

AUT

A FUTURE IN
**ELECTRICAL & ELECTRONIC
ENGINEERING**



WHAT IS ELECTRICAL AND ELECTRONIC ENGINEERING?

In a world where virtually nothing can be done without flicking a switch or pushing a button, electrical and electronics engineers hold the keys to progress. Electrical engineers control the diverse power systems that provide energy for all aspects of daily life, while electronics engineers create and maintain the vast array of electronic systems and devices used by individuals and industry.

The breadth of activity and opportunity in this field is genuinely exciting. Engineers can be designing components for mobile phones or medical devices, researching circuitry for the development of robots, implementing systems that maintain huge power stations or constructing energy efficient lighting structures for towns or sporting stadiums.

Electrical and electronics engineers have an understanding of the whole process of the production of systems and devices, from planning, research, development, manufacture and testing, to implementation and maintenance. As such they will need to be highly competent project managers, communicators and innovators, as well as multi-skilled technicians.

Do you like looking behind exteriors to see what makes stuff work? Are you interested in making systems more efficient and effective? Are you good at Physics, Maths and Technology? Do you like hands-on practical activity? If so, a career in electrical and electronic engineering is definitely for you.

OUTLOOK AND TRENDS

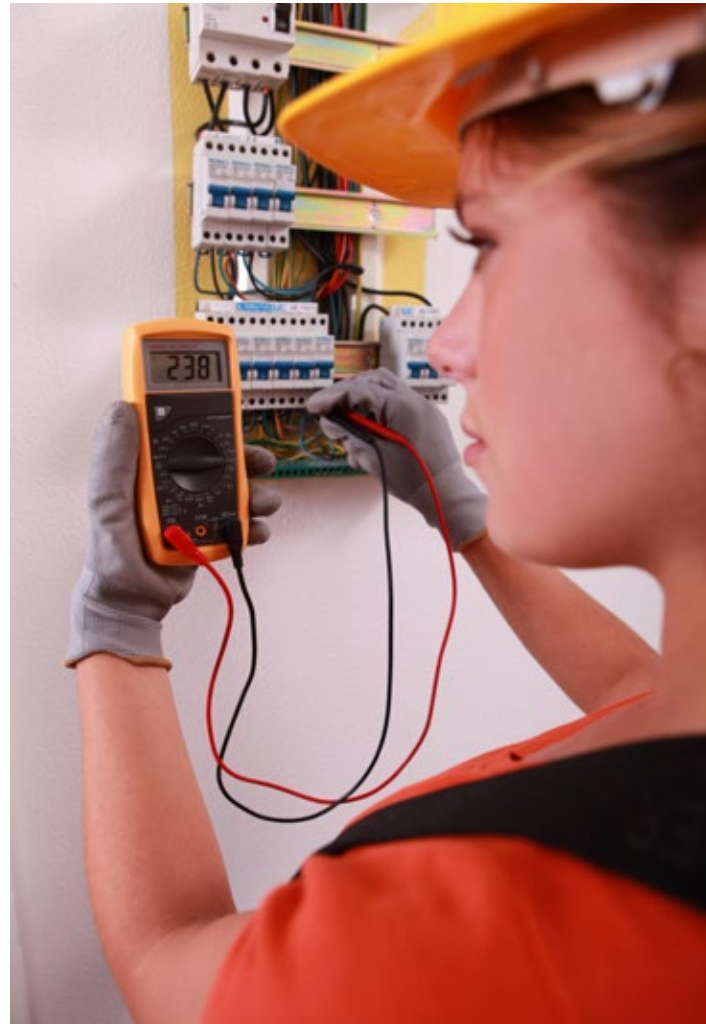
In recent years there has been a big move to **software as opposed to hardware**. Software modelling technology is now so advanced that actual manufacture has become secondary in the production process. Software technology is at the basis of the microcontroller, which runs virtually every electronic product, and design and maintenance in this area is constantly developing.

Demand for electrical engineers has increased alongside government spending on the upgrading of the national grid, and power companies have also stepped up the rate at which they are building new high-voltage substations in response to increased demand for power. This is contributing to demand for electrical engineers who specialise in substations and local power networks.

Similarly, investment in telecommunications infrastructure have led to **more demand for electronics engineers**, as both public and private sector seek to enhance broadband and mobile networks.

More than ever before, **financial factors** are guiding what work is done, and by whom. Privatisation and globalisation have meant that large companies prefer to assign work to contractors rather than doing it in-house. This has led to an increase in the amount of companies who need graduate engineers.

Most large companies are requiring their staff to **move to where the work is** both within NZ and overseas. Engineers need to be prepared to travel, both within New Zealand and internationally (all AUT degrees are internationally accredited).



