab tests to help docs diagnose and treat people

Cardiologist

Diagnose and treat heart disease and abnormalities

Dietician

Be an expert in nutrition and human diet

Epidemiologist

Study disease and health at the population level

Forensic scientist

Collect, interpret and analyse evidence related to crimes. Not strictly health science but there's a big overlap in skills and bodily fluids!

Genetic counsellor

Help patients understand and cope with genetic conditions

Health information manager

Plan, manage and maintain health information systems including patient records

Infectious disease expert

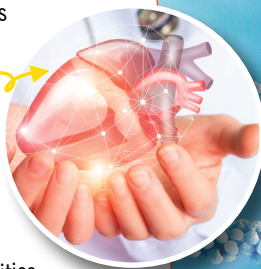
Treat patients with rare infections

Journalist

A science communicator or a journalist specialising in health-related news

Kid's health specialist

Also known as a paediatrician



Lab technician

Work in pathology labs to help doctors and scientists diagnose and treat disease

Molecular geneticist

Detect, analyse and interpret disease-linked genetic abnormalities

Nuclear medicine technologist

Use radioactive materials to diagnose physiological and metabolic changes within the body and treat diseases

Ophthalmologist

Identify and treat eye disorders and diseases

Prosthetist

Make and fit artificial limbs (protheses) for people who have a disability

Quality and risk coordinator

Ensure practices are safe and up to standard in a hospital or medical setting – saving patients' lives and hospitals from lawsuits!

Radiation therapist

Draft, plan and execute radiation treatment for cancer patients

Sports and exercise scientist

Study how the human body works during sports and exercise to promote health and performance



Toxicologist

Study the adverse effects of chemical substances on living organisms (and humans!)

Urologist

Specialise in the study and treatment of the urinary system

Vaccine scientist

Prevent or cure diseases by attempting to develop, trial and execute effective immunisation programs

Ward assistant

Get exposure to the hospital environment before you graduate or commit to a career in the health sector – you'll assist hospital staff with non-medical duties such as transporting patients

X-Ray specialist

OK so they're actually called radiologists – but there aren't many words that start with X, and X-Ray specialist really does a better job of explaining what these peeps do (although the equipment they use extends to other medical imaging devices including MRI and CT scanners)

Youth mental health expert

A mental health professional – such as a psychologist or counsellor – working specifically with young people

Zoo veterinarian

Humans aren't the only animals that get sick! Zoo vets provide medical treatment to the many species of animals kept at zoos



CANCELLING CANCER

REBECCA ABBOTT IS ON A MISSION TO FIND TREATMENTS AND CURES FOR BRAIN CANCER

When Rebecca decided to study Biomedical Science at the Australian Catholic University (ACU) without even seeing the campus, she couldn't have imagined where it would take her. Now in the second year of a PhD trying to find a new treatment for brain cancer, she realises it was the best decision she could have made.

"I couldn't have asked for a better environment to study biomedical science, or more opportunities than I had at ACU," she says. Small class sizes and great support meant Rebecca felt like "more than just a number". Chances to take on responsibilities, like being a lab facilitator for students in the years below, allowed her to learn practical skills and gain experience in communicating science. And unique opportunities to gain independence and learn outside ACU were grabbed with both hands.

As part of her ACU course, Rebecca completed six immunology elective units at Monash University over two years. She also signed up to a two-week intensive healthcare ethics course in Rome. "I loved it so much that I signed up for another two-week course in Italy that year!"

KICKING LIFE GOALS

The same year, she took on a job as a student research assistant at the Peter MacCallum Cancer Centre in Melbourne, providing crucial real-world experience and learning opportunities.

As someone whose family had been touched by cancer, one of Rebecca's life goals had been to work at an institute dedicated to cancer research.

Today, Rebecca is trying to re-engineer



REBECCA ABBOTT
IMMUNOLOGIST

a subset of a patient's own immune cells to fight brain cancer. Brain cancer has one of the lowest survival rates of any type of cancer – only 22%* of brain cancer patients survive at least five years after diagnosis. "This is what motivates me to get out of bed in the morning," Rebecca says.

For her PhD at the Walter and Eliza Hall Institute of Medical Research (WEHI), Rebecca takes blood from patients, and isolates a special type of white blood cell. She then engineers this blood cell by giving it the specific 'key' that it needs to be able to fit the 'lock' on the brain tumour cell. This enables the immune cell to recognise and kill the cancer cell.

"I hope what I'm working on will one day make a real-world difference to a patient diagnosed with brain cancer and their family," Rebecca says. – Ben Skuse

I HOPE WHAT I'M WORKING ON WILL ONE DAY MAKE A REAL DIFFERENCE TO A PATIENT DIAGNOSED WITH BRAIN CANCER"

BACHELOR OF BIOMEDICAL SCIENCE, AUSTRALIAN CATHOLIC UNIVERSITY

HONOURS (SCIENCE), UNIVERSITY OF MELBOURNE/WEHI

PHD (IMMUNOLOGY), WALTER AND ELIZA HALL INSTITUTE OF MEDICAL RESEARCH (WEHI)

WEHI/SHUTTERSTOCK / *SOURCE: AUSTRALIAN GOVERNMENT NATIONAL CANCER CONTROL INDICATORS

Food for thought

When it comes to jobs in food science, there's a whole menu of careers to explore

Can't choose between science or food? As the taco girl says – why not both...

