



studyworkgrow

LINKING LEARNING WITH LIFE

PATHWAYS TO ENGINEERING

[TWO THOUSAND AND TWENTY-TWO]

studyworkgrow.com.au

in this guide...

terms you need to know

careers in engineering

what it's like to be an engineer

key tasks

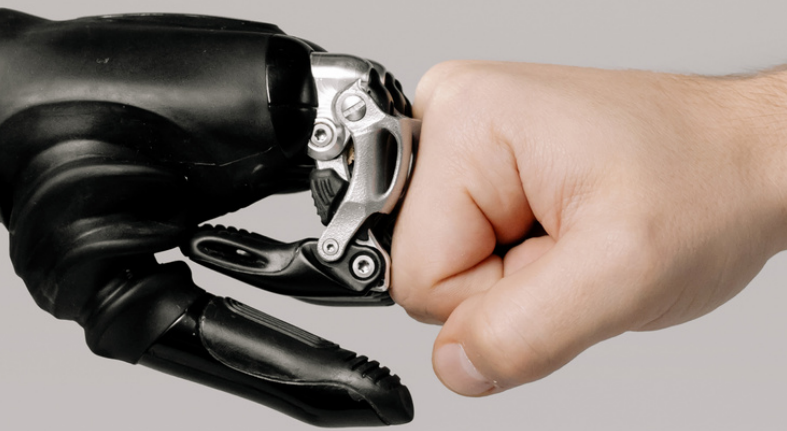
strengths and skills

pathways to becoming an engineer

engineering disciplines

your study options

other career pathways to consider



A guide to a career in engineering explained - from university programs offered in Australia for students commencing study in 2023, to the steps you'll need to take in order to be an engineer.

Created by Study Work Grow Pty Ltd in 2022.

Version 1

The programs in this guide may be subject to change at any time. In our experience, programs may change at short notice, and you should always check directly with the provider before applying. We have verified the information in this guide, but in some cases the information may differ from that provided on third party websites or printed material.

terms you need to know

Engineering has some specific words and terms that you'll need to learn if you want to work in the field.

Engineer - An engineer is someone who is skilled in the design, construction and maintenance of machines, materials, structures and/or complex systems

ADNG - Associate Degree of Engineering

BE or BEng - Bachelor of Engineering

CPEng - Chartered Professional Engineer

DipE or DipEng - Diploma of Engineering

MEng or ME - Master of Engineering

NER - National Engineering Register

RPEng - Registered Professional Engineer of Professionals Australia

RPEQ - Registered Professional Engineer of Queensland

This is just the tip of the iceberg; if you come across any other terms you want to remember, note them down here:

levels of engineering

JUNIOR ENGINEER

A junior engineer has a BEng and works under the direct supervision of a senior engineer. Their role may involve finding problems, testing project components and working with a team of engineers.

MID-LEVEL ENGINEER

A mid-level engineer usually has three to five years of experience. They are more proactive and skilful in their field of work than a junior engineer and may take on their own project.

SENIOR ENGINEER

Senior engineers oversee large engineering projects. They have years of experience and are highly technical. Some of their duties might include writing project proposals and guiding teams.

STAFF ENGINEER

A staff engineer may coordinate many projects at once. They typically focus on identifying technical problems that need to be solved within a team, whereas senior engineers begin with well-defined problems in their teams. Staff engineers normally work with managers, executives and junior engineers.

PRINCIPAL ENGINEER

Principal engineers have many years of field-related experience and communicate with the engineers within the company and senior executives. They work autonomously and use their expertise to lead the technical direction of the company.

These are just some of the most common engineering levels. Since there is no official standardisation, the levels of engineering and their meanings may vary depending on the company and discipline of engineering (e.g. software and civil).

where engineers work

Before you delve any deeper into the world of engineering, let's start by looking at where engineers work. This is important because if you become an engineer, then you'll be working like this, and if you don't think you would enjoy this kind of work environment then you may need to rethink becoming an engineer.



Jobs available across Australia



Opportunity to work from home or online depending on engineering discipline



Opportunities in rural and remote areas

ENGINEERS ARE FOUND ANYWHERE PEOPLE ARE

You'll find them in the middle of the city through to remote communities at the far reaches of Australia. Engineers are also needed all around the world, and your skills will make you a valuable employee wherever you go.

TEAMWORK

Most engineering projects are large (even in a single discipline) and too difficult for just one person to handle. So an engineer would usually be working with a team of engineers. Some engineers work as freelance engineers, which means they seek smaller projects to complete independently. Other examples of freelance engineering include working as a developer for a computer program or designing 3d drawings.

