AUT

A FUTURE IN **ELECTRICAL & ELECTRONIC ENGINEERING**

WHAT IS ELECTRICAL AND ELECTRONIC ENGINEERING?

All technologies that use electricity need electrical and electronic engineering, an engineering discipline that is critically important to the energy revolution the world is currently undergoing. This is because the conversion of energy systems to electric types has been identified by the United Nations, and most governments around the world, as a critical part of the strategy to meet climate change challenges.

Electrical engineers are concerned with the safe supply and use of electricity. Examples of work AUT electrical engineering graduates are involved with include:

- Designing and planning renewable energy electric power systems for low-income countries
- Implementing artificial intelligence for the operation of smart buildings and smart communities
- Designing new electric rail systems for the electrified transportation future of the world
- Designing large solar installations needed for New Zealand and Australia and checking these will operate correctly

Electronics engineers are the creators of intelligent technologies that use electricity. Examples of work AUT electronic engineering graduates are involved with include:

- Developing a laser-based analyser that minimises risk of intravenous medication error in hospitals
- Creating smart systems for use in electricity networks that use wireless communications and artificial intelligence
- Implementing electric drives to be fitted into vehicles for conversion to electric types
- Directing the guidance, navigation and control systems research developments for space-craft

Are you innovative and creative in a practical way? Are you interested in directly changing society and impacting on lives through technology? If so, then a career in electrical and electronic engineering may be the path for you.

OUTLOOK AND TRENDS

Massive increase in electricity demand – The global conversion to electric vehicles and the move to electrify energy systems will massively increase demand for electricity and strain network supply equipment. Consequently, electrical engineers are in demand as governments and industry increase spending on research, infrastructure and new renewable generation methods to overcome high electricity demand issues.

New sustainable technologies are based on electricity – New and exciting technologies that directly impact on society require electrical and electronics engineers. These technologies include electricity systems for smart homes, buildings and communities. These systems incorporate renewable energy-based generation and energy storage systems that are managed intelligently to minimise energy costs and achieve highest efficiency.

Smart grid technologies – These technologies incorporate telecommunications and artificial intelligence systems and are used to sense and manage electricity networks to assure the supply of electricity is reliable and safe. This technology is needed because of the massive increase in electricity demand that will occur.

Medical technology – The use of artificial intelligence is opening up new areas and opportunities to improve lives and improve health. Dedicated electronics engineers are needed to program the intelligence needed in this area.

WORK SETTINGS

Electrical engineers commonly work for power companies, or consultants. Work is office-based but will often involve travel for specific on-site project work.

Electronics engineers design and develop electronics at research laboratories directly associated with manufacturing. Commonly, research and design is carried out in New Zealand while the manufacture of designed products is done in Asia.

CAREER ROLE EXAMPLES

There is often overlap between job outcomes for Bachelor of Engineering (Honours) and Bachelor of Engineering Technology graduates, but in general BEng(Hons) graduates enter design roles, designing, sourcing, purchasing, building and commissioning. They're often involved in structural developments with significant budgets and safety obligations.

BEngTech graduates would more likely work with design engineers, building new projects and maintaining them after completion.

Building Services Engineer (Electrical engineering) – Designs the infrastructure that safely transports electricity to buildings and loads within buildings. Usually involved in the energy management, security, lighting, audio-visual and communications of building design. May deal with property developers, project managers, architects, local councils, distribution network operators and various building engineers.

Power Systems Engineer (Electrical engineering) – Models, analyses and plans the activities of electricity utilities. Can also be involved in maintaining assets (eg transmission and distribution lines, and transformers), diagnosing failures and developing new solutions.

Note: This role has become more important with the integration of solar generation and EV charging loads into power systems.

Renewable Energy Engineer (Electrical engineering) – Involves the generation of electricity through renewable or sustainable sources of energy, including biofuels, hydro, wind and solar power. Involves design of electricity systems for communities, design and testing of equipment, developing ways of improving existing processes, and the conversion, transmission and supply of useful energy from renewable and sustainable sources.

Note: An area of engineering that is growing quickly.

Product Design Engineer (Electronic engineering) – Performs research and development on electrical devices. Delivers electronic circuit design, and intelligent system design through microprocessor programing. Assures product designs meet safety and electromagnetic compliance standards. May liaise with sales teams to meet market needs. May also be involved in assuring quality levels with the manufacturing process during product assembly or developing product test equipment.

SKILLS AND KNOWLEDGE

General requirements

- Ability to work in a team
- Excellent communicator, particularly in explaining complex ideas to clients or co-workers who may not understand technical terms
- Strong project management skills
- Hands-on practical aptitude
- Competent time management and organisation, especially the ability to prioritise.
- Capable problem-solver

Technical requirements

- Understand fundamental principles and how to apply these to electrical and electronic circuits
- Use design and analysis forms of software to verify and investigate performance of circuits
- Ability to design circuits to comply with standards
- Ability to programme microprocessors and other devices used to form intelligent systems
- Proficient in use of equipment such as oscilloscopes, function generators and other types used for circuit analysis

PERSONAL QUALITIES

- Innovative and creative – thinking outside the square
- Logical, methodical and precise
- Eye for detail
- Flexible and quick to adapt to new projects or changing requirements

SALARY GUIDE

Pay can differ depending upon the size of the company. In general larger companies pay more, but smaller organisations provide a broader range of experience.

