CAREERS WITH STEM™ JOB KIT

NUCLEAR ENGINEER

Help solve some of the world's biggest challenges with this exciting and diverse STEM career

SUPPORTED BY

UNSW SYDNEY | UNSW Nuclear Innovation Centre

Bachelor of Engineering (Honours) (Nuclear Engineering)

Australia's only comprehensive undergraduate nuclear engineering degree, designed to equip students with versatile, high-value skills that are essential in nuclear engineering and transferable across a wide range of industries.

As part of this degree, you will learn to:

- Lead the development of next-generation energy systems.
- Design processes and systems that use nuclear radiation.
- Confidently contribute to public discourse on the future of nuclear applications.
- Apply cutting-edge technology to design space reactors, manufacture robotics for extreme environments, or produce radiopharmaceuticals.
- Collaboratively solve complex problems with fundamentals of physics, mathematics, and artificial intelligence.
- Sharpen critical thinking and problem-solving skills through hands-on simulations that replicate real-world nuclear scenarios.
- Develop personal attributes enabling you to work with mission critical technology beyond nuclear.

You will also have the unique opportunity to participate in projects like AtomCraft, designing, building, and operating the world's first student-led fusion energy reactor.

CRICOS Provider Code 00098G

UNSW SYDNEY

DISCOVER NUCLEAR ENGINEERING

Want a career that's creative, world changing, hands-on and that can take you around the world? You've come to the right place

ASSOCIATE PROFESSOR EDWARD OBBARD
DIRECTOR, UNSW NUCLEAR INNOVATION CENTRE

Nuclear properties appear everywhere in the universe, from making starlight, to geothermal heat deep in the Earth. The development of nuclear technology has been astonishingly rapid. In just 20 years, nuclear engineers built the first nuclear powered submarine that circumnavigated the world underwater.

In less than somebody's lifetime, nuclear engineers took this fundamental discovery, to powering 10% of the entire world's electricity - without CO_2.

Today nuclear engineers build new medical scanning technology and medicines that find and cure cancer; build and operate reactors that power ships and submarines and space missions; and build vast physics experiments like the Large Hadron Collider that do fundamental science experiments and tell us more about the universe.

Nuclear engineers make clean and sustainable energy systems. Nuclear fission and fusion release no CO_2, and so nuclear energy is an essential tool to get to net zero, support global development so that hundreds of millions can increase their standard of living, and use less land and less resources so there will be more room for natural habitats.

Sustainable engineering and designing fuel cycles that recycle all the waste have been a central goal of nuclear engineering, right from the start.

When nuclear engineers harnessed the power of nuclear reactions they created the first disruptive technology, one that still influences international relations and politics everywhere.

> "STUDYING NUCLEAR ENGINEERING TEACHES YOU HOW THE WORLD WORKS"

That's why a career in nuclear engineering takes you both to the centre of government decisions – and all around the world – to international organisations like the Nuclear Energy Agency in Paris, and the International Atomic Energy Agency in Vienna.

I love my career in nuclear engineering because I don't think there's anything else that lets me understand fundamental physics, be creative, build things, do experiments, speak at important international events, and train people who I know will change the world.

Studying nuclear engineering means that you must be the best, and it teaches you how the world works, and that is going to help you in any career, even if you don't stay in engineering forever.

Starting your career with our new Bachelor of Nuclear Engineering at UNSW Sydney will set you up for a lifetime of employability as you learn to work in an innovative team to make a big difference in the world.

We look forward to welcoming you on this exciting path.