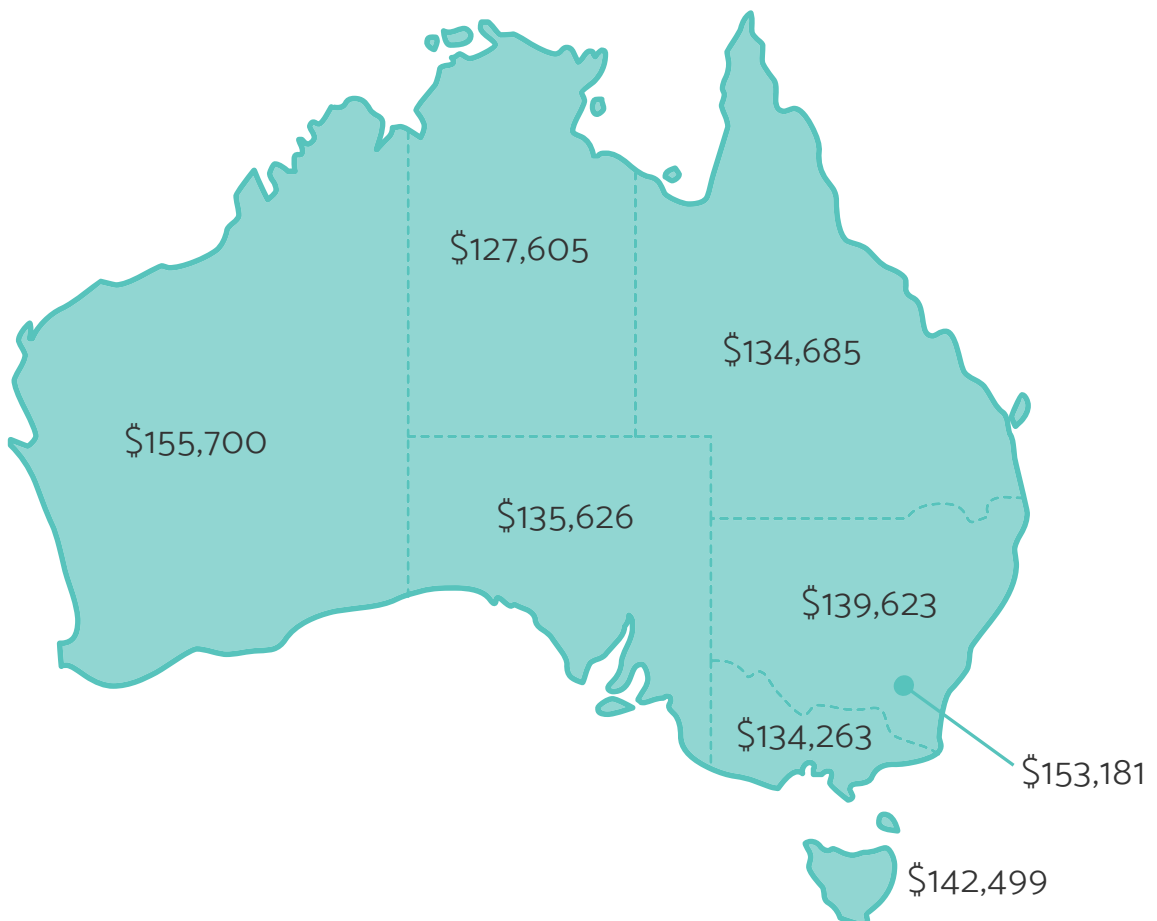
WORK ENVIRONMENT

The opportunity for working from home varies according to the field of engineering. For example, the work software engineers do is mainly online, so they often work remotely; whereas civil engineers are usually required to work at construction sites.

what engineers earn

Salaries for engineers vary across the country, and also depend on your engineering level (e.g. junior engineer vs principal engineer) and discipline (e.g. mining vs mechanical). However, each engineering discipline offers a great starting salary (usually around \$70,000) and the chance for salary increases with experience and further training.

Here are the average median salaries for engineers in Australia:

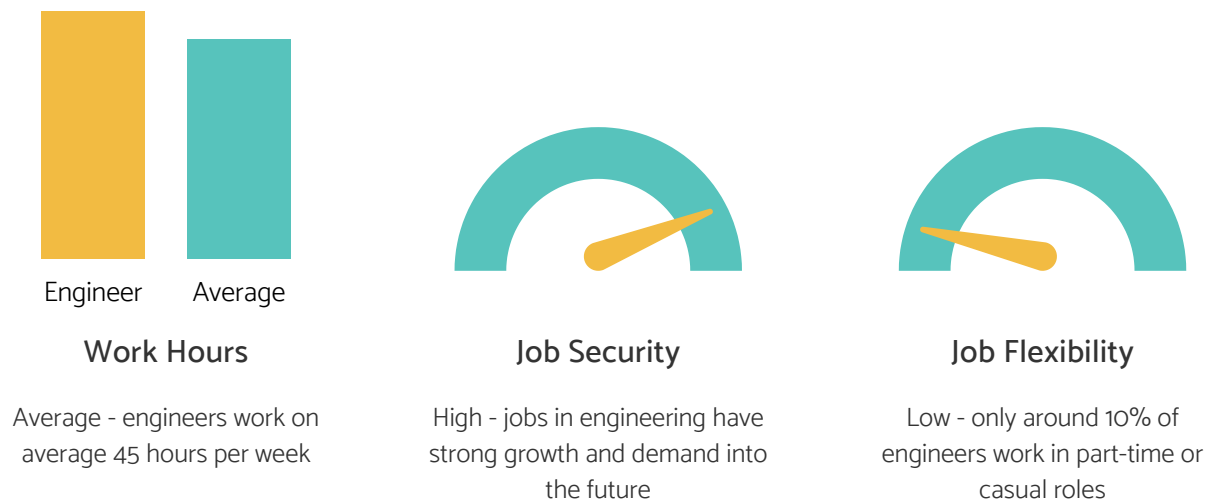


Does this meet your earning expectations?

- Yes, this salary looks good to me
- No, I'd like to earn more

work-life balance

Have you thought about what life will be like if/when you become an engineer? Your career will have an impact on your lifestyle, and engineers often have to adjust to suit their job. Are you willing to change your lifestyle if you need to?



Engineers work slightly above average hours a week at 45 hours. You probably won't need to work much on weekends or holidays, but if a project deadline is looming you might be expected to work overtime.

A large majority of engineers work full-time, so there isn't much room for part-time and casual work. You can usually expect to work typical business hours most of the time.

Jobs in engineering have some of the strongest growth going forward into the future, so you can expect that there will always be plenty of jobs available.

Do you think you could handle the impact on your lifestyle?

- Yes, it sounds like it would suit me
- No, I'm not so sure this is sounding like me

key tasks

Because there are so many different engineering disciplines, the tasks you undertake will vary depending on the discipline you choose to work in.

Even within a specific discipline, the projects you work on can be incredibly varied, so the tasks you perform can often change. Some common tasks you can expect include conducting planning and research, drawing up plans, or creating and testing prototypes.

Engineering is a project-based profession, which means that you will probably be working on long, complex projects quite often. Depending on the scope of a particular project, you might be working on it for a few days or weeks, or potentially up to years.



Automation Risk

There is a very low risk of your job being automated



Project-based

You could be working on a single task or project for extended periods of time



People Facing

You will often be working in large teams with other engineers

You might also be responsible for supervising and training junior engineers, attending meetings and briefings, or conducting site visits to make sure projects are running smoothly.

You will be dealing with people on a regular basis, including your clients, other workers and professionals, stakeholders, investors, and more.

What do you think of the key tasks of this career pathway?