There are plenty of areas you can cook up a career in food science. Like, think about how food gets from 'farm to plate' for instance, or the research and development that goes into producing crops and livestock – how are foods processed and packaged? How are they stored and moved safely to where they'll be sold? Quality controls are needed at every stage to ensure a safe product for the end consumer, as well as a complete nutritional breakdown and information on where the ingredients have come from.

A new taste for science

"As a food scientist or food technologist, you have the opportunity to work in diverse areas, from formulating new foods and beverages, improving their nutrition and safety, to developing processes or technology to make food products," says Lita Katopo, a senior food scientist and technologist at CSIRO.

According to the Australian Institute of Food Science and Technology, jobs such as nutritionist, food technologist, research and development and

quality assurance officer, are rife in areas like food chemistry, sensory and consumer sciences, food engineering, quality assurance, nutrition and regulation. #choice

Before the kitchen

So, you've decided the food game is for you, but what does that look like from a study perspective? The usual starting point is a Bachelor of Science in the engineering, biological, physical or chemical sciences, but you can do an Honours year, following your area of specialty or look out for opportunities like scholarships and mentor programs that can lead to internships, too.

You could be doing research in state-of-the-art commercial labs solving real-life industry problems at uni. For instance, there are eight universities currently partnering with the Fight Food Waste Cooperative Research Centre to divert food waste into other purposes.

"I find it so rewarding to see products that you have helped make in supermarkets, with people buying them," says Lita. – *Kirsten Colvin*

FOOD SCIENCE WINS FOR OZ!

AUSTRALIAN FOOD SCIENTISTS ARE HITTING IT OUT OF THE PARK WHEN IT COMES TO COOL NEW DISCOVERIES IN THE EDIBLE ARENA...

✓ CSIRO have figured out adding seaweed to cow feed will reduce their methane emissions

✓ CSIRO biochemical engineer, Dr Simon Harrison, built the first-ever virtual mouth to investigate the science of chewing

✓ Aussie researchers have produced the world's first probiotic drink to deliver good bacteria to the gut

✓ Wine producers are upcycling waste into grape-seed extract for nutraceutical products

✓ CSIRO are using shockwave tech to extract bioactives from plants

START YOUR CAREER HERE

SCIENCE+FOOD STUDY

Bachelor of Science (Food Science), Curtin University

Bachelor of Science (Food Science and Nutrition), The University of Queensland

Bachelor of Nutrition and Food Sciences, University of South Australia

Bachelor of Sustainable Agriculture and Food Security, Western Sydney University

SCIENCE+FOOD JOBS

Food scientist: \$44K–\$96K

Food technologist: \$50K–\$93K

Nutritionist: \$44K–\$105K

Quality assurance manager: \$57K–\$124K*

*Source: salaries according to payscale.com

Cream of the crop

Professor Michelle Colgrave is tackling one of the biggest challenges the world faces: making sure we have enough food to go around



**PROFESSOR
MICHELLE COLGRAVE**
FOOD RESEARCH SCIENTIST

I joined Edith Cowan University in 2018 after being offered the role of ‘Professor of Beer,’ jokes Michelle Colgrave. Though her actual title is Professor of Food and Agricultural Proteomics, Michelle’s success in studying one particular protein gave her a reputation as a beer science expert. It led to an ultra-low-gluten barley that is now being used to make beer.

More than a good brew

Michelle’s work on proteins, the building blocks of life, is much more than beer science. She’s pinning down proteins involved in how plants, animals and insects are impacted by genetics or the environment. She hopes this understanding will help us produce more food – but better, safer and less harmful to our environment.

Michelle’s passion for food science developed when a love for science was sparked by “an inspiring science teacher, Mr Bruce” at her first high school in Batemans Bay, NSW. She then made the link between science and food at the agricultural high school she attended in Sydney. Finally, a science degree and PhD mentored by Professor Margaret Sheil – Australia’s first female

WE NEED TO MAKE MORE FROM LESS, UPCYCLE WASTE AND ENSURE IT’S SAFE FOR ALL”

professor of chemistry – gave her the skills she needed to succeed as a protein scientist.

Fast-forward to today and Michelle is involved in a range of cutting-edge food science research. Some days she can be found testing foods involved with food allergy or intolerance to make sure it’s safe for people. Other days she’ll be looking at insects to see if they have the same proteins as seafood that cause allergy.

Changing food systems

Michelle’s latest project is looking at why wheat seeds sometimes sprout at the wrong time. Understanding the proteins involved could help farmers improve wheat quality and avoid wheat losses. With 10 billion hungry mouths to feed around the globe by 2050, farmers will need ideas like this to help them produce 70% more food.

