



ELCT4001

Smart Power Grids

Session 2, In person-scheduled-weekday, North Ryde 2026

School of Engineering

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General Information

Unit convenor and teaching staff

Convener/Lecturer

Sara Deilami

sara.deilami@mq.edu.au

Room #2117 , Level 2, 9WW

Wednesdays 12:00 PM - 2:00 PM, by appointment only

Credit points

10

Prerequisites

ELEC2005 and ELCT4004

Corequisites

Co-badged status

ELEC8202

Unit description

This unit provides students with knowledge and necessary skills for designing, analysing, controlling and operating future energy systems containing a large- scale renewable energy sources (i.e. intermittent and distributed generation), energy storage, and new types of loads such as electric vehicles, in "smart grids". It will also provide strong foundation in classical methods and modern protection schemes and engineering practices to protect the safety of the public, personnel and the system by detecting, isolating, and clearing the electric fault, and restore the system. Topics covered include smart grids in electrical energy systems, renewable energy resources, grid and micro- grid connections, energy efficiency and energy management strategies, smart grid protection, electricity network monitoring technologies and the IEC61850 power equipment automation standard.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals ([UNSDGs](#)) Affordable and Clean Energy; Industry, Innovation and Infrastructure; Climate Action

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: Identify the operational characteristics of power grid networks including conventional and smarter power grids, the components of the power networks, renewable energy resources and nonrenewable energy resources.

ULO2: Analyse, simulate, design and operate electrical energy systems incorporating distributed and intermittent (e.g. renewable) energy resources, including energy storage, and Electric Vehicles.

ULO3: Analyse and apply the knowledge of the stability, power quality of smart power grid and smart power system protection.

ULO4: Demonstrate knowledge and understanding of energy management systems, including monitoring control and protection of smart power systems and microgrids.

ULO5: Work effectively in teams by: identifying individual roles and responsibilities, sharing knowledge through peer-led learning, writing technical reports and logbooks, and effective communications.

General Assessment Information

Grading and Passing Requirement for Unit

- In order to pass this Unit a student must obtain a mark of 50 or more for the Unit (i.e. obtain a passing grade P, CR, D, or HD).
- For further details about grading, please refer below in the policies and procedures section.
- If you receive special consideration for the oral presentation and demonstration of the Project, a supplementary conventional exam will be scheduled by the faculty during a supplementary exam period, typically about 3 to 4 weeks after the normal exam period. By making a special consideration application for the oral presentation and demonstration of the Project you are declaring yourself available for a conventional exam during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to applying. Approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Late Assessment Submission Penalty

- 5% penalty per day: If you submit your assessment late, 5% of the total possible marks will be deducted for each day (including weekends), up to 7 days. Example 1 (out of 100): If you score 85/100 but submit 20 hours late, you will lose 5 marks and receive 80/100. Example 2 (out of 30): If you score 27/30 but submit 1 day late, you will lose 1.5

marks and receive 25.5/30.

- After 7 days: Submissions more than 7 days late will receive a mark of 0.
- Extensions: Automatic short extension: Some assessments are eligible for automatic short extension. You can only apply for an automatic short extension before the due date. Special Consideration: If you need more time due to serious issues and for any assessments that are not eligible for Short Extension, you must apply for Special Consideration.

Need help? Review the Special Consideration page [HERE](#)

Assessments where Late Submissions will be accepted

In this unit, late submissions will be accepted as follows:

Practical Assignment – YES, Standard Late Penalty applies

Mid-Term Quiz (Class Quiz) - NO, unless Special Consideration is Granted

Project Assessment – YES, Standard Late Penalty applies

Release Dates for Assessment Activities

Instructions for assessment tasks will be made available to students by the dates below:

- Practical Assignment: To be released from Week 2 (05/08/2026)
- Project Assessment: To be released no later than Week 8 (16/09/2026)
- Mid-Term Quiz (Class Quiz): To be released no later than Week 7 (09/09/2026)

Special Consideration

The [Special Consideration Policy](#) aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through ask.mq.edu.au.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Assignment	30%	No	18/09/2026	Individual	Yes	Open
Project assessment	40%	No	Week 13	Individual and Group	No	Open
Class Quiz	30%	No	20/09/2026	Individual	No	Observed

Assignment

Assessment Type ¹: Practice-based task

Indicative Time on Task ²: 17 hours

Due: **18/09/2026**

Weighting: **30%**

Groupwork/Individual: Individual

Short extension ³: Yes

AI Approach: Open

Students will be assessed based on their ability to perform analysis, modeling and implementation of the practical experiment as well as software tools.

On successful completion you will be able to:

- Analyse, simulate, design and operate electrical energy systems incorporating distributed and intermittent (e.g. renewable) energy resources, including energy storage, and Electric Vehicles.
- Demonstrate knowledge and understanding of energy management systems, including monitoring control and protection of smart power systems and microgrids.
- Work effectively in teams by: identifying individual roles and responsibilities, sharing knowledge through peer-led learning, writing technical reports and logbooks, and effective communications.

