*What can I do with a degree in*

# Electrical and Electronic Engineering?

UC UNIVERSITY OF CANTERBURY
*Te Whare Wānanga o Waitaha*
CHRISTCHURCH NEW ZEALAND

# Electrical and Electronic Engineering.

## What is Electrical and Electronic Engineering?

Electrical and electronic engineers harness one of the fundamental forces of the universe, electromagnetism, for the benefit of the world. They design and maintain systems and devices that involve the generation, transmission, distribution, and utilisation of electrical energy and information to provide efficient and sustainable power for homes and industry, and the transfer of information between computers and smart miniature devices throughout the modern world.

Electrical and electronic engineers have played a major role in the development of many technological advances, from personal computing and smart phones to autonomous vehicles and renewable electrical power, digital television, unmanned aerial vehicles, robotics, medical imaging, and space exploration. These developments have all been possible in large part because of electrical engineering innovation.

## Learn more

It is important to do some research when planning a future career. Speak with, ask questions of, and follow relevant professional bodies, organisations, companies, thought leaders and industry professionals to learn more about:

- Career opportunities, work environments and salary information
- Education and training requirements.

### Examples of professional bodies

- Electricity Engineers' Association 💻 www.eea.co.nz
- Engineering New Zealand 💻 www.engineeringnz.org
- Institute of Electrical and Electronic Engineers 💻 www.ieee.org
- The Institution of Engineering and Technology 💻 www.theiet.org
- International Council on Large Electric Systems 💻 www.cigre.org
- Electrical Workers Registration Board 💻 www.ewrb.govt.nz

## Career and study information

Some study pathways and degrees have a recommended school background, and some careers may require further study beyond a first degree or additional experience.

### Gather helpful information from:

- Subject-specific content at 💻 www.canterbury.ac.nz/beng-honours
- Job profiles on career websites like 💻 www.careers.govt.nz
- Job adverts/vacancy descriptions
- Industry professional bodies.

This resource is part of a set of brochures focused on subject majors; many can also be studied as minors.

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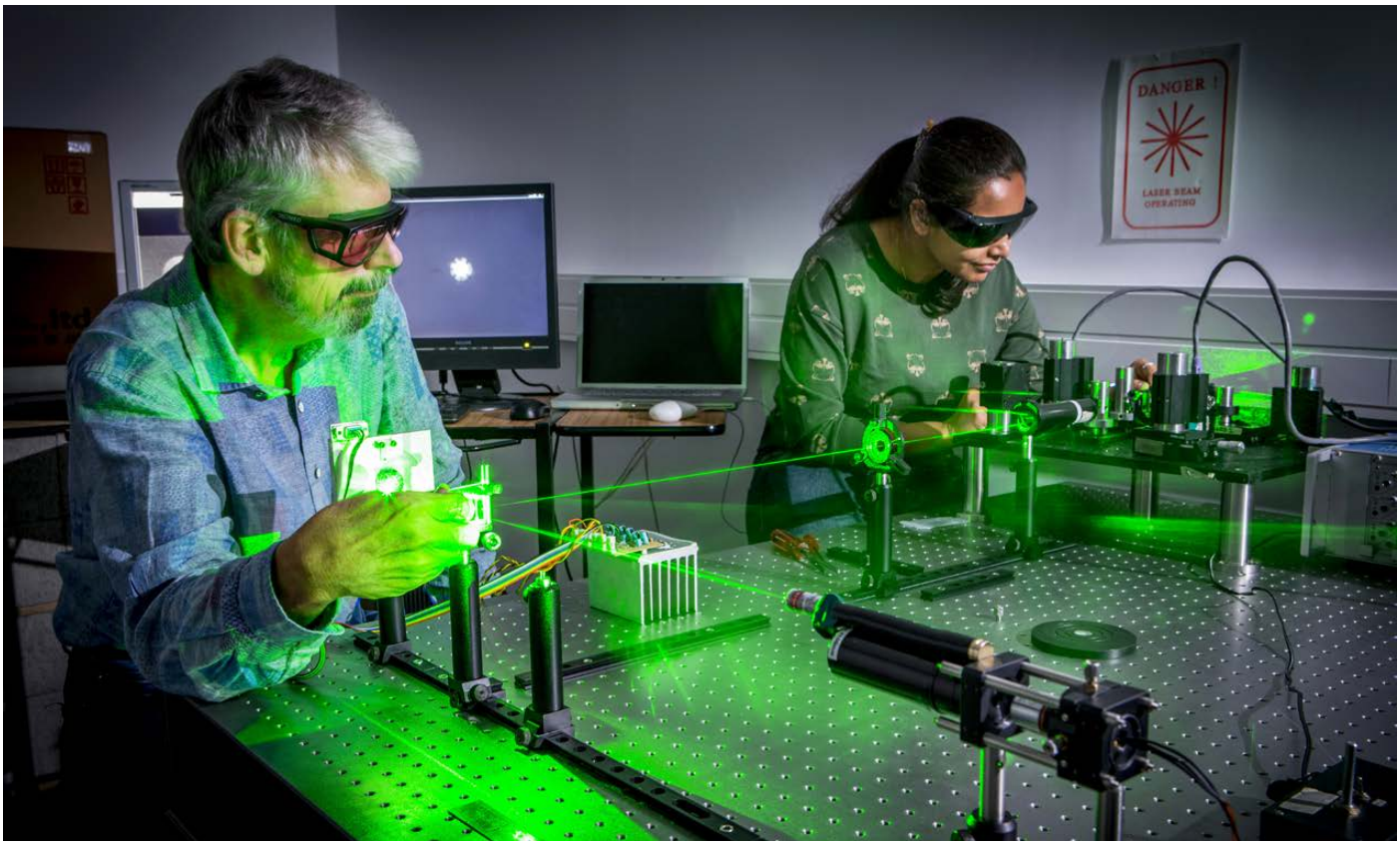