“We need to make more from less, upcycle waste into new ingredients and ensure it’s safe for all,” says Michelle. “It’s an exciting time to be in food research.” – Ben Skuse



@michellecolgrave

BACHELOR OF SCIENCE
(ANALYTICAL CHEMISTRY),
UNIVERSITY OF WOLLONGONG

PHD (BIODIAGNOSTIC MASS
SPECTROMETRY), UNIVERSITY
OF WOLLONGONG

POSTDOCTORAL RESEARCH
FELLOW, UNIVERSITY OF
QUEENSLAND

PROTEOMICS RESEARCH
SCIENTIST, CSIRO

PROFESSOR OF FOOD AND
AGRICULTURAL PROTEOMICS,
EDITH COWAN UNIVERSITY

GOOD GRUB!

ENTOMOLOGIST AND FOOD SCIENTIST SKYE BLACKBURN LAUNCHED HER OWN STARTUP TO GET BUGS ON OUR PLATES

"I tried crickets, grasshoppers and bamboo worms in Thailand. They were tasty, although the worms were oily and a bit too spicy for me!" recalls Skye Blackburn of her first taste of bugs.

When she got back from her holiday, Skye, who was already working as a food scientist (and had her own bug-based education business), made 1000 lollipops with insects like mealworms and scorpions inside them, and set up a stand at a pet expo. They sold out in an hour.

"I decided to send some crickets and mealworms for nutritional testing. When I got the results, I was shocked that no-one was eating them as a source of food. They

SKYE BLACKBURN FOOD SCIENTIST

had a complete amino acid profile; they were like a superfood! I thought, you know what? If anyone can convince people that eating insects is a good idea, it's me. As an entomologist and food scientist I had the perfect combination of skills."

Skye set up her own insect-breeding facility and processing plant and hasn't looked back. Her edible-bug products have evolved to meet changing tastes and the novelty lollipops have made way for foods like high-protein cricket pasta.

"Even though I didn't set out to teach people about edible insects, I've taken my skills and made it into something really awesome." – Kirsten Colvin

Don't try this at home!
Only sample edible bugs that have been farmed and prepared for that purpose. If you are allergic to seafood, avoid eating bugs as they can cause a similar reaction.



BACHELOR OF SCIENCE (BIOLOGICAL AND CHEMICAL TECHNOLOGY) (INVERTEBRATE BIOLOGY), WESTERN SYDNEY UNIVERSITY

GROUP TECHNICAL MANAGER, THE SYDNEY BISCUIT COMPANY

BUTTERFLY SKYE'S, BUTTERFLY RELEASE AND INSECT EDUCATION BUSINESS

FOUNDER, CIRCLE HARVEST (FORMERLY THE EDIBLE BUG SHOP)

MAKING MENUS

BONNY RAWSON IS A PROUD BALLARDONG NOONGAR WOMAN, WHO DISCOVERED A NEW WORLD OF FOOD VIA AN AIRLINE CORPORATE GIG

As a product technologist, Bonny Rawson works with a team to bring new choice to the supermarket aisle. "It's great because I'm not just stuck in the office," she says. "I love being able to travel and work with different people, from supply chain and category managers, to suppliers – big and little. I love being around food, and eating it!"

Bonny studied a Bachelor of Science (Food Science and Technology major) at Perth's Curtin University, and then went on to do Honours.

In her last year at uni, she joined CareerTrackers, a program that links Indigenous students with the corporate world. That led to an internship at Qantas' Q Catering division where she helped develop menus for business- and first-class meals.

After uni, Bonny joined Coles as a Quality Inspector at a Perth distribution

BONNY RAWSON PRODUCT TECHNOLOGIST

centre, then went on to the company's Store Support Graduate program which led her to a career as a product technologist.

"You can stay in one category or move around, I choose to move around. I like to try new things and learn a bit more. I do want to develop my technical skills further, so I'm still figuring out what the career path is from here. I've got lots of ideas! I was accepted to be on an advisory committee for CSIRO's Young Indigenous Women's STEM Academy. It's fun and such a diverse career." – Kirsten Colvin

YOU CAN STAY IN ONE (FOOD) CATEGORY, BUT I CHOOSE TO MOVE AROUND"

