Programme Specifications

Master of Science (Power System Analysis and Renewable Integration)

General Information

Awarding Institution: ECT (Engineering College of Technology)

Modes of Delivery: Online, Full-time & Part-time.

Course Title: Master of Science (MSc) Power System Analysis and Renewable Integration

Interim Award Titles (Exit Awards):

- **Postgraduate Certificate (PGCert)**
- **Postgraduate Diploma (PGDip)**

Programme Overview

The Master of Science (Power System Analysis and Renewable Integration) has been carefully designed to address the growing need for engineers with advanced capabilities in modern power systems and the integration of renewable energy sources. Developed in collaboration with industry stakeholders, the programme bridges traditional power engineering with the latest developments in clean energy and smart grid technologies.

The course equips students with strong analytical and practical skills to model, analyse, and design complex electrical power systems. Early modules cover essential topics such as power system operation, fault analysis, protection, load flow studies, and grid stability. Students gain hands-on experience using industry-standard simulation tools and software, enabling them to engage with real-world technical challenges from the outset.

A central focus of the programme is the integration of renewable energy sources into existing and future power networks. Students explore the technical, economic, and regulatory challenges of incorporating variable generation from wind, solar, and other renewables. Topics such as inverter-based systems, energy storage, and power quality are examined in depth, alongside emerging areas like microgrids and distributed energy resources.

As the programme progresses, students delve into advanced topics including smart grids, system automation, demand-side management, and digital control systems. Elective modules allow students to specialise in key interest areas, while a substantial final project provides the opportunity to conduct applied research on a contemporary issue in power systems or renewable integration.

Throughout the course, students develop not only technical expertise but also professional competencies in sustainability, ethical engineering, cybersecurity, and energy regulation. Industry-relevant case studies and project-based learning ensure that graduates are prepared to make informed, responsible decisions in a rapidly evolving energy landscape.

Graduates of this programme will be well-suited for roles in power utilities, energy consultancies, grid planning, renewable integration, and regulatory bodies. With a focus on both legacy systems and future technologies, the qualification prepares engineers to lead innovation and drive the global transition toward cleaner, smarter energy networks.

Programme Aims

- Provide students with advanced knowledge and understanding of power system analysis, renewable integration and modern grid technologies.
- Develop practical and transferable skills in modelling, simulation, problem-solving, and research.
- Prepare graduates for technical and leadership roles in the electrical power and energy sectors.
- Foster awareness of professional responsibilities, including ethics, data security, sustainability, and inclusive practices.
- Promote creative, critical, and systematic approaches to solving complex engineering problems.
- Enable students to undertake a substantial research project that demonstrates independent investigation and application of advanced concepts.
- Support progression to further study or professional recognition, including pathways to Chartered Engineer* status.

  **Subject to successful accreditation*

Programme Learning Outcomes (PLOs)

Graduates of this programme will be able to demonstrate the following learning outcomes:

1. Demonstrate a comprehensive understanding of the scientific and engineering principles and apply underpinning natural, physical and engineering sciences, mathematics, statistics, computer and information sciences to solve complex problems in power systems engineering.
2. Apply in-depth as well as broad understanding of the relevant specialist body of knowledge within the electrical systems engineering discipline.
3. Critically reflect on and synthesise engineering knowledge to plan and execute research-based projects in power system engineering, remaining aware of evolving trends in risk assessment and security challenges within the field.
4. Draw comprehensive knowledge of engineering design practice and understand the scope, principles, norms, accountabilities and bounds of sustainable engineering practice and social and environmental responsibility in the power systems engineering discipline.
5. Apply systematic approaches, design processes and established engineering methods, tools, techniques and resources, underpinned by hazard and risk framework considerations to conduct and manage power systems engineering projects.
6. Communicate complex technical ideas, design concepts, and research outcomes clearly and effectively to diverse audiences, including conveying complex risk, security and ethical considerations in an accessible manner.
7. Engage proactively in lifelong learning and reflective practice, demonstrating initiative and intellectual curiosity, and apply creative and innovative thinking to develop original and sustainable solutions to real-world engineering challenges.
8. Critically evaluate, manage, and use information and data responsibly, demonstrating professional integrity, data security awareness, and compliance with relevant engineering codes and digital governance frameworks.
9. Demonstrate autonomy, adaptability, and accountability in professional decision-making, exhibiting sound judgement informed by technical expertise, ethical values, and a commitment to inclusive, responsible engineering practice.
10. Work effectively in diverse, cross-disciplinary and intercultural teams, showing leadership and collaboration skills while actively fostering a professional culture that supports equity, diversity, inclusion (EDI) and robust risk-aware engineering practices.