- I'm excited to get started
- I'm not so sure about these tasks and responsibilities

skills and attributes

Engineers require a particular skill set to help them solve complex problems, meet important deadlines, and work effectively in teams.

You don't need to match all these attributes right now, but it would be good if you meet some of them and are willing to work towards the others.



Communication

Liaising with colleagues and clients, as well as expressing ideas effectively, are things you'll need to do often



Creativity

You'll need to be creative to come up with new ideas and solve problems in inventive ways



Time management

Meeting strict deadlines and completing projects in a timely manner is very important as an engineer

Circle the attributes you feel you have:

Problem solver	Time management
Analytical	Organised
Excellent communicator	Reliable
Adaptable	Innovative
Thorough	Creative
Strong maths skills	Resilient

How many did you circle?

0 to 3 - you and engineering may not be a good fit

4 to 6 - there could be potential

7 and up - sounds like you could make a great engineer

thoughts so far

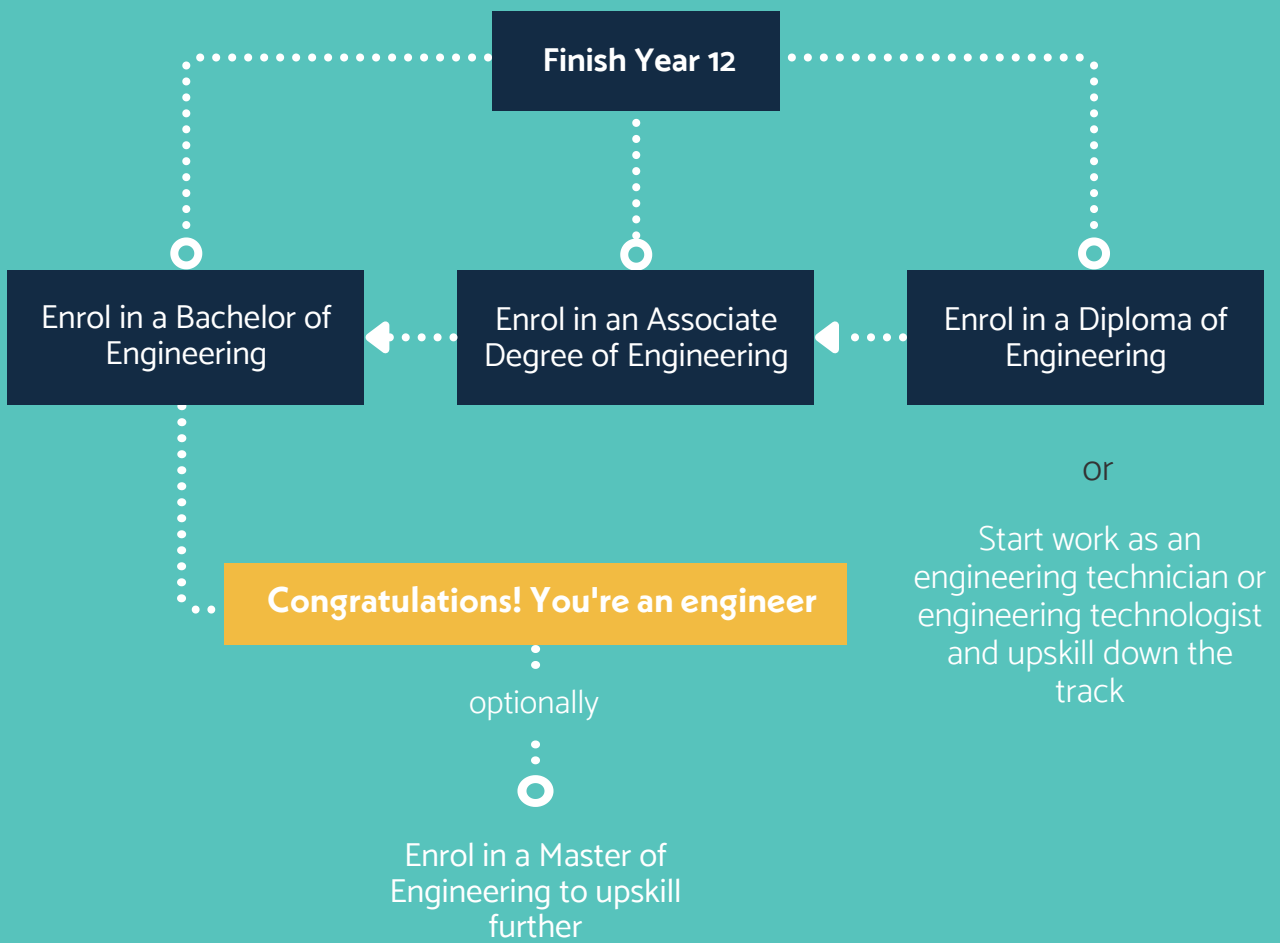
Do you think you could become an engineer? It's an important job, and you will be expected to innovate safe solutions to problems that will benefit mankind, which means you'll need to commit to the role. Next we're going to look at pathways to becoming an engineer, but first, ask yourself these questions:

What are you most looking forward to if you become an engineer?

What do you think you will struggle with most as an engineer?

Do you think the lifestyle, pay, and conditions would suit you?