BACHELOR OF SCIENCE (FOOD SCIENCE AND TECHNOLOGY), CURTIN UNIVERSITY

CAREER TRACKERS INDIGENOUS INTERN, Q CATERING, QANTAS AIRWAYS

STUDENT MENTOR, AUSTRALIAN INDIGENOUS MENTORING EXPERIENCE

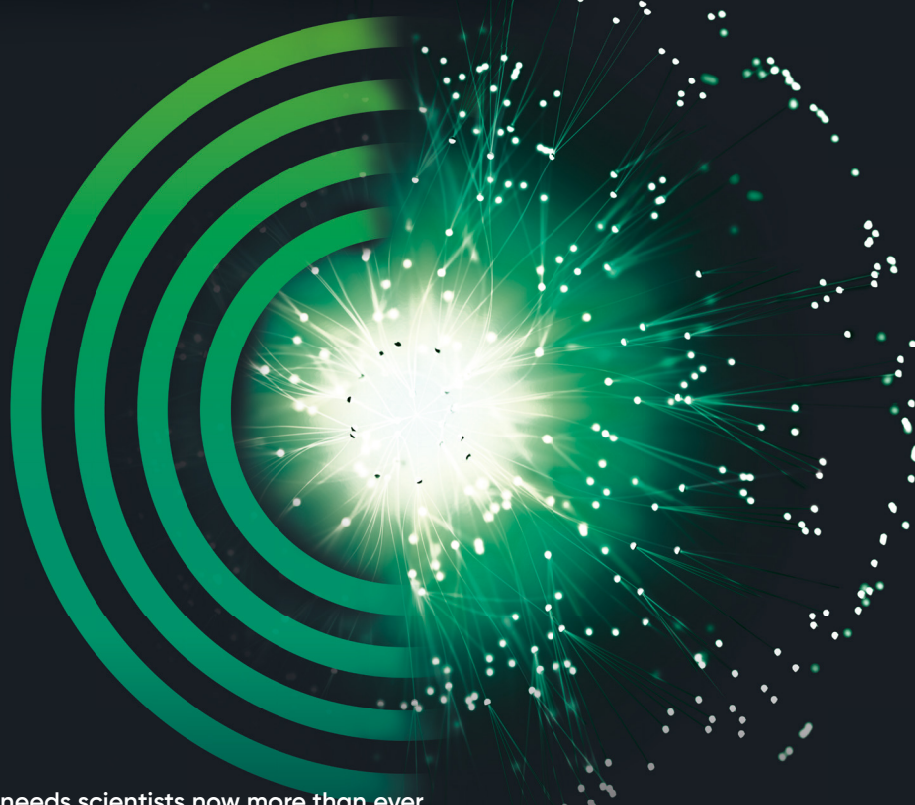
MENTOR, CSIRO YOUNG INDIGENOUS WOMEN'S STEM ACADEMY

PRODUCT TECHNOLOGIST, COLES

SHUTTERSTOCK / PICAREDDIT

STUDY THE SCIENCE THAT WILL DEFINE TOMORROW

**ECU'S DIVERSE SCIENCE
DISCIPLINES ARE MORE
RELEVANT THAN EVER.**



The world needs scientists now more than ever.

ECU's School of Science offers a range of practical degrees that can lead to distinctly different careers in fields such as biological science, bioinformatics, environmental science and management, data science and more. If you're interested in Science, but not sure what direction to go in, our Bachelor of Science degree gives you the flexibility to explore subjects, while developing a solid grounding in science and mathematics.

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We offer a range undergraduate and postgraduate courses in a number of scientific disciplines such as:

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- Biological Science
- Conservation & Wildlife Biology
- Data Science
- Environmental Science & Management
- Marine & Freshwater Biology
- Mathematics
- Physics

FIND OUT MORE AT
ECUWORLDREADY.COM.AU/SCIENCE

Walk on the wild side

Dream of working with animals? There are more career paths than you think

Passionate about animals? There's a world of science-focussed careers for you to discover. "It's more diverse than people immediately think," says Sarah Legge, a wildlife ecologist at the Australian National University in Canberra. "You can be hands-on, working in the field, or you can sit at a desk computer modelling."

Sarah's 30-year career has taken her all over the world, from Africa to Papua New Guinea. A major perk of her job is exploring the planet's wilderness and learning about the inner workings of the natural world.

"When you start recognising species and how they fit together, you'll never walk through the forest in the same way again. The world just comes alive. It's endlessly interesting and you'll never be bored!"

Secrets from the animal kingdom

Sarah believes the secret to building a career in animals and wildlife is gaining first-hand experience early on.

The Australian Wildlife Conservancy and NSW National Parks and Wildlife Service run volunteer programs focussing on Australia's threatened birds and animals. Volunteers get their hands dirty setting up traps, recording animal sightings, and restoring habitats.

For those passionate about taking care of animals, Taronga Zoo Sydney and Taronga Western Plains Zoo Dubbo take on volunteer keepers across a range of animal care activities, from chopping food to keeping enclosures clean.

Citizen science projects are also a great way to build skills, and you don't even need to leave the house. Wildlife Spotter is an online project run by the Australian Museum that helps researchers monitor native animals. Participants identify and record animals in camera trap images from all over Oz, spotting almost 2.4 million animals in 2020 alone.

With over half of mammals, birds, fish, and reptiles being wiped out in the last 40 years, Sarah says, "The more young people join this discipline, the better. That's how we'll change the world." – Gemma Conroy



START YOUR CAREER HERE

SCIENCE+ANIMALS STUDY

Bachelor of Science (Zoology) / Bachelor of Natural Science (Animal Science), Western Sydney University

Bachelor of Veterinary Science, James Cook University

Bachelor of Science (Marine Biology)

Bachelor of Science (Wildlife Conservation Biology), The University of Adelaide

SCIENCE+ANIMALS JOBS

Zoologist: \$50K–\$86K

Wildlife biologist: \$50K–\$77K

Veterinarian: \$53K–\$101K

Zookeeper: \$36K–\$75K*

*Source: Salaries according to payscale.com



THE PET PROTECTOR

UNIVERSITY OF ADELAIDE GRADUATE
HANNAH PASSMORE SAVES LIVES FOR
 A LIVING – AS A VET AT AN ANIMAL
 EMERGENCY CENTRE IN ADELAIDE

Hannah Passmore dreamed of being a vet since she was little, even though she knew it was highly competitive and would mean lots of study – she was driven.