Programme Learning Outcome Mapping

Programme Learning Outcomes: Level 7	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO 10
MEEP711	X	X	-	X	X	X	-	X	X	-
MEEP712	X	X	-	-	X	X	-	X	X	-
MEEP713	X	X	-	X	X	-	-	X	X	-
MEEP714	X	X	-	X	X	-	-	-	X	-
MEEP715	X	X	-	-	X	-	-	X	X	-
MCSX700	X	-	X	-	-	X	X	X	X	X
MSPT701	X	X	X	X	X	X	X	X	X	X
Optional Electives										
ELEC721	X	X	-	X	X	X	-	X	X	X
ELEC722	X	X	-	X	X	X	-	X	X	-
ELEC723	X	X	-	-	X	-	X	X	-	X
MIAI712	X	X	X	-	X	X	-	X	X	-
MIAI713	X	X	X	X	X	-	X	X	-	-
MIAI715	-	X	-	-	X	X	-	X	X	-
MEEP716	X	X	-	X	X	-	-	X	X	-
MEEP717	X	X	X	X	X	X	X	X	X	X
Workshops and Industry Experience Units										
PRAC005	X	-	X	X	X	X	X	X	X	X
INDX002	X	X	X	X	X	X	X	X	X	X

Programme Structure

Students must complete 180 credits comprising 8 modules and one capstone Project Thesis. The Project Thesis has 60 credits, and all other modules have 15 credits each.

There are eight optional elective modules for students to choose from.

The Master of Science (Power System Analysis and Renewable Integration) can be completed within the following registration periods:

Full time: minimum of one-year, maximum of two years.

Part time: minimum of two years, maximum of four years.

To qualify for graduation, students are required to complete or receive Recognition of Prior Learning (RPL) for one discipline-specific hands-on workshop unit PRAC006 and to undertake 240 hours of documented professional experience INDX002.

Assessment Regulations

- The pass mark for all Master's modules and assessments is 50%.
- Students must achieve at least 50% in each module in order to be awarded the associated credits.
- The Research Dissertation/Project must also be passed at 50% or above; no compensation is permitted for this component

Teaching periods:

Full-time students undertake four modules in each of the first two trimesters, followed by the capstone project module in the third trimester. This structure is based on three teaching periods per year and is designed for completion within one academic year.

Part-time students undertake two modules per trimester over four consecutive trimesters, followed by the capstone project module, which is completed over the final two trimesters. This structure is based on three teaching periods per year and is designed for completion within two academic years.