Associate Professor Edward Obbard
School of Mechanical and Manufacturing Engineering, UNSW Sydney
Director, UNSW Nuclear Innovation Centre

MASTER OF ENGINEERING (HONS) IN MECHANICAL DESIGN, MATERIALS, AND MANUFACTURE, UNIVERSITY OF NOTTINGHAM >> PHD, MATERIALS SCIENCE, CHINESE ACADEMY OF SCIENCE INSTITUTE OF METAL RESEARCH

NUCLEAR MATERIALS ENGINEER, ANSTO >> ASSOCIATE PROFESSOR, SCHOOL OF MECHANICAL AND MANUFACTURING ENGINEERING, UNSW SYDNEY >> DIRECTOR, UNSW NUCLEAR INNOVATION CENTRE

Check out CareerswithSTEM.com for more insights, information, inspiration and advice about nuclear engineer careers!

UNSW NUCLEAR INNOVATION CENTRE

BE IN DEMAND

The career possibilities in nuclear engineering are endless

Pay day

The average base salary for a nuclear engineer in Australia is **$157,749**, according to salaryexpert.com

Keen on engineering but wondering what to specialise in? You should definitely consider nuclear engineering. Right now, there's a huge skills shortage for nuclear engineers all around the world. Becoming an expert in this area will make you super employable and could lead to a range of exciting career opportunities here in Australia and internationally.

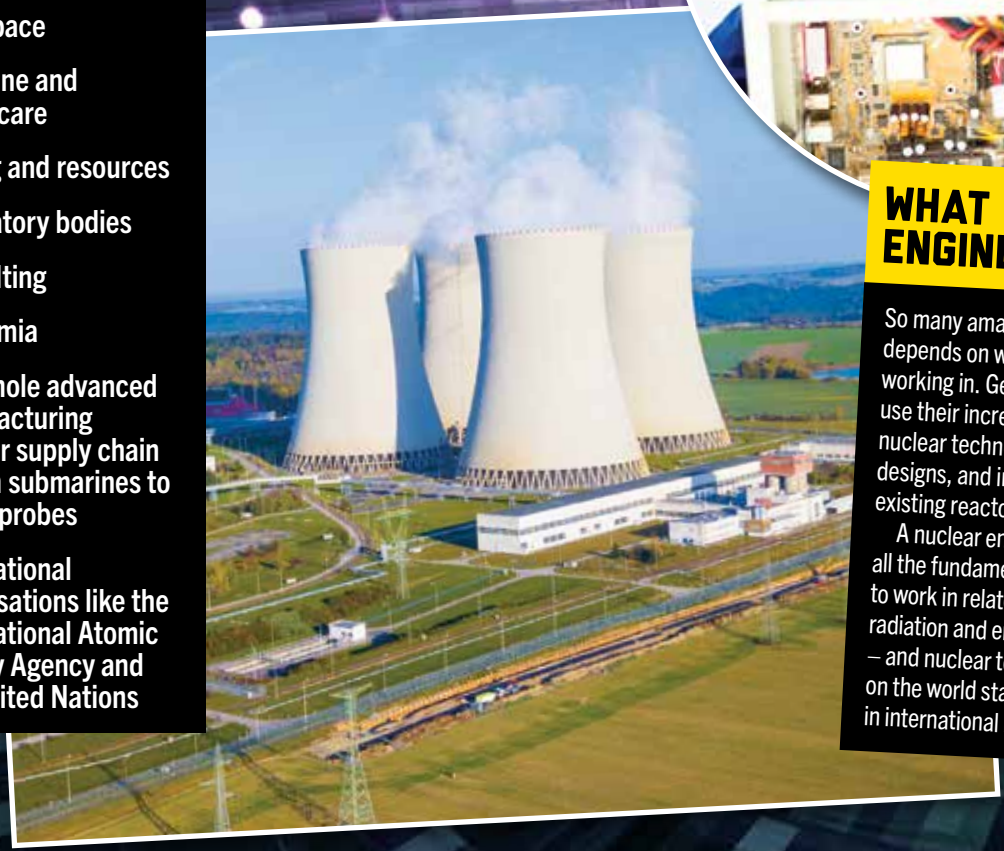
Nuclear engineering is all about building machines that use the nuclear properties of matter, and the different kinds of energy that can be released from the core of an atom, to do useful things. It links up with other engineering branches, like electrical, mechanical and chemical, and is really important to our present and future as it can help solve some of the world's biggest challenges – like achieving net zero carbon emissions.