Hannah got the marks to go straight into the Bachelor of Science (Veterinary Bioscience) at the University of Adelaide, followed by a doctorate of Veterinary Medicine. And after six years of study, which included months of work placements and clinical experience, she's now living her dream, saving animals for a living.

"It's definitely a degree you need to be quite committed to and passionate about. But even if you have to do a different degree first, you'll end up with a really rewarding career," says Hannah, who loved the close-knit environment at the Roseworthy Campus, where animal behaviour and animal science courses are taught.

Her current role is at an animal emergency centre in Adelaide, where Hannah works long shifts after-hours and at night, taking in animals with emergency medical needs.

Since working as a vet, one thing Hannah has learned is how important it is to be a people person in this role. "I have a huge love of animals, but so much of the job is also to do with your people skills, managing people and client expectations," she says.

– Gemma Chilton

BACHELOR OF SCIENCE
 (VETERINARY BIOSCIENCE),
 UNIVERSITY OF ADELAIDE

DOCTORATE OF VETERINARY
 MEDICINE, UNIVERSITY OF ADELAIDE

VET, VETS4PETS
 ADELAIDE

VET, ANIMAL EMERGENCY
 CENTRE, ADELAIDE



CRICOS 00123M

STUDY VETERINARY TECHNOLOGY

There's more than one way to lead animal health care

Also known as Allied Veterinary Professionals, veterinary technologists play a vital role in modern animal welfare.

As well as providing high-level, hands-on veterinary care, including being a part of the anaesthesia, surgery and diagnostic imaging team, they oversee the

application of cutting-edge new veterinary technology.

As a veterinary technologist, you can play a key role in delivering maximum benefit to animals' health and wellbeing.

adelaide.edu.au/degree-finder
 Search: **vet + tech**



THE UNIVERSITY
 of ADELAIDE

SHASTA HENRY
ENTOMOLOGIST /
SCIENCE COMMUNICATOR

BUG GIRL

SPINY OR FUZZY. SHASTA HENRY
IS PASSIONATE ABOUT SHARING
INSECTS WITH THE WORLD



**THE MORE YOU LOOK,
THE MORE QUESTIONS YOU
HAVE. IT'S ENDLESSLY
INTERESTING"**

Peering under rocks and climbing trees to find insects is something Shasta Henry never grew out of. Now, she gets to study how bushfires have impacted insect and invertebrate populations in Tasmania's Mount Field National Park.

"Insects are like building blocks that create the ecosystem as a whole," says Shasta. "There are 40 tonnes of them per person, so there are plenty of opportunities to learn!"

Despite her passion for creepy-crawlies as a kid, becoming an entomologist wasn't exactly on Shasta's radar as a teenager. She skipped science altogether in Year 12 and did a couple of stints working in ecotourism and

whitewater rafting when she left school. After working in the outdoors for a few years, Shasta enrolled in uni when she was 23 and never looked back.

When she isn't looking for bugs in the Tasmanian wilderness, Shasta works as a science communicator.

"People don't realise that insects impact every aspect of their lives," says Shasta. "Scientists have so much to gain from telling their own stories. Science belongs to the community."

Shasta says that it's important to grab every opportunity you can and ask for help. "You deserve to ask for what you want, so put your hand up, volunteer for things and put yourself out there," she says. — Gemma Conroy

BACHELOR OF SCIENCE (HONOURS), INVERTEBRATE ECOLOGY, UNIVERSITY OF TASMANIA

INTERN, SMITHSONIAN INSTITUTION, MUSEUM OF NATURAL HISTORY

SCIENCE COMMUNICATOR, FUTURE CRUNCH

PHD, UNIVERSITY OF TASMANIA

TALKING TO ANIMALS

BEN DESSEN COMBINES HIS ZOOLOGICAL BACKGROUND WITH EXCELLENT COMMUNICATION SKILLS AS A TV PRESENTER AND CONSERVATIONIST



@TheConservationFiles

Growing up in the Australian bush meant that snakes, spiders and other creepy crawlies were never far away. But unlike some of us, Ben LOVED his early introduction to the amazing Australian ecosystem.

He started out in volunteer work as a wildlife rescuer to get some hands-on experience and in 2014 completed a Bachelor of Natural Science majoring in Animal Science at the University of Western Sydney. He's appeared on TV shows from *Sunrise* to *Saturday Disney* and even had a feature role in the movie *Rise of the Eco Warriors*.

His work has taken him to Borneo, an amazing island that is in the Greater Sunda Islands group of the Malay Archipelago and home to the endangered orang-utan and many other incredible species threatened by logging activities and bushfires.

I WAS THAT WEIRD KID GROWING UP WHO WAS MORE INTERESTED IN BUGS THAN FOOTBALL."

