From research into wi-fi and robots to wearable antennas for medical applications and next-generation cellular systems, Macquarie’s researchers in the School of Engineering are uniquely positioned to help shape the current and future needs of society.

We have research strengths in antenna design, energy conversion and management, integrated wireless communication systems, nonlinear electronics, guided-wave optics, very-large-scale integration, medical imaging, and wireless communications and networking. We have a strong research program in mechanical engineering with an emphasis on medical devices and applications, while other researchers work on biomedical devices, biomedical imaging and mid-infrared photonics research.

In the most recent Excellence in Research for Australia evaluation, our research in electrical and electronic engineering received a rating of performance above world standard and our research in biomedical engineering received a rating of performance at world standard.

As a higher degree research candidate at Macquarie, you’ll have the opportunity to conduct research alongside some of the world’s best scholars whose cutting-edge research continually pushes the boundaries of knowledge. You’ll also benefit from our working partnerships with many of the global companies neighbouring our campus in the Macquarie Park Innovation District, Australia’s largest high-tech precinct.

**RESEARCH HUBS**

- Biomedical Imaging and Sensing Group
- Future Wireless Networks
- Materials Engineering
- Optical and Photonics Engineering
- Reconfigurable Electronics and Antennas
- Sustainable Energy Systems Engineering Group
AREAS OF SPECIALISATION
- Antennas and electromagnetics
- Biomechanics
- Biomedical signal processing
- Communication system technologies
- Computational fluid dynamics
- Electrical power systems and smart grids
- Environmental engineering
- Error-control coding
- Guided-wave optics and photonics
- Large-scale electronic system design
- Linear and nonlinear guided-wave optics and photonics
- Manufacturing and materials engineering
- Medical imaging technologies
- Microelectronics and very-large-scale integrated circuit design
- Microfluidics
- Microwave and millimetre-wave circuits and devices
- Network performance analysis
- Power electronics
- Radiation dosimetry
- Smart energy infrastructure
- Smart Sensor, WSN and IoT
- The generation and application of mid-infrared laser radiation

FACILITIES
- Ansoft high-frequency system simulators and mechanical design package
- ANSYS mechanical design software
- Automated antenna range in a shielded anechoic chamber
- Computational fluid dynamics simulation software
- CST Studio Suite for electromagnetic and microwave design
- dSPACE, renewable energy systems and motor drives
- Electric vehicle
- Electronic and mechanical packaging facility
- Hardware accelerator for numerical simulations and computer-aided design
- Hardware-in-the-loop system for power electronics and systems
- Large-signal nonlinear network measurements – to 70 GHz
- Large-signal nonlinear spectrum analysis – to 70 GHz
- Materials synthesis, characterisation and testing facility
- Mechanical testing
- Mentor Graphics IC nanometre design tools
- Millimetre-wave linear vector network analysis – to 150 GHz
- Nuclear Magnetic Resonance laboratory with NMR spectrometer (9.4 T)
- On-wafer device probing – Cascade probe station with thermal stage
- Optical fibre processing, opto-mechanics and mid-infrared radiation detection
- Optics and photonics laboratories
- Parameter analysis and extraction software
- Programmable loads and sources
- Pulsed network measurements (up to 5th order) – 1 Hz to 10 MHz
- RF shielded room
- Synopsys digital IC design tools and complete set of Xilinx FPGA platforms
- Two-tone active load-pull analysis – to 18 GHz
- Wind tunnel

OUR RESEARCH PRIORITIES
We pursue excellence in a broad range of research areas. Our five interdisciplinary strategic research priorities – Healthy People, Resilient Societies, Prosperous Economies, Secure Planet and Innovative Technologies – respond to globally significant challenges and opportunities to improve the lives of millions. Together, these research priorities provide a focal point for research, with discoveries made under these priorities translating into real improvements in the lives of local, national and global communities.

JOINTLY SUPERVISED PHD PROGRAMS
Macquarie actively encourages cotutelles and joint degrees – shared supervision arrangements with universities whose research activity strongly aligns with ours. Under each model, you are enrolled at two universities with a principal supervisor at each and may be eligible for additional scholarship support.