Start exploring your nuclear engineering study and career path options below. Your future self will thank you!

WHERE YOU COULD WORK

These industries all need nuclear engineers:

- Science and technology
- Government
- Defence
- Aerospace
- Medicine and healthcare
- Mining and resources
- Regulatory bodies
- Consulting
- Academia
- The whole advanced manufacturing nuclear supply chain – from submarines to space probes
- International organisations like the International Atomic Energy Agency and the United Nations



WHAT DO NUCLEAR ENGINEERS DO?

So many amazing things, and it all depends on what industry you end up working in. Generally, nuclear engineers use their incredible STEM skills to create nuclear technology, develop new reactor designs, and improve and maintain existing reactors.

A nuclear engineering degree gives you all the fundamental knowledge you need to work in related areas like medical radiation and environmental monitoring – and nuclear technology is so important on the world stage you can end up working in international relations and diplomacy.

SHUTTERSTOCK

STUDY PATHS

There's no single way to become a nuclear engineer. Here are your options at UNSW Sydney - they'll get you skilled up and job ready!

UNDERGRADUATE

UNSW now offers a NEW Bachelor of Engineering (Honours) (Nuclear Engineering), the only comprehensive nuclear engineering undergraduate degree in Australia.

- Bachelor of Engineering (Honours) (Nuclear Engineering)

Learn more about the nuclear engineering degree at UNSW Sydney here: bit.ly/UNSW-nuclear

NUCLEAR MINOR

In addition to the above, the following undergraduate degrees also offer the possibility of a nuclear engineering minor.

- Bachelor of Engineering (Honours) (Aerospace)
- Bachelor of Engineering (Honours (Chemical Engineering)
- Bachelor of Engineering (Honours) (Chemical Product Engineering)
- Bachelor of Engineering (Honours) (Civil Engineering)
- Bachelor of Engineering (Honours) (Environmental Engineering)
- Bachelor of Engineering (Honours) (Electrical Engineering)
- Bachelor of Engineering (Honours) (Mechanical and Manufacturing Engineering)
- Bachelor of Engineering (Honours) (Mechanical Engineering)
- Bachelor of Engineering (Honours) (Mechatronic Engineering)

POSTGRADUATE

Take your engineering career to the next level with a postgraduate qualification.

- Master of Engineering Science (Nuclear Engineering)
- Graduate Diploma of Engineering Science (Nuclear Engineering)
- Graduate Certificate of Engineering Science (Nuclear Engineering)

5 MINS WITH A NUCLEAR ENERGY COMEDIAN

WE SPOKE TO TINA BARADARAN, THE PRESIDENT OF UNSW STUDENT NUCLEAR SOCIETY, ABOUT HOW SHE'S MIXING NUCLEAR ENGINEERING WITH EDUCATION, COMMUNICATION AND COMEDY TO BUILD HER DREAM CAREER!

CwS: Hey Tina! Give us your best nuclear joke...
T: What do nuclear power plants and tea kettles have in common? They both generate steam to get things boiling!

CwS: How did you get into nuclear?
T: I was drawn to nuclear education and science communication due to my passion for physics and teaching. My PhD focuses on determining the best methods to educate and train Australia's future nuclear engineers, ensuring we have a highly skilled workforce for operating nuclear reactors. Humour is a powerful tool for capturing interest, simplifying intricate concepts, and addressing misconceptions about nuclear energy.

CwS: Why do you think high school students should study nuclear engineering?
T: Nuclear is currently exploding (with lots of job opportunities) in Australia, and it's the only hot and fancy engineering field where you can literally have a blast while keeping everything under control! Plus, you'll always be at the core of the action, making it the coolest (and safest) job around!