pathways to engineering

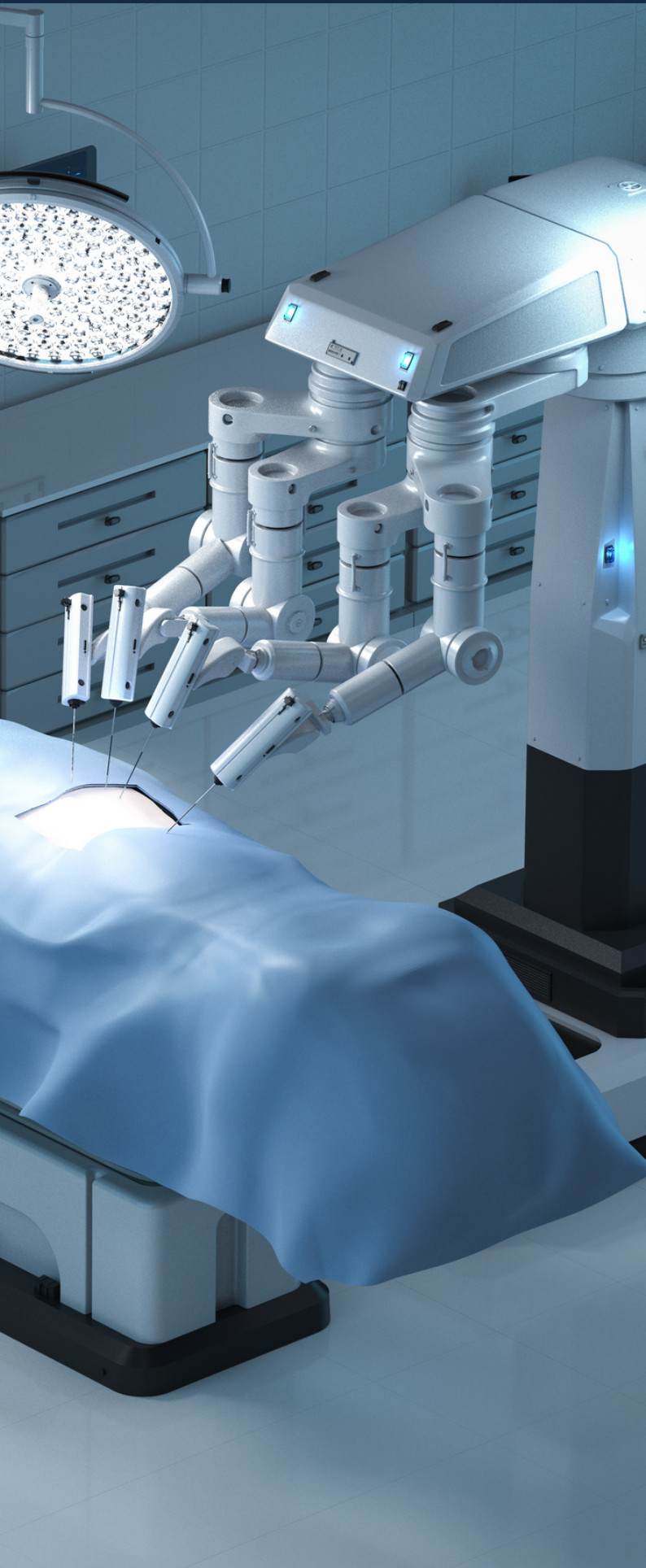


biomedical engineering

Biomedical engineers apply engineering concepts to biology and medicine to create new equipment and technologies that improve human health.

They are responsible for designing life-changing devices such as pacemakers, knee replacements, MRI scanners and even robots that can perform surgery under the control of a surgeon.

Biomedical engineering may suit you if you are interested in biology or medical science, and electrical, mechanical or chemical engineering.



jobs in biomedical engineering

TISSUE ENGINEER

Tissue engineering is concerned with developing biological substitutes that restore, maintain or improve human tissue.

This means you could work towards designing organ tissue that can be implanted in patients, enter stem cell research or design tissues that can be used to test drugs, for example.

ROBOTICS IN SURGERY

The medical world is a rapidly changing industry, and one of the exciting advances that have come from biomedical engineers is robots in surgery.

This means you could design and maintain surgical robots to allow doctors to more precisely perform surgical procedures and lower the risk of infection and blood loss in the patient undergoing surgery.

WHERE DO YOU THINK YOU FIT?

Biomedical engineers work in lots of different places; do any of these appeal to you? Write a bit about how you feel about biomedical engineering here:

REHABILITATION ENGINEER

Rehabilitation engineers develop technology and devices to help those with disabilities.

As a rehabilitation engineer, you may design custom wheelchairs, bionic limbs, or even something as sophisticated as a brain computer interface that allows a computer to be operated by an individual just by their thoughts.

IMAGING ENGINEER

Imaging engineers maintain, install and calibrate imaging equipment, which allow the biological structures inside your body to be examined in detail.

This means some of the machines you could work with are MRIs, CT scans and x-rays. You may also work as a researcher to discover breakthroughs in imaging equipment.

chemical engineering

Chemical engineering involves transforming raw materials into everyday products.

Some examples of products chemical engineers play a key role in processing are paper, clothing, food, microelectronics, polymers, petrochemicals and pharmaceuticals.

You should consider chemical engineering if you are interested in fluid mechanics, chemistry, thermodynamics and methods to separate materials.



jobs in chemical engineering

MATERIALS ENGINEER

Materials engineers research, design and test materials at the atomic level, such as minerals, glass, plastics, chemicals and textiles.

This means you could be finding new ways to use materials, testing material performance or improving manufacturing processes.

NANOTECHNOLOGY ENGINEER

Nanotechnology engineers alter individual molecules and atoms to do things like create materials with specific properties, design tiny pieces of electronics and manipulate cells.

As a nanotechnology engineer, you may find yourself designing lighter and more durable material for bulletproof vests, manipulating molecules in food to deliver a specific taste, or enhancing the microbial properties of bandages to fight against bacterial infections.

WHERE DO YOU THINK YOU FIT?

Chemical engineers work in lots of different areas; do any of these appeal to you? Write a bit about how you feel about chemical engineering here:

METALLURGIST

(METALLURGICAL ENGINEER)

Metallurgical engineers focus on transforming raw metals such as platinum, lithium and aluminium into useful materials.

As a metallurgical engineer, you may examine the performance of specific metals or extract desired metal from ores or recycled materials, for example.

BIOPROCESS ENGINEER

Bioprocess engineers concentrate on creating products using biological or chemical processes.

This means you could be involved processes that drive biological outcomes, such as in the production of vaccines, fuels, food, or the genetic mutations in hybrid crops.

civil engineering

Civil engineers design, construct and maintain the built environment around us.

They are responsible for humungous structures such as bridges, buildings, roads, airports, railways, sewage systems and dams.

Civil engineering might be right for you if you are interested in building materials and working in a team to design infrastructure.



jobs in civil engineering

TRANSPORT ENGINEER

Transport engineering involves the planning, design and maintenance of transportation networks such as airports, roads, harbours, train stations and bridges.