### Career and study information continued

UC students can choose to complete a minor alongside Electrical and Electronic Engineering in Power Engineering. For more information, visit: 💻 www.canterbury.ac.nz/study/academic-study/subjects/electrical-and-electronic-engineering

## What skills can graduates gain?

Through studying a degree in Electrical and Electronic Engineering, graduates develop a valuable set of skills and competencies that can include:

- Practical application of engineering technology and science
- Technical knowledge of electronic and electrical systems
- Programming software for embedded (smart) systems
- Coping with rapid technological changes
- Analytical and problem-solving skills
- Logical and quantitative thinking.
- Time-management, planning and organisation
- Creativity and innovation.

### Applied learning

Students undertake 800 hours of work experience as part of this engineering degree, providing them with a good understanding of the industry and the confidence to apply their skills in a workplace setting. This experience can deepen students' skillset, awareness of others, working knowledge and employability.

### What do employers look for?

Many employers look for generic skills such as communication, client/customer-focus, bicultural competence, cultural awareness, teamwork and initiative.

With technology, globalisation, and other drivers changing society, skills such as resilience, problem solving, and adaptability are important.

Skills that are likely to grow in importance include analytical and creative thinking, systems thinking and technological literacy.*

**World Economic Forum: www.weforum.org/agenda/2023/05/future-of-jobs-2023-skills*

### How can these skills be developed?

- Some skills are gained through studying
- Extra-curricular activities can help, such as getting involved in clubs, mentoring, cultural groups, part-time work or volunteering
- Be open to professional and personal development opportunities, whether it is undertaking work experience, overseas exchange, skills seminar, or joining an industry group.

## Where have graduates been employed?

Graduates are found in many industries such as:

- Telecommunications
- Electrical power
- Renewable/power engineering
- Nanotechnology
- Biomedical engineering
- Embedded systems
- Rocketry/space
- Health sector
- Geoscience
- Electronics.

Graduates have found roles with:

- Information, media and telecommunications organisations
- Manufacturers
- Electricity and energy services
- Professional consultancy companies
- Scientific and technical services
- Tertiary institutions.

# What jobs and activities might graduates do?

Graduates with this degree are employed in a range of jobs — see some examples below.

Note: This list is not exhaustive, and some jobs may require further study, training or experience. It is recommended to start with the section 'How can I gain a sense of career direction?'

### Electrical engineer, graduate electrical engineer

- Design systems to generate, distribute and manage electricity
- Test electricity systems and resolve problems
- Manage electrical infrastructure assets
- Undertake simulation studies to analyse performance

### Electronics engineer

- Research, develop and design electronic equipment and systems e.g. circuits and software for medical devices, mobile phones, automated control systems, navigation systems

### Power engineer, power systems engineer, power electrical engineer

- Plan and develop systems that supply power
- Test and maintain these power systems
- Research alternative sources of power and methods of conveyance

### Software engineer, graduate software engineer

- Analyse customer needs, evaluate computer software and research new technologies
- Identify solutions and develop software programs for new products
- Manage software development projects

### Communications engineer

- Design and develop software for improved and more reliable communications
- Design new communications data algorithms

### Hardware engineer

- Design the physical parts of computer systems
- Research and test hardware components
- Consider the costs of hardware to end users

### Research engineer, research and design engineer

- Evaluate and develop new systems and equipment in the electronics industry
- Make recommendations to resolve problems
- Support general organisational operations

### Biomedical engineer

- Develop electrical and electronics systems for improved healthcare
- Design new algorithms for medical imaging

### Electrical / electronic technician

- Interpret instructions from an engineer and ensure these are implemented correctly
- Install and maintain power-using equipment

### Test analyst, validation tester

- Design tests to check software/systems
- Identify defects and bugs, and suggest fixes
- Record issues and track solution results

### Network engineer, network assets engineer

- Design and develop computer networks, infrastructure and systems for phone calls, internet access, TV and radio broadcast
- Ensure designs are implemented correctly

### Project engineer, project manager

- Manage project plan, timelines, costs, and compliance
- Manage procurement, purchasing, and contracts
- Liaise with project staff and clients

### Design engineer, junior design engineer

- Use software/technology to develop new ideas
- Design and test prototype devices
- Liaise with suppliers and manufacturers

### Radio frequency engineer

- Forecast future traffic resources needed
- Plan radio network changes and improvements
- Integrate front-end RF systems into other systems like aviation or aerospace

### Examples of other job titles and careers include:

- Agricultural technology engineer
- Automation engineer
- Cloud engineer
- Signals engineer
- Firmware engineer
- Performance and data engineer
- Building services / compliance engineer
- Factory engineer
- Patent adviser
- Product development engineer
- Process engineer.