CwS: What traits are helpful in this field?
T: Being cool, calm and collected. Add these traits to a dash of nuclear curiosity and a sense of humour, and you'll be competent to handle the "hot" aspects of the job!

SCAN HERE OR VISIT BIT.LY/3WH2YVI TO WATCH TINA DO NUCLEAR STAND-UP!

BACHELOR OF MEDICAL RADIATION PHYSICS, UNIVERSITY OF WOLLONGONG >> MASTER OF PHILOSOPHY (MEDICAL RADIATION PHYSICS RESEARCH), UNIVERSITY OF WOLLONGONG >> ASTRONOMER GUIDE, SYDNEY OBSERVATORY

MASTER OF TEACHING (PHYSICS AND MATHS), UTS >> EDUCATION OFFICER, ANSTO DISCOVERY CENTRE >> PHD CANDIDATE/EARLY CAREER RESEARCHER IN NUCLEAR ENGINEERING EDUCATION, UNSW

MODEL REACTOR

HELSINKI-BASED ENGINEERING GRADUATE TIM ROWNES HAS ENJOYED A HIGH-ENERGY CAREER IN NUCLEAR OPERATIONS

As a longtime maths and science fan, Tim kicked off his post high school pathway with a focus on both - enrolling in an engineering and science double degree at UNSW.

However a graduate gig at ANSTO later - followed by a string of permanent positions - inspired the passionate problem-solver to head back to uni and specialise in nuclear operations.

"When I heard that UNSW were creating a nuclear engineering program, I applied as soon as I could," he says of the university's Nuclear Innovation Centre. "I even managed to fit the degree around my roster on shift operating the OPAL reactor."

After learning the ins and outs of reactor design, Tim's masters qualifications allowed him to relocate to Finland as an operation planning engineer and eventually make the jump into consulting and general practice projects.

"The engineering degrees I've done have opened up so many doors," he says. "I've got solid credentials and very transferable expertise."

TIM ROWNES
NUCLEAR CONSULTANT

"THE ENGINGEERING DEGREES I'VE DONE HAVE OPENED UP SO MANY DOORS"

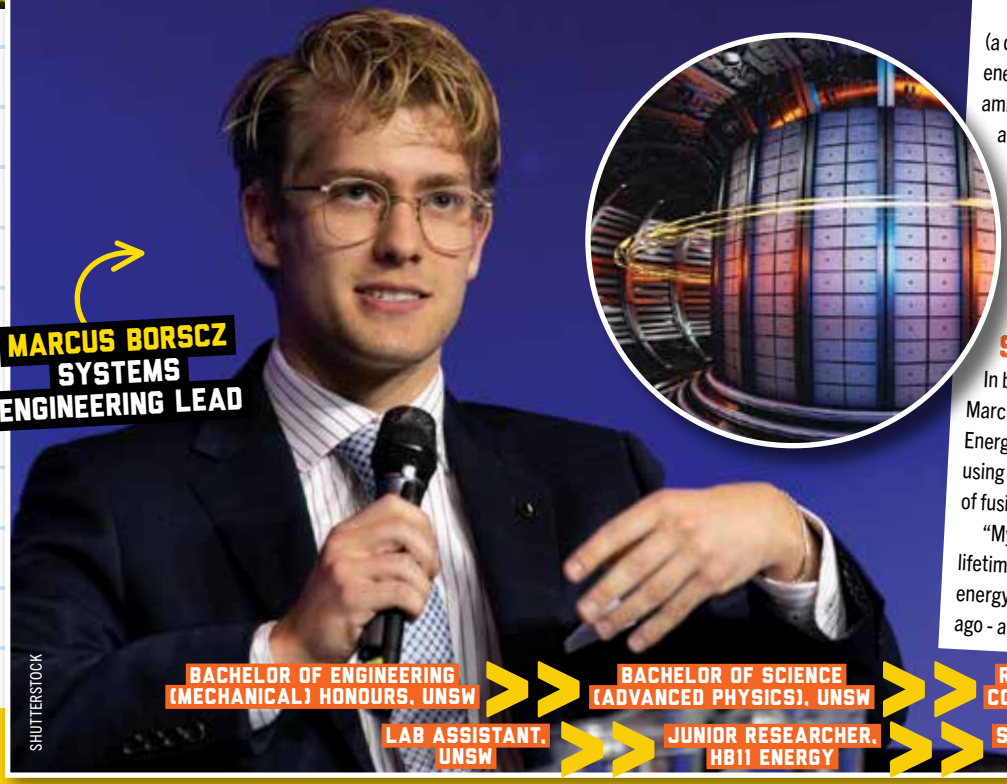
BACHELOR OF ENGINEERING (MECHANICAL) AND BACHELOR OF SCIENCE (PHYSICS), UNSW >> GRADUATE ENGINEER, ANSTO >> REACTOR ENGINEER, ANSTO >> SHIFT MANAGER, ANSTO