This means you could work on evaluating the best location for a train station, determining the runway directions at an airport or ensuring highway department standards are obeyed.

MINING ENGINEER

Mining engineers plan and oversee mining operations to ensure resources such as gold, iron ore and coal are removed from mines efficiently and safely.

As a mining engineer, you may find yourself designing the layout of a mine, improving the safety of an existing mine or investigating mineral deposits to determine whether they can be profitably mined.

WHERE DO YOU THINK YOU FIT?

Civil engineers work in lots of different places; do any of these appeal to you? Write a bit about how you feel about civil engineering here:

STRUCTURAL AND CONSTRUCTION ENGINEER

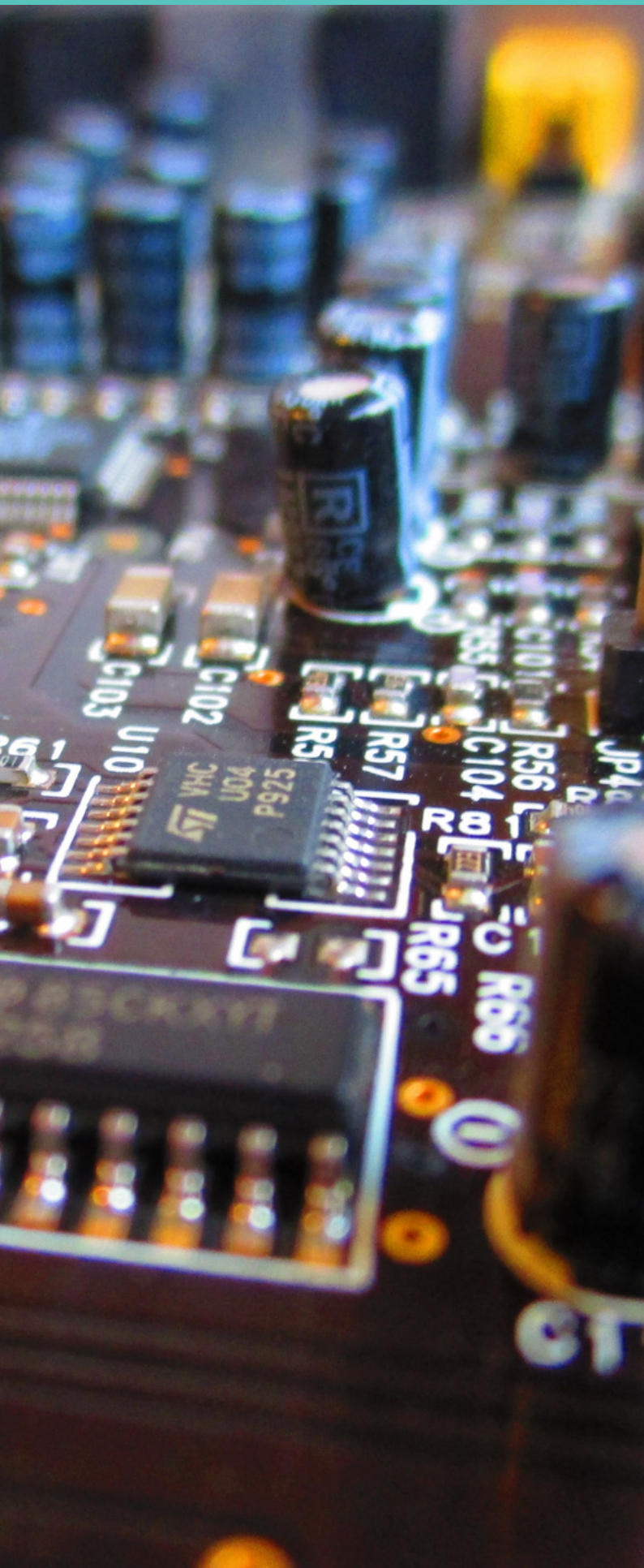
Structural engineers usually focus on designing buildings and other structures, whereas construction engineers concentrate on building these designs.

As a structural engineer, you will ensure materials and structural supports in buildings withstand the test of time. Alternatively, as a construction engineer, you might manage a construction team and develop construction project budgets.

HYDRAULIC ENGINEER

Hydraulic engineering is concerned with the management and flow of water resources.

This means you could be designing hot and cold water supply systems, automatic sprinkler systems, rainwater collection or sewage systems, for example.



electrical engineering

Electrical engineering involves designing, testing and maintaining electrical equipment and systems.

Some of the devices electrical engineers work on include electrical power stations, household appliances, radar and navigation systems, and computer circuitry.

This discipline would suit you if you are interested in electromagnetism, electrical circuits and coding.

jobs in electrical engineering

POWER ENGINEER

Power engineers design and maintain the generation, transmission and distribution of electric power.

This means you could be discovering new ways to harness renewable energy, design an electrical substation, or help deliver power to remote areas, for example.

ELECTRONIC ENGINEER

Electronic engineers design and test electronic devices and circuits, such as electric motors, computers and Global Positioning System (GPS) devices (just to name a few!).

As an electronic engineer, you may find yourself working with smaller devices such as earphones to large machines like the electrical systems in rocket ships.

MECHATRONICS (CONTROL AND AUTOMATION) ENGINEER

Mechatronics engineering ties together electrical, mechanical and software engineering to design computer-controlled machines.

In this role, you might design control systems for amusement park rides, robots that help the elderly or massive industrial robots.

TELECOMMUNICATIONS ENGINEER

Telecommunications engineers design and install hardware that is used to communicate over large distances electronically.

This means you could work on satellite communication, telephone services and television broadcasting.

WHERE DO YOU THINK YOU FIT?

Electrical engineers work in lots of different places; do any of these appeal to you? Write a bit about how you feel about electrical engineering here:

environmental engineering

Environmental engineers use their skills in chemistry, biology and engineering to discover solutions to environmental problems.

They work towards improving human quality of life through projects related to air and water pollution, recycling, efficient fuel methods, public health and waste disposal.

Environmental engineering may suit you if you have an interest in protecting the environment and studying human influences on the environment.



jobs in environmental engineering

AIR QUALITY ENGINEER

Air quality engineers ensure we are breathing clean and safe air by developing ways to analyse and control air pollution.