Project assessment

Assessment Type ¹: Presentation task

Indicative Time on Task ²: 20 hours

Due: **Week 13**

Weighting: **40%**

Groupwork/Individual: Individual and Group

Short extension ³: No

AI Approach: Open

Students will be assessed on their ability to apply theoretical knowledge to practical scenarios, work collaboratively in teams, and demonstrate innovative problem solving skills.

On successful completion you will be able to:

- Identify the operational characteristics of power grid networks including conventional and smarter power grids, the components of the power networks, renewable energy resources and nonrenewable energy resources.
- Analyse, simulate, design and operate electrical energy systems incorporating distributed and intermittent (e.g. renewable) energy resources, including energy storage,

and Electric Vehicles.

- Analyse and apply the knowledge of the stability, power quality of smart power grid and smart power system protection.
- Demonstrate knowledge and understanding of energy management systems, including monitoring control and protection of smart power systems and microgrids.
- Work effectively in teams by: identifying individual roles and responsibilities, sharing knowledge through peer-led learning, writing technical reports and logbooks, and effective communications.

Class Quiz

Assessment Type ¹: Examination

Indicative Time on Task ²: 12 hours

Due: **20/09/2026**

Weighting: **30%**

Groupwork/Individual: Individual

Short extension ³: No

AI Approach: Observed

The quiz will assess both factual knowledge and problem solving ability.

On successful completion you will be able to:

- Analyse, simulate, design and operate electrical energy systems incorporating distributed and intermittent (e.g. renewable) energy resources, including energy storage, and Electric Vehicles.
- Analyse and apply the knowledge of the stability, power quality of smart power grid and smart power system protection.
- Demonstrate knowledge and understanding of energy management systems, including monitoring control and protection of smart power systems and microgrids.

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- Academic Success for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation.

³ An automatic short extension is available for some assessments. Apply through the Service Connect Portal.

Delivery and Resources

COMMENCEMENT OF ACTIVITIES

- **Lectorials (online):** Start from Week 1.
- **Practicals (in-person):** Start from Week 3.
- **Projects:** Start from Week 8.

Unit Schedule

For details, please refer to the Unit Schedule on the iLearn webpage.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies](https://students.mq.edu.au/support/study/policies) (<https://students.mq.edu.au/support/study/policies>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit connect.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Academic Success

[Academic Success](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Ask a Study Coach](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)
- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

Student Enquiries

Got a question? Ask us via the [Service Connect Portal](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit <https://students.mq.edu.au/support/technology/service-desk>.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Changes from Previous Offering

We value student feedback to be able to continually improve the way we offer our units. As such we encourage students to provide constructive feedback via student surveys, to the teaching staff directly, or via the FSE Student Experience & Feedback link in the iLearn page. Student feedback from the previous offering of this unit was very positive overall, with students pleased with the clarity around assessment requirements and the level of support from teaching staff. As such, no change to the delivery of the unit is planned, however we will continue to strive to improve the level of support and the level of student engagement.

Engineers Australia Competency Mapping

EA Competency Standard		Unit Learning Outcomes
Knowledge and Skill Base	1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline.	ULO1, ULO2,ULO3
EA Competency Standard		Unit Learning Outcomes
Knowledge and Skill Base	1.1 Comprehensive, theory-based understanding of the underpinning fundamentals applicable to the engineering discipline.	ULO1, ULO2,ULO3
	1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing.	ULO1,ULO3,ULO4
	1.3 In-depth understanding of specialist bodies of knowledge	ULO1,ULO2,ULO3,ULO4
	1.4 Discernment of knowledge development and research directions	ULO1,ULO2,ULO4
	1.5 Knowledge of engineering design practice	ULO1,ULO2,ULO3,ULO4
	1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice.	ULO1,ULO2,ULO3,ULO4,ULO5
Engineering Application Ability	2.1 Application of established engineering methods to complex problem solving	ULO3,ULO4
	2.2 Fluent application of engineering techniques, tools and resources.	ULO1,ULO2,ULO3,ULO4
	2.3 Application of systematic engineering synthesis and design processes.	ULO1,ULO2
	2.4 Application of systematic approaches to the conduct and management of engineering projects.	ULO3,ULO4
Professional and Personal Attributes	3.1 Ethical conduct and professional accountability.	ULO5

	3.2 Effective oral and written communication in professional and lay domains.	ULO5
	3.3 Creative, innovative and pro-active demeanour.	ULO1,ULO2,ULO4,ULO5
	3.4 Professional use and management of information.	ULO1,ULO4,ULO5
	3.5 Orderly management of self, and professional conduct.	ULO3,ULO4
	3.6 Effective team membership and team leadership	ULO5

Changes since First Published

Date	Description
22/07/2026	Assessment dates have been updated.

Unit information based on version 2026.02 of the [Handbook](#)