	Salary (per year)
Electrical and electronic engineering graduate	$55,000–$75,000
Intermediate level engineer	$77,000–$115,000
Senior level engineer	$100,000+

Sources: Glassdoor, Payscale.com, Jobtet

Salary range is indicative of NZ's job market at time of publication (Oct 2021) and should only be used as a guideline.

THE AUT ADVANTAGE

AUT students are taught best industry practices in terms of electronics circuit design and electrical circuit design. The focus is to be as industry ready as possible, and includes working on real world, practical and industry-focused projects in electronics and electrical engineering. All students must fulfil 800 hours of practical industry work.

PROFESSIONAL REGISTRATION

Registration with Engineering New Zealand is highly recommended. Other relevant professional organisations include Institute of Electrical and Electronics Engineers (IEEE), CIGRE New Zealand and Institution of Engineering Technology (IET). Many engineers join professional organisations for industry and academic connections, professional development and advocacy.

FURTHER STUDY OPTIONS

Further study in electrical and electronic engineering is available at postgraduate level, including Postgraduate Certificate in Engineering, Postgraduate Diploma in Engineering, Master of Engineering, Master of Philosophy and Doctor of Philosophy.

Research areas include electrical machines, power system control, energy management and smart grid, distributed generation and renewable energy.

ROBEL HAILU

Project Manager, Downer NZ

Bachelor of Engineering (Honours)
in Electrical and Electronic Engineering

"I'm an electrical engineer working as a project manager at Downer where I've worked for four years. Downer designs and builds assets that change society, such as working on the underground City Rail Link for the Auckland CBD, the 5G telecommunications system for New Zealand and large-scale renewable energy projects.

On a regular basis I am involved in scoping, designing and quoting for complex and multi-million dollar projects. I then manage the project work, including the financials.

What I like best about my job is that everything is new. No one job is the same and it makes the whole process feel like an adventure.

I am continually looking for innovative ways of doing things and finding the opportunities where commercial and socially good outcomes can combine. An example is the integration of renewable energy systems into New Zealand for the benefit of local communities and society.

I'm also involved in a project for Downer NZ at AUT. This exposes me to new cutting edge technology that I can feed back into the business.

To graduates I say, don't stress it. Do your best, have an open mind and you will slowly find your way. On day one you always feel like a fish out of water but, like everything, you will pick up 90% of what you need to know on the job."

EMPLOYER COMMENT

"At Downer we look for employees with knowledge and skills, specifically innovative ideas, thought leadership, safety leadership, excellence in delivery and the ability to collaborate in a team. We also like candidates from diverse backgrounds and cultures.

Robel is always looking for innovative solutions and isn't afraid to challenge the status quo. He stays on top of new technology, offering innovative solutions, striking a good balance between theoretical knowledge and practical application. He works well in a team and understands our customers' needs."

TIPS TO GRADUATES

"Keep your CV brief, up-to-date and professional looking. A cluttered or poorly presented CV makes it hard to find key attributes. Keep a good balance between education, work experience, skills and interests as you don't know necessarily know what a potential employer is looking for.

Take the time to understand the company and role and consider whether it is the correct fit for you. Focus your attention on applying for a smaller number of vacancies that you really want rather than taking a scattergun approach."

Shaun Frazerhurst
Downer NZ National Project Manager

USEFUL WEBSITES

Transpower
www.transpower.co.nz

Beca
www.beca.com

Engineering New Zealand
www.engineeringnz.org

Institute of Electrical and Electronic Engineers NZ
www.ieee.org

FURTHER INFORMATION

For the most up-to-date information on the study of Electrical and Electronic Engineering please visit our website: www.aut.ac.nz/electrical-eng or www.aut.ac.nz/eng-tech

For other Future Career Sheets visit: www.aut.ac.nz/careersheets

EMPLOYABILITY & CAREERS

For employability and career support, AUT students can book an appointment through https://elab.aut.ac.nz/
@AUTEmployabilityandCareers

FUTURE STUDENTS

Contact the Future Student Advisory team for more information: www.aut.ac.nz/enquire
futurestudents@aut.ac.nz
@AUTFutureStudents

CURRENT AUT STUDENTS

Contact the Student Hub Advisors team for more information: 0800 AUT UNI (0800 288 864)
www.aut.ac.nz/enquire
studenthub@aut.ac.nz

CITY CAMPUS

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The information contained in this career sheet is correct at time of printing, October 2021.