This means you could be monitoring emissions from power plants, ensuring indoor air in new buildings is high quality or analysing the toxicity of air samples from the environment, for example.

COASTAL ENGINEER

Coastal engineers are concerned with the risks and demands of construction along a coastline and may also monitor the effects of a developing coast.

As a coastal engineer, you may find yourself working on installing breakwaters, managing pollution in nearby marine environments or modelling coastal sediment transport.

HAZARDOUS WASTE MANAGEMENT

Hazardous waste management deals with the collection, treatment, disposal and reduction of hazardous waste.

In this role, you might oversee the transportation of hazardous waste, develop techniques to treat hazardous waste or assess the environmental risks of disposal of hazardous waste, for example.

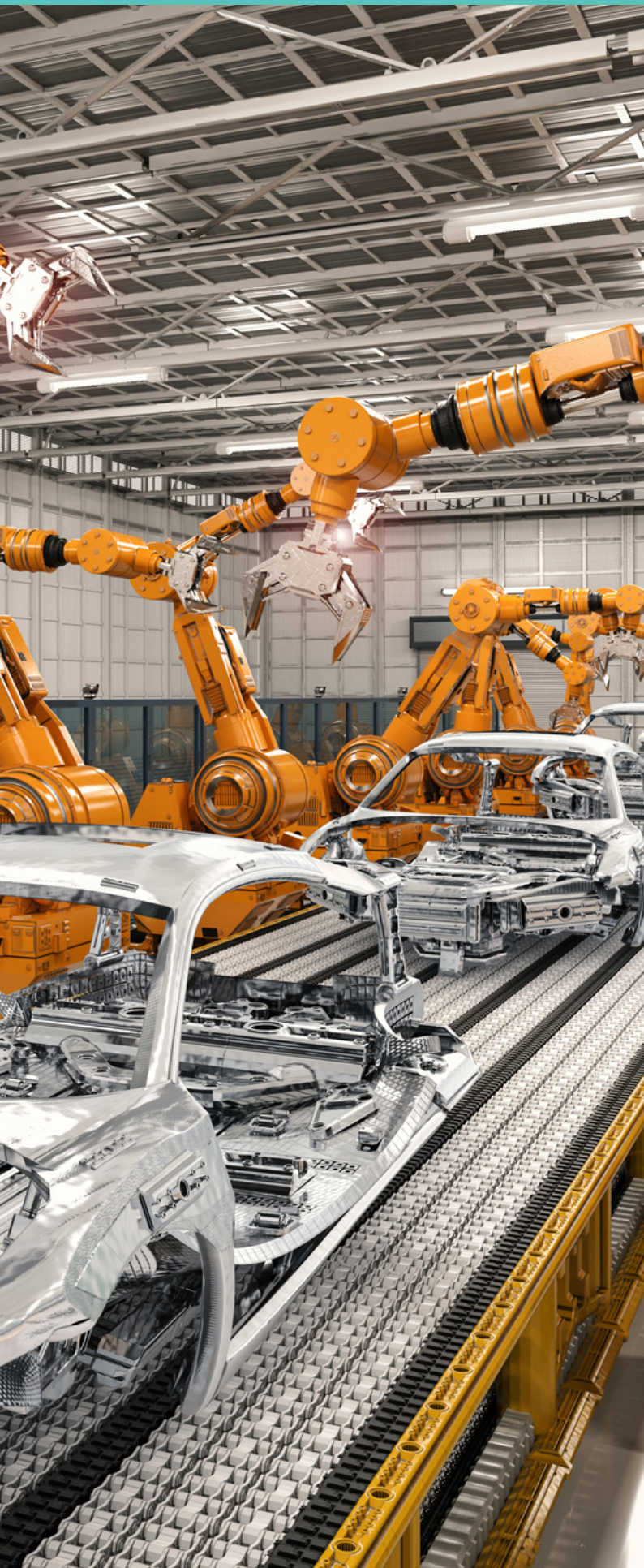
WATER QUALITY ENGINEER

Water quality engineers focus on treating water to be safe for humans and the environment.

This means you could work on implementing wastewater treatment facilities in remote areas, research techniques to treat water or analyse the safety of different water sources.

WHERE DO YOU THINK YOU FIT?

Environmental engineers work in lots of different places; do any of these appeal to you? Write a bit about how you feel about environmental engineering here:



mechanical engineering

Mechanical engineering involves the design, testing, building, and maintenance of objects and systems in motion.

From the mechanical systems in remote controlled cars and printers to the engines in cruise ships and trains, chances are you've used something mechanical engineers worked on.

Mechanical engineering may suit you if you are interested in motion, energy, thermodynamics and materials science.

jobs in mechanical engineering

AEROSPACE ENGINEER

Aerospace engineers design, test and maintain flight vehicles such as spacecraft, aircraft, satellites and missiles.

This means you could be performing wind tunnel tests on prototypes, designing the propulsion system of a rocket or analysing the structure of an aeroplane wing, for example.

AUTOMOTIVE ENGINEER

Automotive engineering is concerned with researching, designing and testing vehicles such as cars, motorbikes and trucks.

As an automotive engineer, you may find yourself improving brake technologies in buses, designing engines in race cars or improving safety features in motorcycles.

MANUFACTURING ENGINEER

Manufacturing engineers strive to improve the manufacturing processes of a product by designing production equipment and systems.

In this role, you might design the layout of an automobile factory, automate manufacturing processes in a soft drink facility or design more efficient industrial machinery in a bicycle factory.

MECHANICAL DESIGN ENGINEER

Mechanical design engineers focus on designing mechanical systems and components using software.

This means you could work on anything that has moving parts - like amusement park rides, trains or robots!

WHERE DO YOU THINK YOU FIT?

Mechanical engineers work in lots of different places; do any of these appeal to you? Write a bit about how you feel about mechanical engineering here:

software engineering

You are able to interact with your computer because it is given a set of instructions known as software. Those who develop, test, maintain and deploy software are called software engineers.

Software engineers work on any software system, from video games, mobile apps and websites, to the software used in airlines, banking, music and robotics.