WORK SETTINGS

There are two main work settings for both electrical and electronics engineers:

- The design office, factory, or laboratory, including practical research and development roles
- Onsite technical installation, maintenance and sales roles

Electrical engineers often work for power companies, building projects and on development of infrastructure.

Electronic engineers often take part in the design and development of electronic and micro-electronics products.

CAREER ROLE EXAMPLES

There is often overlap between jobs gained by graduates of the Bachelor of Engineering and the Bachelor of Engineering Technology, but in general BE graduates would expect a design role where projects are designed, sourced, purchased, built and commissioned. BEngTech graduates would be more likely to be working with the design engineers in terms of building new projects and maintaining them after completion.

Lighting design (Electrical Engineering)

Designs lighting for all interior and exterior spaces, from parks and walkways to factories and high rise buildings. Plans, researches and implements all aspects of

illumination using specialised lighting software such as AGI or Dialux, communicates with clients and works alongside other building professionals on projects.

Electrical products design (Electronic Engineering)

Works closely with research and development teams to produce all manner of electrical devices. Determines the ideal way for the product to be made, generates specifications for manufacturing equipment, programmes it, tests it and sometimes maintains it. Project manages the process, keeping all parties informed of progress, obstacles and revisions.

Power Systems Engineer (Electrical Engineering)

Performs power system studies, network modelling and analysis for energy companies such as Mighty River Power, Meridian or Transpower. Ensures network models are fully maintained and up-to-date, and monitors and analyses network model performance. Provides technical support to others associated with power quality, security of supply and network degradation. Prepares, updates and communicates policies, technical specifications, standards and procedures.

Renewable Energy Engineering (Electrical Engineering)

Involved with the production of energy through renewable or sustainable sources of energy, including biofuels, hydro, wind and solar power. Focussed on finding efficient, clean and innovative ways to supply energy. Can fulfil a variety of roles, including designing and testing machinery, developing ways of improving existing processes, and converting, transmitting and supplying useful energy. Research and develop ways to generate new energy, improve the efficient use of energy through reducing emissions from fossil fuels, and minimise environmental damage.

SKILLS AND KNOWLEDGE

General skill 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 skills

- Design Software – AutoCAD, Matlab, Altium, LabVIEW
- Proficiency with circuitry and components
- Instrumentation equipment such as oscilloscopes, function generators and various electrical analysis equipment

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

There can be a difference in pay 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	\$50,000 - \$70,000
Intermediate level engineer	\$80,000-\$100,000
Senior level engineer	\$100,000 - \$120,000

Source: 2015 Hudson Salary Guide and Robert Walters Salary Guide 2014

Salary range is indicative of the New Zealand job market at the time of publication and should only be used as a guideline.

THE AUT ADVANTAGE

Students are constantly working on real world practical industry-focussed projects, which prepare them for employment. Guest lecturers include such high profile employers as Beca, Mighty River Power, Transpower and Fisher and Paykel (both Appliances and Healthcare).

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.



GUY PAINE *Ngati Whakaue*

Electrical Engineer, Station Services Electrical Team

Mighty River Power

Bachelor of Engineering (Honours) – Electrical and Electronic Engineering

“Lifestyle flexibility, employment security and mental challenge were the three key reasons I chose to pursue an engineering qualification. My job takes me to some beautiful locations in the Central North Island, and I really enjoy the stimulation and diversity of the power industry.

My role involves managing Mighty River Power’s electrical assets – basically anything with wire. This can mean anything from upgrading and maintaining power systems, providing direction to technical projects, writing business case reports, and presenting at engineering conferences. My main tool is my laptop, and I have a great mix of office and on-site work. I do need to have a clear understanding of the diverse technology used to produce power, but most of that hands-on work is done by technicians.

The main skills I apply are problem solving, project management, technical ability, communication and collaboration. These all present their own challenges, and I gain a lot of satisfaction from arriving at solutions.

In the future I’d like to run my own consultancy in a niche area in power generation. Did you know that a third of all CEOs have engineering degrees? I think that shows how valuable and practical the qualification is.”

EMPLOYER COMMENT

“Understanding and application of engineering principles to electrical equipment is the main requirement for a successful electrical engineer. They need to be able to define, investigate and analyse complex engineering challenges, and at Mighty River they need to design solutions to engineering problems in a power station environment.

Guy brings the ability to capably apply engineering-first principles, and he cogently analyses engineering problems, finding solutions that are both practical and fit for purpose.”

Anirban Dey

Electrical Engineering Manager
Mighty River Power

USEFUL WEBSITES

Transpower

www.transpower.co.nz

Beca

www.beca.com

Engineering New Zealand

www.engineeringnz.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

FUTURE STUDENTS

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

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The information contained in this career sheet is correct at time of printing, August 2019.