PROGRAMME STRUCTURE (Full time)		
Trimester	**Modules**	**Credits**
Trimester 1	• MEEP711 Power Generation • MEEP712 Transmission and Distribution Systems • MEEP713 Electric Power System Analysis • MEEP714 Renewable Energy Systems	15 15 15 15
Trimester 2	• MEEP715 System Stability Analysis • MSCX700 Engineering Practice and Key Research Methods ***Optional Elective** – choose **two** of the following optional modules • ELEC721 Power Conversion • ELEC722 Power Quality and Mitigation • ELEC723 Substation Design and Automation • MIAI712 Programmable Logic Controllers • MIAI713 Industrial Process Control Systems • MIAI715 Industrial Data Communications • MEEP716 Power System Safety and Protection • MEEP717 Smart Grids	15 15 }2 x 15
Trimester 3	• MSPT701 – Project Thesis	60
Additional Mandatory Modules		
Modules		**Credits**
• PRAC005 – Professional Practice Hands-on Workshop		0
• INDX002 – Professional Experience		0
PROGRAMME STRUCTURE (Part time)		
Trimester	**Modules**	**Credits**
Trimester 1	• MEEP711 Power Generation • MEEP712 Transmission and Distribution Systems	15 15
Trimester 2	• MEEP713 Electric Power System Analysis • MEEP714 Renewable Energy Systems	15 15
Trimester 3	• **Choose one Optional Elective*** • MEEP715 System Stability Analysis	15 15
Trimester 4	• **Choose one Optional Elective*** • MSCX700 Engineering Practice and Key Research Methods	15 15
Trimester 5 and 6	• MSPT701 – Project Thesis	60
	***Optional Elective** • ELEC721 Power Conversion • ELEC722 Power Quality and Mitigation • ELEC723 Substation Design and Automation • MIAI712 Programmable Logic Controllers • MIAI713 Industrial Process Control Systems • MIAI715 Industrial Data Communications • MEEP716 Power System Safety and Protection • MEEP717 Smart Grids	
Additional Mandatory Modules		
Modules		**Credits**

• PRAC005 – Professional Practice Hands-on Workshop	0
• INDX002 – Professional Experience	0

Other Protocols for the Programme

All engineering disciplines are underpinned by distinct bodies of knowledge that converge to support specific applications. This programme builds upon foundational knowledge acquired during undergraduate study, particularly in mathematics, physics, and discipline-specific content while extending and deepening expertise through the specialist modules delivered at master's level. Each module contributes to students' ability to investigate complex problems, critically analyse and synthesise multifaceted solutions, and effectively communicate technical ideas and outcomes.

The curriculum is designed to foster progressive development in both technical and professional capabilities, culminating in the final capstone Project Thesis, where students integrate and apply their learning to address a complex real-world challenge. All core (compulsory) modules, the two elective modules and the two compulsory professional practice and professional experience modules must be successfully completed, or formally exempted, for the award of the qualification, which requires achievement of 180 credits.

Industry Placements and Practical:

The nature of online learning means that most of our students are working in industry and can often demonstrate appropriate internships and partial or all compliance with practical workshops.

For students unable to secure industry placements, ECT will facilitate practical learning through industry informed projects, placement and virtual placements depending on each individual situation. Our dedicated student support team will also actively engage with employers to identify and arrange suitable experiential learning/industry placement opportunities.

ECT delivers all core practical learning through virtual and remote laboratories, fully integrated into each module. These platforms provide real-world scenarios, simulations, and remote control of physical equipment, ensuring all students acquire the necessary hands-on skills, regardless of geographic location.

Entry Requirements

A minimum of a lower second-class (2:2) honours degree or international equivalent in electrical, electronic or mechatronic engineering. Other disciplines including mechanical, computer science, mathematics, or physics will be considered on a case-by-case basis.

AND

evidence of strong relevant content within your degree programme. When assessing your academic record and the suitability of your degree background, we take into account your grade average with particular emphasis on relevant course units and the standing of the institution where you studied your qualification. We will be checking for sufficient relevant content in at least one of the following areas: electrical power systems, control and automation, maths and programming.

English language requirement for this course:

- IELTS at least 6.5 overall with no subtest below 6.0.
- TOEFL iBT: at least 90 overall with no subtest below 20.
- Pearson PTE: at least 70 overall with no subtest below 65.

Version Control

Version	Author	Date	Changes	Approved By
1.0	ECT		Original Version	Validation Committee

1.1	HE Admin Specialist	28/01/2026	• Add version control table • Update Programme structure to make clear the optional module choice • PLO mapping updated to reflect optional modules	Compliance & Risk Manager