



THE UNIVERSITY OF
MELBOURNE



LOW-CARBON POWER SYSTEMS

MASTER OF ELECTRICAL
ENGINEERING

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Want to have the skills to ensure our energy grid and markets are ready for the transition to renewables and low-carbon technologies?

The energy sector is undergoing revolutionary change as it transitions to clean, renewable, and low-carbon technologies. The scale of this change brings unprecedented challenges for operating and planning future power and energy systems. The new Low-Carbon Power Systems specialisation within the Master of Electrical Engineering at the University of Melbourne was developed in response to demand for a future workforce able to get across both the economic and technical fundamentals of energy systems, including how power systems work and how a future grid and energy marketplace could operate. Attention is given to developing the knowledge and skills to perform deft technoeconomic analysis of energy systems.

Taught by world-leading experts in power and energy systems engineering, the course prepares students to join a cohort of future industry leaders, equipped with the depth of technical knowledge and breadth of practical skills to apply systems thinking to the biggest challenges of the clean energy transition.

The course specialisation starts with a foundational understanding of the physics and engineering of modern power systems, before exploring core subjects in power system analysis, power electronics – including the modelling and control of renewable energy resources like wind and solar photovoltaics, and new technologies such as batteries and hydrogen electrolyzers – and the operation and economics of low-carbon grids.

A final project-focused unit allows students to apply their expertise to the integration of utility-scale renewable energy sources and distributed energy resources into power systems, covering technical and economic aspects, operation and planning, and system-level and distribution network applications. The specialisation is Australia's premier accredited course in this developing area of study – accreditation by Engineers Australia, EUR-ACE and the Washington Accord means that graduates can work as engineers in Australia, Europe, and the United States.

INTENDED LEARNING OUTCOMES

On completion, graduates will:

- Be able to apply physical principles, fundamental abstractions, and modelling techniques in the analysis of electrical power and energy components, systems, networks, and markets, including for renewable and low-carbon technologies;
- Have developed and demonstrated electrical engineering laboratory skills through simulation of electrical power systems using software tools, as well as through real-life experiments with power system components and systems;
- Be able to demonstrate mastery of fundamental knowledge of mathematical and engineering techniques and basic optimisation tools for electrical power system and energy market applications;
- Be conversant with and able to discuss broad issues influenced by electrical power system engineering – such as the energy trilemma of affordability, reliability and sustainability; internet-related privacy and security matters; and the functioning and ethical aspects of electricity sectors and relevant businesses and stakeholders;
- Have developed and mastered effective verbal and written communication skills, including for public presentations and professional technical reports, in power and energy systems and the broader electrical engineering domain.

KEY ACADEMICS

- [Professor Pierluigi Mancarella](#)
- [Professor Luis \(Nando\) Ochoa](#)
- [Dr Maria Vrakopoulou](#)
- [Dr Mehdi Ghazavi Dozein](#)

EXPLORE THE MASTER OF ELECTRICAL ENGINEERING: LOW-CARBON POWER SYSTEMS

More information about the Master of Electrical Engineering and the Low-Carbon Power Systems specialisation, including the course structure, entry requirements and how to apply, can be found in the [University of Melbourne Handbook](#).





STUDENT PROFILE

“The study of power systems is increasingly important as population density increases and the focus of energy generation shifts towards reducing carbon emissions. Balancing these two concepts requires a lot of research and innovation. My capstone project, to design a controller which managed an off-grid power system, involved a good mix of design and implementation, allowing me to develop a range of skills. I particularly enjoyed working on a practical application for my studies in the power department, and getting to know and work with researchers in the Smart Grid Lab.”

“I had a fantastic experience studying with Professor Nando Ochoa. He was an incredibly supportive supervisor, was very organised, and made sure that I received feedback frequently throughout my capstone project. He particularly focused on improving my communication and presentation skills, and I can see a massive difference in my confidence in presenting from when I started the project to when I finished it.”

Elissa Piubellini, Master of Electrical Engineering student



STUDENT PROFILE

“The power system electives stream sets the basics for an understanding of power networks in Australia and an in-depth understanding of the National Electricity Market. Engineers who understand the challenges of modern power systems can undertake the challenge to design sustainable solutions that will ensure the security of electricity supply, now, and in the future.”

“Soon after graduation, I started work as an electrical engineer at DiGSILENT Pacific HQ in Melbourne, a power systems consultancy company whose work involves generator design, modelling, and commissioning. I have also been involved with on-site testing which takes me on adventures to solar, wind, hydro, and coal power plants all around Australia!”

“Professor Pierluigi Mancarella has provided immense support to advance my interest in the field of power systems, which has set me up for success in my career.”

Muhammad Khalid, Master of Electrical Engineering graduate



INDUSTRY SUPPORT

“The Low-Carbon Power Systems specialisation is an essential learning and skills development ingredient for future power system practitioners within an emerging low-carbon electricity supply ecosystem.”

Our experience with the University of Melbourne in Project EDGE, where we are developing a cutting-edge Marketplace for Distributed Energy Resources, has shown the exceptional depth and quality of knowledge, research and leadership that can be applied in this area.”

John Theunissen, Manager DER Integration, AusNet Services

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If you're considering studies at the University of Melbourne, we'd love to hear from you online or meet you on campus.

Sign up and submit enquiries online at:
study.unimelb.edu.au/connect-with-us

For information on our courses and entry requirements contact Stop 1

 Call 13 MELB (13 6352)
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