CASUAL, AUSTRALIAN REPTILE PARK

WILDLIFE RESCUER/CARER, SYDNEY METROPOLITAN WILDLIFE SERVICES

BACHELOR OF NATURAL SCIENCE, UNIVERSITY OF WESTERN SYDNEY

BOARD DIRECTOR AND SANCTUARY MANAGER, ZAMBI NATIVE WILDLIFE SANCTUARY

WILDLIFE TRACKER

DR THOMAS NEWSOME IS INVESTIGATING HOW HUMANS AND ANIMALS SHAPE ECOSYSTEMS

Thomas Newsome spent his early teens tagging along with his ecologist father on field trips. "It exposed me to all of the problems we face in Australia, such as the impacts of introduced species and native animal extinctions," says Thomas, who now works in wildlife ecology himself and is based at the University of Sydney.

Thomas is researching how humans and wildlife drive ecosystem changes, particularly scavengers and large predators like dingoes. Today he could be setting up camera traps, while tomorrow could involve measuring nutrients in the soil.

"There is a real academic side to wildlife ecology, but you also need to be able to dig a hole, trap an animal, or fire a darting rifle," says Thomas.

Thomas' advice for aspiring wildlife ecologists? Get experience during your degree. "There are a lot of opportunities, but they are often not sitting on a platter," says Thomas. "Don't be afraid to write that email or ask someone." – Gemma Conroy

**DR THOMAS NEWSOME
ECOLOGIST / LECTURER**



**BACHELOR OF SCIENCE (ENVIRONMENTAL),
UNIVERSITY OF SYDNEY**

**MASTER OF APPLIED SCIENCE (WILDLIFE HEALTH AND
POPULATION MANAGEMENT), UNIVERSITY OF SYDNEY**

**RESEARCH FELLOW, SCHOOL OF BIOLOGICAL
SCIENCES, UNIVERSITY OF SYDNEY**

**POSTDOCTORAL RESEARCH ASSISTANT,
DESERT ECOLOGY RESEARCH GROUP,
UNIVERSITY OF SYDNEY**

**LECTURER, UNIVERSITY
OF SYDNEY**

Q+A WITH A WILDLIFE BIOLOGIST

**JANICE VAZ SPENT HER CHILDHOOD WATCHING NATURE DOCUMENTARIES,
AND NOW AS A WILDLIFE BIOLOGIST HER 9-5 LIFE BASICALLY IS ONE**

How did you get into wildlife biology – was there loads of study involved?

"Yep, and I did most of it in my hometown – Mumbai, India! I originally took up zoology and botany so I could learn about animals and plants, but after interning at a private vet clinic I realised I didn't just want to work with sick or injured animals. I decided I was more interested in studying animal behaviours, completed a Masters in Wildlife Biology, applied for a doctorate degree and landed the Australian Government Endeavour scholarship which led me here to study."

Were you always a fan of STEM at high school?

"I spent most of my childhood watching shows on the Discovery Channel and National Geographic, so biology has always been my favourite science."

What kind of research are you working on?

"Big cat personalities! Many lions, tigers and leopards have been brought up or bred in captivity, so my research looks at their behaviour under stress

in order to improve their welfare. Some of the techniques I'm researching will be used in real rescue operations which will improve – and spread awareness – about big cat welfare."

What does an average work day look like?

"One day I might spend time collecting data and observing a lion's behaviour. Another I might be in the lab – in my white coat – studying a big cat's poop. I also work at a desk sometimes writing up my results and findings."

Any tips for others keen to land a gig like yours?

"Find your passion! Keep trying different options until you find it. Talk to others and get hands-on experience which will help you realise what you do and don't like about a particular career. Keep moving in the direction of what you love!" – Cassie Steel

**JANICE VAZ
BIOLOGIST**



Processing a lion's faecal samples – aka poop – is all in a day's work for wildlife biologist Janice.

**BACHELOR OF SCIENCE (ZOOLOGY AND BOTANY),
ST XAVIER'S COLLEGE, INDIA**

**MASTER OF SCIENCE (WILDLIFE BIOLOGY),
A.V.C. COLLEGE, INDIA**

**PHD,
WESTERN SYDNEY UNIVERSITY**

New stuff

Scientists are reinventing how mass production works and the materials we're using

Manufacturing has come a long way from simple production lines. Artificial Intelligence (AI), Virtual Reality (VR), and cutting-edge materials are taking it in exciting new directions. According to Australia's outgoing chief scientist Dr Alan Finkel, this is opening up opportunities for new graduates.

"AI is seeping into every aspect of manufacturing – and manufacturing companies are buying up AI talent as fast as universities can churn it out," he says.

What is advanced manufacturing?

Advanced manufacturing uses technology and innovation to change up the way we make things. It could be turning used glass bottles, old clothes and coffee grounds into kitchen tiles in a microfactory, or making metal parts for navy ships with 3D printing. All kinds of scientists are working hard in research labs and manufacturing plants to drive the revolution forward!

Check out these fab five areas of science and technology behind the advanced manufacturing revolution...

