



ELEC2005

Electrical and Electronic Systems

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

School of Engineering

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General Information

Unit convenor and teaching staff

Convenor

David Payne

david.payne@mq.edu.au

Room 290 / 9 Wally's Walk

Typically 13:30 - 14:30 on Thursdays. Email appointment

Credit points

10

Prerequisites

PHYS1520 and ELEC2070 and (MATH1020 or MATH1025)

Corequisites

Co-badged status

Unit description

This unit develops fundamental knowledge and skills that apply to common electrical and electronic system applications, including conventional and renewable energy, energy storage and electrical transportation. The main goals are to understand how to use non-linear devices such as diodes and transistors, and to understand power conversion and signal flow in electrical systems. Prior knowledge and skills in physics and mathematics is assumed.

The unit will introduce the fundamental concepts of three topics: (1) Renewable energy and storage systems, power conditioning, and electrical machines; (2) Power computations for single and three-phase AC systems; (3) Semiconductor technologies and nonlinear devices. The practical component of this unit includes computer simulation, implementation, and analysis of simple electrical circuits.

This unit uses problem/team-based learning approach. The concepts studied in this unit, and the knowledge and skills gained, will be used in multiple areas of electrical, electronics and mechatronics engineering.

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

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: Distinguish the main technical features of electrical and electronic technologies used in renewable energy and storage, electrical transportation, robotics and autonomous systems

ULO2: Identify operational characteristics of typical power converters and electrical machines for a range of industrial applications

ULO3: Demonstrate fundamental knowledge in power computations in AC systems

ULO4: Explain the working principles of key nonlinear devices such as transistors and power semiconductors

ULO5: Design, simulate, and perform hardware evaluation of circuits with one or more nonlinear components

General Assessment Information

RELEASE

Part 1 Assignment: To be released no later than 07/08/2026

Part 2 Assignment: To be released no later than 02/10/2026

REQUIREMENTS TO PASS THIS UNIT

To pass this unit you must achieve a total mark equal to or greater than 50%.

LATE ASSESSMENT SUBMISSION

Late assessments are not accepted in this unit unless a Special Consideration has been submitted and approved.

SPECIAL CONSIDERATIONS AND SHORT EXTENSIONS

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 <http://connect.mq.edu.au/>.

Short Extensions

Students are allowed to request an extra 3 calendar days to complete eligible assessments. Eligible assignments in this unit are the Part 1 and Part 2 assignments.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Part 1 Assignment	30%	No	20/09/2026	Individual	Yes	Open
Final Exam	40%	No	Within Exam Period - date TBC	Individual	No	Observed
Part 2 Assignment	30%	No	08/11/2026	Individual	Yes	Open

Part 1 Assignment

Assessment Type [1](#): Problem-based task

Indicative Time on Task [2](#): 20 hours

Due: **20/09/2026**

Weighting: **30%**

Groupwork/Individual: Individual

Short extension [3](#): Yes

AI Approach: Open

A selection of problems that will test the students knowledge and understanding of the topics covered in the first half of the unit. Questions will include theoretical analysis and design. Some questions will require data gathered from practical work.

On successful completion you will be able to:

- Explain the working principles of key nonlinear devices such as transistors and power semiconductors
- Design, simulate, and perform hardware evaluation of circuits with one or more nonlinear components

Final Exam

Assessment Type [1](#): Examination

Indicative Time on Task [2](#): 23 hours

Due: **Within Exam Period - date TBC**

Weighting: **40%**

Groupwork/Individual: Individual

Short extension [3](#): No

AI Approach: Observed

You will undertake a final examination during the formal examination period.

On successful completion you will be able to:

- Distinguish the main technical features of electrical and electronic technologies used in renewable energy and storage, electrical transportation, robotics and autonomous systems
- Identify operational characteristics of typical power converters and electrical machines for a range of industrial applications
- Demonstrate fundamental knowledge in power computations in AC systems
- Explain the working principles of key nonlinear devices such as transistors and power semiconductors
- Design, simulate, and perform hardware evaluation of circuits with one or more nonlinear components

Part 2 Assignment

Assessment Type ¹: Problem-based task

Indicative Time on Task ²: 20 hours

Due: **08/11/2026**

Weighting: **30%**

Groupwork/Individual: Individual

Short extension ³: Yes

AI Approach: Open

A selection of problems that will test the students knowledge and understanding of the topics covered in the second half of the unit. Questions will include theoretical analysis and design. Some questions will require data gathered from practical work.

On successful completion you will be able to:

- Distinguish the main technical features of electrical and electronic technologies used in renewable energy and storage, electrical transportation, robotics and autonomous systems
- Identify operational characteristics of typical power converters and electrical machines for a range of industrial applications
- Demonstrate fundamental knowledge in power computations in AC systems

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

WEEK 1 CLASSES

The only activity in week 1 is the unit workshop session. This is an interactive lecture delivered by the unit convenor. Attendance is strongly encouraged. All efforts will be made to ensure that presented content will be recorded and made available through ECHO360. Practical sessions will commence in Week 2

METHODS OF COMMUNICATION

We will communicate with you via your university email and through announcements on iLearn. Queries to convenors can either be placed on the iLearn discussion board or sent to the unit convenor via the contact email on iLearn.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#) (<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>). 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>) 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.

A small amount of negative feedback was given for the previous offering and almost entirely centred around the limitations of the three assessment principles. It should be noted that the unit convenor does not have authority to change the assessment principles. Feedback focussed on improving the assessment strategy whilst still aligning with the principles is of course always welcome.

Unit information based on version 2026.03 of the [Handbook](#)