MASTER OF ENGINEERING SCIENCE (NUCLEAR), UNSW >> OPERATION PLANNING ENGINEER, FENNOVOIMA >> SENIOR ASSOCIATE CONSULTANT, BAIN + COMPANY

SHUTTERSTOCK

NATURAL RESOURCE

MARCUS BORSCZ IS MAKING THE MOST OF HIS TIME AT UNSW, TEAMING HIS STUDY WITH A GROUND-BREAKING STUDENT-LED PROJECT



MARCUS BORSCZ
SYSTEMS ENGINEERING LEAD

It's not all lecturers and library hangs for UNSW student Marcus. Alongside his Bachelor of Mechanical Engineering commitments the talented undergrad is heavily involved in the uni's cutting-edge AtomCraft program with a bunch of like-minded classmates.

With the end goal of delivering the world's first fusion tokamak (a device that creates a nuclear fusion reaction to release energy) entirely designed, built and operated by students, the ambitious group are the first in the world to attempt such a mission. And yep, they get course credit for it too!

"I'm the magnet engineering and plasma physics department lead," explains Marcus, "We're responsible for simulating the plasma, designing the magnets, heating the plasma with microwaves, and figuring out how to measure everything with diagnostics."

STRONG REACTION

In between his coursework and AtomCraft commitments Marcus is holding down a real-world research role at HB11 Energy - contributing to sustaining thermonuclear fusion by using high power lasers to compress and ignite a small pellet of fusion fuel.

"My dream is to see nuclear fusion energy realised within my lifetime," he says. "I strongly believe it will bring forth another energy industrial revolution, much like coal and oil did centuries ago - and it's my goal to help contribute to that."

BACHELOR OF ENGINEERING (MECHANICAL) HONOURS, UNSW >> BACHELOR OF SCIENCE (ADVANCED PHYSICS), UNSW >> RESEARCH INTERN, ARC CENTRE FOR QUANTUM COMPUTATION AND COMMUNICATION TECHNOLOGY

LAB ASSISTANT, UNSW >> JUNIOR RESEARCHER, HB11 ENERGY >> SYSTEMS ENGINEERING LEAD, ATOMCRAFT

SHUTTERSTOCK

HIGH ENERGY

Postgraduate student Casey Alston is supercharging her process engineering degree with a masters in nuclear engineering science

CASEY ALSTON
PROCESS ENGINEER
+ POSTGRAD STUDENT

Casey and engineering go way back. She started her career in Queensland, with a Bachelor of Process Engineering at QUT, peppering her pathway with impressive grad gigs at engineering consultancies Hatch and now Worley.

"Through these roles I was able to work in so many different sites and offices," she says. "I've spent time everywhere - from test labs that deal with rare earth and uranium to rural processing plants in the US."

With her experience in processing facility and mine site design, Casey has become increasingly aware of the amount of energy needed to mine and process materials and metals - inspiring her to pursue postgraduate studies at UNSW in alternative nuclear energy sources.