1. Augmented and virtual reality

Gamers are fans, but this tech also helps improve safety, training and production speeds in manufacturing. Computer scientists help develop the tech, but it can be used by any science grad to take manufacturing to the next level.

START YOUR CAREER HERE

ADVANCED MANUFACTURING + STUDY

Associate Degree in Advanced Manufacturing, UTS
 Bachelor of Science (Nanotechnology) /
 Bachelor of Science (Applied Sciences), RMIT
 Bachelor of Science / Bachelor of Data Science, Griffith University

ADVANCED MANUFACTURING + JOBS

Research scientist: \$56K–\$110K
 Production planner, manufacturing: \$51K–\$92K
 Data analyst: \$51K–\$100K*

*Source: salaries according to payscale.com

Homegrown heroes

Since the start of COVID-19 and the global pandemic, people have been keen to ramp up local manufacturing using advanced technologies. And keeping it local will mean more jobs for Australian science grads to find new and better ways to make the things we need.



2. 3D printing

Artificial limbs, fire-fighting hose fittings and face shields can all be made cheaply and quickly using this technology, which is also known as 'additive manufacturing'. Chemists and materials scientists play an important role in the additive manufacturing sector.

3. Automation and smart robots

Advanced manufacturing workers share their workspace with collaborative robots and automated equipment. Computer scientists and mathematicians collaborate with engineers to make sure things run smoothly!

4. Next-generation materials

From ceramics that shapeshift when you apply electricity to a non-cut material based on abalone shells, materials scientists are transforming the building blocks of manufacturing.

5. Sensors and data analytics

Data scientists are keeping track of how manufacturing processes are running and using the information to reduce costs, energy use and waste. – Nadine Cranenburgh

SHAPESHIFTING SONAR

PHD STUDENT **SCARLET KONG** IS HARNESSING SHAPE-CHANGING MATERIALS TO SEND SOUNDWAVES THROUGH THE DEEP

Scarlet Kong works with defence industries to design next-gen piezoelectric materials for underwater sonar systems. When you squeeze these materials, they produce an electrical charge. And if you apply electricity to the materials, they change their shape!

"We're enhancing this shape-changing property to use in sonars," Scarlet says – which gives ships and submarines the ability to 'see' underwater, for instance.

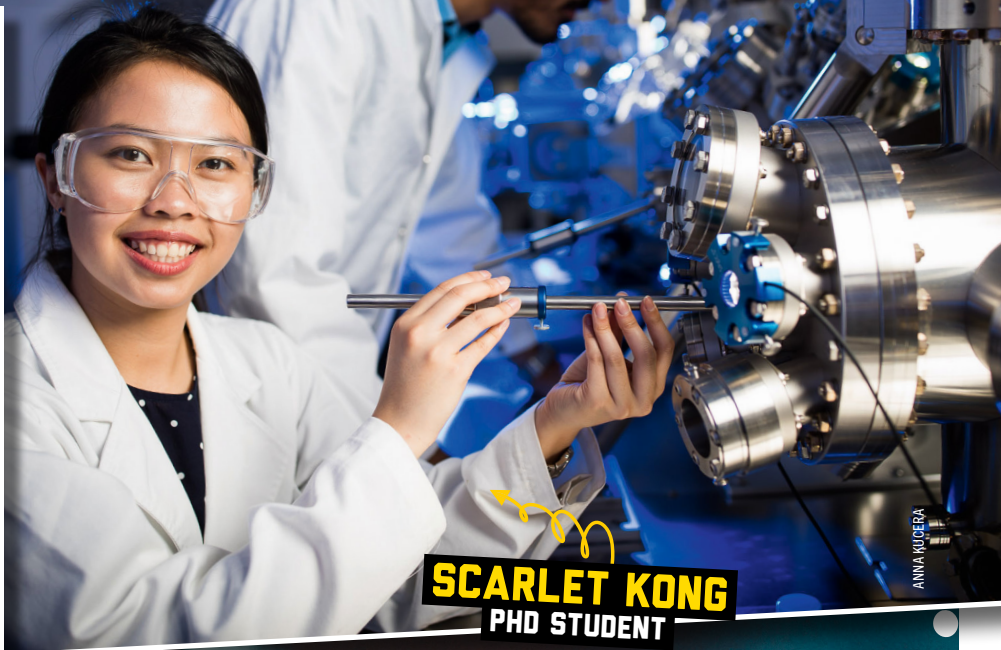
IN CONTROL

A fascination with understanding and controlling materials led Scarlet into her current career.

"Materials science and engineering is looking at how materials behave and how we can change their properties," she says.

During her undergrad degree, Scarlet scored a six-week US research exchange through UNSW, which opened the door to her PhD project. She encourages other students to seek out opportunities to gain experience outside of their coursework.