# Further study options

Postgraduate study options are available in Electrical and Electronic Engineering up to a master's and PhD level. Postgraduate study options can include areas from power and electronic systems, wireless research, renewable energy, to nanotechnology engineering.

Research opportunities/partnerships may be available through the EPECentre, HITLabNZ, Wireless Research Centre, Spatial Engineering Research Centre, and MacDiarmid Institute.

Further study may facilitate career benefits such as specialist skills, entry into a specific occupation, higher starting salary, faster progression rate, and advanced research capability.

It is important to determine which, if any, further study options align with future career aspirations.

For further UC study options visit:
💻 www.canterbury.ac.nz/study/academic-study

# How can I gain a sense of career direction?

Understanding yourself and others is important to gain a sense of direction. This grows with experience; therefore, trying new things and reflecting on an ongoing basis is important.

## Career planning checklist

❑ **Discover and reflect on:**

- Your values, interests, strengths, abilities, and aspirations
- Your connection to whānau, people, and places
- Lifestyle preferences and location
- The skills you want to gain, use, or enhance

❑ **Engage in a variety of experiences to learn about:**

- How you want to contribute to society, the environment, and global challenges
- The tasks, responsibilities and work environments you prefer
- Your work values, priorities and interests

❑ **Learn more and gather career and study information**
(refer to page one of this resource)

- Speak with people working in careers that interest you; check the realities of a job/career
- Gather information from various sources

❑ **Identify your next steps**

- Talking to a career consultant can help you to identify your next steps. Visit: 💻 www.canterbury.ac.nz/life/jobs-and-careers

# What have other students and graduates done?

Explore career stories of students' university experiences and UC alumni who make a difference globally in varied ways.

Visit: 💻 www.canterbury.ac.nz/about-uc/why-uc/our-students/student-stories

## Philipp

Chief technology Officer (CTO), Kea Aerospace

PhD in Electrical and Electronic Engineering

### What led to you to co-found Kea Aerospace?

I love both engineering and exploration. Working in the aerospace field is a perfect combination of both, where you have to push the boundaries of what is known and currently possible.

### What's the best part about your work as a CTO?

I like the challenge and unknown parts of the job. We are doing something fairly new. No one has been commercially operating solar-powered stratospheric aircraft so far. Otherwise, I love the diversity of the job, from design work on a computer to manufacturing in a lab and flight testing outside.

### What is your next big project?

We are developing a new unmanned high-altitude fixed-wing aircraft that will fly in the stratosphere at around 20km altitude, which, being fully solar powered, will operate for days or weeks per flight. With a wingspan of over 30m, it will likely be the largest unmanned aircraft designed in the Southern Hemisphere.

Right now, my job involves a bit of everything from the aircraft design and manufacturing to flight testing and regulatory work. Additionally there is of course more work on the business side of things.

### How has UC supported your team?

We are getting amazing support from the Centre of Entrepreneurship (UCE) and their ThincLab advisory team. UC was also the only place in the world where I could work on rocket control systems in a non-military context. Studying at UC was far more practical than in Germany. I was working with UC Aerospace during study – a great team of postgraduates

# Career guidance

Career services are available for future and current students, and recent graduates. To learn more, contact:

Te Rōpū Rapuara | Careers
T: +64 3 369 0303
E: careers@canterbury.ac.nz
💻 www.canterbury.ac.nz/life/jobs-and-careers

### Helpful career insights

- Speaking with employers is key to finding opportunities; not all jobs are advertised
- Developing an online presence is useful as employers can search for future employees online
- Learning about recruitment patterns and where to find opportunities is important.

# Study advice

Student Advisors at UC help with questions focused on starting, planning and changing studies. To connect with Student Advisors, visit:

💻 www.canterbury.ac.nz/study/study-support-info/study-support

### Future students – contact:

The Future Students team
T: 0800 VARSITY (0800 827 748)
E: futurestudents@canterbury.ac.nz

### First year students – contact:

Kaitoko | First Year Student Advisors
T: +64 3 369 0409
E: firstyearadvice@canterbury.ac.nz

### Continuing students – contact:

Pūhanga | Faculty of Engineering

T: +64 3 369 1717
E: engdegreeadvice@canterbury.ac.nz
💻 www.canterbury.ac.nz/study/academic-study/engineering

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*Career profiles and the information in this brochure were correct at the time of creation but are subject to change.*