"I think there's a lot of exciting development in the industry, particularly with nuclear fusion, small modular reactors, and advanced reactor designs," she says. "I want to be a part of implementing nuclear energy in Australia."

With a full-time gig to juggle along with her studies, Casey is lucky that her hours are flexible and a lot of her UNSW coursework is done online.

First up on her to-do list? Kickstarting her research project - topic TBC.

Day in the life

7:30am
Head into the office early. Worley offers morning fitness sessions, which I try to get to as much as I can.

9:00am
Scrum meetings for projects to see what needs doing and discussing.

9:30am
Check emails, and then dive into my daily tasks: equipment sizing, test work analysis, producing process flow diagrams and sometimes meeting with vendors.

5pm
Hang out with my dog.

6:30pm
Time to study! I tend to spend evenings re-watching lectures and taking proper notes.

"I WANT TO BE PART OF IMPLEMENTING NUCLEAR ENERGY IN AUSTRALIA"

BACHELOR OF PROCESS ENGINEERING, QUT >> GRADUATE ENGINEER, HATCH >> PROCESS ENGINEER, WORLEY >> MASTER OF ENGINEERING SCIENCE (NUCLEAR), UNSW

Get the job!

Is nuclear engineering in your future? This page is all about the next steps you can take in your study and career journey!

Electives checklist
Study these at school to get a headstart:
✔ Mathematics Extension 1 and 2 ✔ Physics ✔ Chemistry ✔ Software Design and Development ✔ Engineering Studies

LISTEN

Your ears (and brain!) will thank you for tuning into this one...

Titans of Nuclear
This podcast is by the Energy Impact Center in the US. The hosts interview experts in nuclear energy from different backgrounds – think science, politics, business and more. They chat about all things nuclear and linked topics like, climate change, medicine and political policy. Perfect for anyone who wants to get across all the areas nuclear engineering can touch!

APPLY

Tyree Foundation Nuclear Scholarships are available for undergraduate and postgraduate students at UNSW Sydney.

Head to **unsw.edu.au/research/nuclear-innovation-centre/education/scholarships** to find out more.

WATCH

Binge this after school!

Nuclear Now (Apple TV)
This doco shows how nuclear energy can help fight climate change. You also get insights into the nuclear industries in France, Russia and the United States.

FOLLOW

Stay across all things nuclear engineering study and careers by checking out these social media accounts and websites.

UNSW Nuclear Innovation Centre
UNSW's nuclear innovation centre, that does nuclear research, develops a skilled workforce and nurtures future leaders for prosperity of Australia and competitiveness of our nuclear technology sector.

@unsw_nusoc
A student society aiming to educate and promote awareness of nuclear technology and its applications. **Fun fact: They are the only nuclear society in Australia!**

Women in Nuclear
Promotes diversity in nuclear through networking, advocating for women in nuclear, and informing the nuclear debate.

ansto.gov.au
ANSTO is home to the Open Pool Australian Lightwater nuclear reactor (a.k.a. OPAL), a state-of-the-art multipurpose reactor producing 75 to 85 per cent of the radioactive isotopes used in 700,000 lifesaving patient procedures in Australia every year.

asa.gov.au
The Australian Submarine Agency is all about safely and securely acquiring, constructing, delivering, technically governing, sustaining and disposing of Australia's conventionally-armed nuclear-powered submarine capability. Check out their jobs page for inspiration!

GET HANDS ON

UNSW Sydney engineering students get to take part in some incredible projects, like **AtomCraft**. Those working on AtomCraft aim to make the world's first fusion reactor entirely designed, built and operated by students.

UNSW SYDNEY / SHUTTERSTOCK

SCAN THE QR CODE TO LEARN MORE ABOUT ATOMCRAFT AND TO FIND OUT ABOUT THE INDUSTRY PARTNERS WORKING WITH THEM!

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