"That's where you're going to get the most out of your uni journey," she says. – *Nadine Cranenburgh*



SCARLET KONG
PHD STUDENT

BACHELOR OF ENGINEERING (CHEMICAL) / MATERIALS SCIENCE AND ENGINEERING (DOUBLE DEGREE). UNSW

UNDERGRADUATE RESEARCH ASSISTANT. NORTH CAROLINA STATE UNIVERSITY. US

STUDENT AMBASSADOR. UNSW

PHD. MATERIALS SCIENCE. UNSW

KEEPING IT CLEAN

CHEMISTRY HONOURS GRADUATE **DECLAN BURKE** IS HELPING TURN NATURAL GAS AND IRON ORE INTO CLEAN HYDROGEN AND GRAPHITE

STATS SPEAK!

According to *The 2020 Revolution* report from St George Bank, Aussie manufacturers are all about keeping it local...

88% WANT TO MAKE MORE ESSENTIAL PRODUCTS IN AUSTRALIA

82% WANT THE GOVERNMENT TO USE LOCALLY PRODUCED ITEMS

68% SAID THEY WERE MORE LIKELY TO USE LOCAL PRODUCTS THAN BEFORE COVID-19



DECLAN BURKE
RESEARCH ASSISTANT

As a research assistant at the Hazer Group in WA, Declan Burke is working to commercialise an Australian-designed, low-emissions process to make hydrogen for clean vehicle fuel and energy.

"We're using high temperatures and pressures to force the hydrogen and carbon apart and deposit the carbon as graphite," he says. Hazer is building a commercial demonstration plant to produce 100 tonnes of hydrogen and 380 tonnes of graphite each year. And there are plans to power the plant with a hydrogen fuel cell, so it is self-sustaining, too.

LIGHT-BULB MOMENT

Early in Declan's university studies, he realised that he wanted to use his chemistry skills to make the world a better place. He took on a double major in philosophy to explore how best to do that. "Philosophy made me realise my actions had consequences," he says.

For his Honours project, Declan channelled his passion for renewable energy into a hydrogen-splitting project, then scored his current role at Hazer after graduation.

Declan says the independent and critical thinking skills he learned during his Honours year have been invaluable. "It was the hardest year, but the one that prepared me most for the real world," he says. – *Nadine Cranenburgh*

LABORATORY TECHNICIAN. WA DEPARTMENT OF PARKS AND WILDLIFE

BACHELOR OF SCIENCE (CHEMISTRY). HONOURS. UWA

RESEARCH ASSISTANT. HAZER GROUP

Kickstart your career in science

If your future dream job is all about science, start here...

High school elective checklist

Your fave science electives (biology, chemistry, physics) are the obvious choice for any aspiring scientist – but your science career elective must-haves don't stop there.

For a start, you'll want to stick with maths. "I can't overemphasise that for many tertiary study fields you must have strong knowledge of mathematics. These include medicine, science, engineering, economics and commerce," says Australia's outgoing chief scientist, Dr Alan Finkel.

Humanities subjects are a definite bonus for a career in science, while creativity and language are valuable, too. You won't always be working with other scientists, for a start, so communication skills are crucial!



MAHONRI OWEN
ROBOTICS ENGINEER



JULIANNA KADAR
SHARK BIOLOGIST

Find mentors

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KATIA VEGA
COMPUTER SCIENTIST

BECOME A CITIZEN SCIENTIST!

Start to hone your passion and skills in science before you have any formal qualifications – as a citizen scientist! Here are three projects you can take part in right now...

FROGID

The Australian Museum's FrogID app records the frog calls you discover out in nature, with the aim of counting Australia's frogs in their habitats. Your recordings are sent to frog experts to discover which species of frog, or frogs, are singing to you. frogid.net.au



ASTRO QUEST

Got a computer and the internet? Then you can help Australian scientists understand how galaxies grow and evolve by inspecting images of galaxies in a game format. astroquest.net.au

FOLDIT

Foldit is an online game that challenges players to fold proteins to better understand their structure and function. Want to help scientists and save lives? The Foldit team is now challenging citizen scientists to design antiviral proteins that can bind with coronavirus. fold.it



To find courses and compare universities in Australia, check out the Good Universities Guide at gooduniversitiesguide.com.au

Take our quiz!

Love science, but not sure which science to major in? Take our Bachelor of Science quiz to help you decide bit.ly/which-science



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We acknowledge the Traditional Owners of country throughout Australia and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past, present and emerging.

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Co-founder, CEO & Head of Content: Heather Catchpole

Managing Editor: Gemma Chilton

Digital Editor: Cassie Steel

Deputy Editor: Pippa Duffy

Art Director: Katherine Power

Issue editorial advisors: Ari Traucki, University of Adelaide, Brook Thurlow, Australian Space Agency, Sam Moyle, Brighton Secondary School

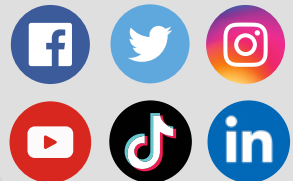
Writers: Ben Skuse, Cassie Steel, Gemma Chilton, Gemma Conroy, Heather Catchpole, Nadine Cranenburgh, Matthew Brace, Kirsten Colvin

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EDITORIAL & ADVERTISING ENQUIRIES: Email: info@refractionmedia.com.au or +612 9188 5459

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CareerswithSTEM.com

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