Software engineering may be for you if you are interested in programming, software design, information systems and databases.



jobs in software engineering

CLOUD ENGINEER

Cloud engineers develop and maintain cloud-based software. The cloud refers to everything that is stored on remote servers and can be accessed over the internet, rather than being stored on your own computer.

This means you could work on the cloud security of an online store, moving a social media company to the cloud or improving the cloud-based technology of an email platform.

DEVOPS ENGINEER

DevOps engineering closes the gap between software developers (Dev) and IT Operations staff (Ops) so that companies can update their products more quickly.

As a DevOps engineer, you might manage an IT project, build software to automate processes, or test how reliably systems run, for example.

WHERE DO YOU THINK YOU FIT?

Software engineers work in lots of different places; do any of these appeal to you? Write a bit about how you feel about software engineering here:

DATA ENGINEER

Data engineers design, build and maintain software systems that collect, transform and analyse data so that it can be interpreted by data scientists.

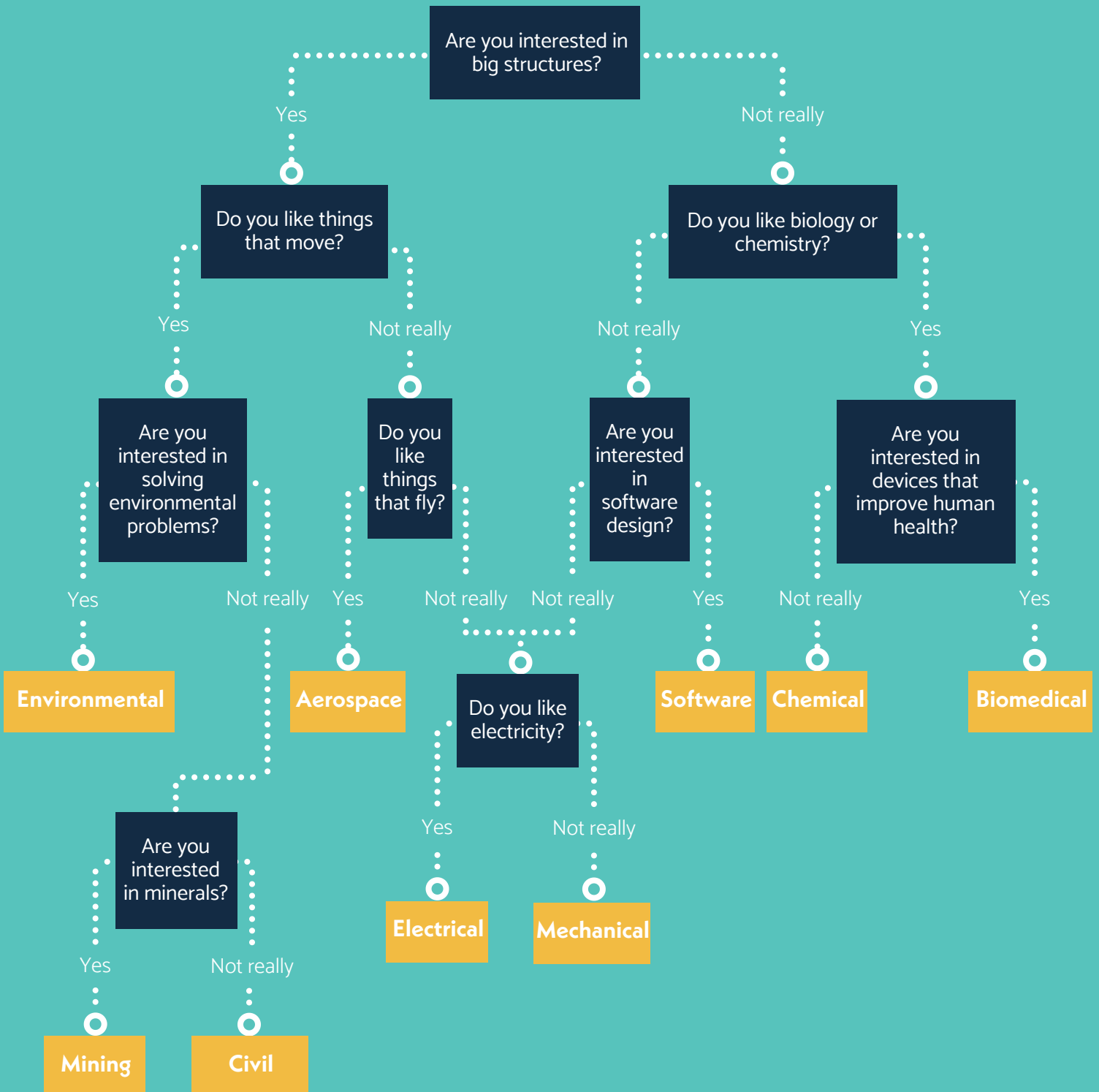
In this role, you may find yourself creating databases to store a company's data, designing new data validation methods or designing platforms to allow machine learning models to process data correctly.

FULL STACK ENGINEER

Full stack engineers can design, test and build software at any stage of its development, including both front-end (what users see and interact with) and back-end ('behind-the-scenes' functionality) development.

This means you could develop a website or mobile application from start to finish, or work on any aspect of it.

which engineering discipline should you choose?



your study options

In Australia, the engineering course you complete should be accredited by Engineers Australia. This means that your degree will cover the essential skills and knowledge you need to practice as an engineer once you graduate.

If you study a non-accredited degree, it might not affect your ability to work as an engineer right away. But it can impact you down the track if you want to become a member of Engineers Australia, eventually be registered on the National Engineering Register (NER) or be assessed for eligibility for state registration, or eventually become Chartered.

Once you leave school, you have a few options:

Don't want to go to uni?

Enrol in a Diploma of Engineering at a TAFE or RTO. These generally have the lowest entry requirements for students who do not have an ATAR or don't meet the requirements for a Bachelor's degree.

Once you finish your Diploma of Engineering, you can start working as an engineering technician.

Happy to go straight to uni?

You can also start studying a Bachelor of Engineering straight out of school. Completing a Bachelor's degree will allow you to start working as an engineer straight after graduation.

WHICH PATHWAY ARE YOU LEANING TOWARDS?

1

If you are thinking about a role as an engineering technician, then read through the next section about Diploma Programs.

2

If you're keen to go to university, skip the next section and move onto the section about Bachelor Degrees.

becoming an engineering technician

Becoming an engineering technician is generally the first and most basic step towards your career in engineering.

STEP ONE

To become an engineering technician, you will need to complete a Diploma of Engineering, which is usually offered by RTOs and TAFEs. Some universities also offer this course.

Some places may require you to have an ATAR or other subject prerequisites to gain entry into a Diploma of Engineering. At others, you will simply need to have finished grade 12, and be able to show competency in English and Maths.

A Diploma of engineering usually takes around 1-2 years to complete on average.

You might need to complete your Diploma of Engineering face-to-face, as there are often work placements and practical experiences that you need to undertake as part of the course. However, you may be able to study some of the other theory subjects online.

FIND A COURSE

You can find course providers and more info about the Diploma of Engineering on the [MySkills](#) website.

STEP TWO

Once you finish your Diploma, you can start working as an engineering technician.

As an engineering technician, you will generally work under the direction of an engineer or engineering technologist to perform tasks such as maintaining, testing and building equipment.

You can usually qualify for credit towards an Associate Degree of Engineering or Bachelor of Engineering, which will shorten the full-time duration of completing one of these degrees by up to a year.

[search for courses](#)

becoming a professional engineer

For students who want to go to uni straight out of school, starting a degree is a great choice.

STEP ONE

To become a professional engineer, you will need to complete a Bachelor of Engineering, which is usually offered by universities.

You will need an ATAR and some subject prerequisites (usually Maths or Science) to gain entry into a degree.

The requirements are different for each university, so make sure to check with the institution you want to go to.

A Bachelor of Engineering can take anywhere between 4-5 years to complete, depending on your major and whether you'd like to do a dual degree.

Most of your study will be done face to face, as you'll often be working with your hands or completing practical units. Some of the theory learning may also be online.

FIND A COURSE

You can find course providers and more info about undergraduate courses on [Course Seeker](#).

STEP TWO

Once you finish your degree, you will start working as a graduate engineer. After a few years of experience, you will become a fully qualified professional engineer.

As a professional engineer, you'll be skilled in the design, construction and maintenance of machines, materials, structures, and/or complex systems.

Further into your career, there are other certifications you might like to consider, such as becoming a Chartered Professional Engineer (CPEng) or Registered Professional Engineer (RPEng).

[search for courses](#)

other pathways to engineering

It's a great idea to have a Plan B for which course or pathway you'll take if you don't get an offer for your first preference. You can still become an engineer even if you miss out on an offer in the first round of university applications, so don't worry.

If you don't get into your dream course straight after school, you can always consider completing a degree with a lower ATAR requirement and then applying as a graduate.

What if you don't want to become an engineer right away? There are plenty of other career choices in STEM that will let you upskill down the track if you do decide to become an engineer.

You could work as a lab technician which often only requires a Certificate III or IV qualification. This is a great way to build up your experience, and see if a career in STEM is right for you.

If hands-on work is more for you, you might even like to complete an apprenticeship. This will give you lots of practical experience and a nationally-recognised qualification too.

The best part is both of these options can provide a direct pathway into either a Diploma or Bachelor of Engineering if you want to become a qualified engineer one day.

DO YOU HAVE A PLAN B?

It could be wise for your Plan B to include career options other than 'engineer', in case you don't get into your dream engineering course, or you change your mind during your studies. Having a solid backup career option with good job prospects, even if you never get into engineering, is a smart idea.

Write down some Plan B (or C, or D...) ideas here:

how else can you use an engineering degree?

Like any career, there are lots of reasons why you might change your mind about engineering once you've finished your degree or even after a few years in the job.

If a lifetime of engineering isn't for you, that's OK. Your qualifications, skills, and experience could open the doors to careers in lots of other areas.

An engineering degree provides a great basis for other jobs in STEM, from areas as diverse as biology, chemistry, physics and geology.

The skills and knowledge you gain from an engineering degree or work as an engineer are valuable across many different industries, including manufacturing, aviation and transport, and even health.

You might like to consider jobs that let you flex your strong mathematical muscles, including finance, investing, or data analysis.

You could even consider passing your knowledge on to others as a teacher, lecturer or even researcher.

For a completely fresh start, your skills could provide a great basis to work in a host of other industries such as law, marketing, defence, Government, IT, and more.

Consider why you're getting an engineering degree to start with though - if another career path seems more appealing, then it would be better to study for that role directly.

SKILLS STRENGTHS

What transferrable skills do you think you'd gain from an engineering degree and work experience as an engineer? They'll be useful in other careers and lots of other industries other than engineering. Have a think and write some of the core skills below, then research other jobs where they'd be useful.



study work grow

Since 2006, we've been committed to supporting Australian schools with quality, researched information that can help make the transition to post-school life more successful.

Finishing school is a big step in your life, and it can be stressful thinking about what's next. We want to help make the transition from school to further study, work, or whatever you wish to do as smooth as possible.

Remember, you can always ask your family, friends, teachers, and other support people in your life for advice and guidance as well. We wish all students the best of luck with their planning and hope that you have amazing experiences that enrich your lives, no matter what you do.

CONNECTING YOUNG PEOPLE
WITH FUTURES THEY LOVE



studyworkgrow

p. + 61 7 4039 3862

e. info@studyworkgrow.com.au

Study Work Grow has exercised its best efforts and judgement in compiling the information in this Guide, however you acknowledge that: 1) it is provided for information and general advisory purposes only and does not constitute professional, legal or career advice; 2) it should not be relied upon or regarded as a comprehensive assessment or evaluation or recommendation of your skills, competencies or personality or your prospects of success in a particular vocation, field or industry; 3) we recommend you contact the relevant educational institution or professional or trade organisation before making any decisions about a career or future plans; 4) to the extent permitted by, law we make no representations or warranties of any kind, express or implied; 5) you release us from liability for any loss, damage or expense resulting or arising from your use of or reliance on this communication.

All rights are reserved.

studyworkgrow.com.au