



ELCT4001

Smart Power Grids

Session 2, Weekday attendance, North Ryde 2021

School of Engineering

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>General Assessment Information</u>	3
<u>Assessment Tasks</u>	4
<u>Delivery and Resources</u>	7
<u>Unit Schedule</u>	9
<u>Policies and Procedures</u>	9
<u>Changes from Previous Offering</u>	10

Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

Session 2 Learning and Teaching Update

The decision has been made to conduct study online for the remainder of Session 2 for all units WITHOUT mandatory on-campus learning activities. Exams for Session 2 will also be online where possible to do so.

This is due to the extension of the lockdown orders and to provide certainty around arrangements for the remainder of Session 2. We hope to return to campus beyond Session 2 as soon as it is safe and appropriate to do so.

Some classes/teaching activities cannot be moved online and must be taught on campus. You should already know if you are in one of these classes/teaching activities and your unit convenor will provide you with more information via iLearn. If you want to confirm, see the list of [units with mandatory on-campus classes/teaching activities](#).

Visit the [MQ COVID-19 information page](#) for more detail.

General Information

Unit convenor and teaching staff

Convener/Lecturer

Sara Deilami

sara.deilami@mq.edu.au

Contact via 9850 2296

1st floor, No. 119, 44 Waterloo Rd Macquarie Park

Thursdays 12am-1pm

Credit points

10

Prerequisites

(ELEC2005 or ELCT2005 or ELEC 295) and (ELCT4004 or ELEC 494)

Corequisites

Co-badged status

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.

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.

Hurdle Requirements

- Students must attend and participate in at least **4 of the 5 weekly PC Labs** (Weeks 3-7) to pass this unit.
- Students must attend and participate in at least **5 of the 6 weekly Project Labs** (Weeks 8-13) to pass this unit.

Late Submissions and Re-submissions

- Late report submissions will attract a penalty of <10/100, 10%> marks per day. Extenuating circumstances will be considered upon lodgement of an application for special consideration.
- Re-submissions of work are not allowed.

Students are reminded of the University policies regarding [assessment](#), [academic honesty](#) and [disruption to studies](#).

Requests for extension on assessable work are to be made to the Unit Coordinator but will only be considered in the event of illness or misadventure.

Assessment Tasks

Name	Weighting	Hurdle	Due
Pre- Class Quiz (Lectorial)	10%	No	Week 2- 7
Practical Lab	20%	No	Week 3-7
Project	50%	No	Week 13 & 14
Class Quiz (Lectorials)	20%	No	Week 8

Pre- Class Quiz (Lectorial)

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 6 hours

Due: **Week 2- 7**

Weighting: **10%**

Students are expected to go through the iLearn content, understand the theory and attempt the online quiz every week prior to in class activities (lectorials).

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.

Practical Lab

Assessment Type ¹: Practice-based task

Indicative Time on Task ²: 14 hours

Due: **Week 3-7**

Weighting: **20%**

Laboratory sessions and submission of lab report by the end of each session. Students will be assessed based on their attendance, participation, performance, and their ability to perform analysis, modeling and implementation of the practical experiment as well as software tools. There is no laboratory session in week 1. Students need to record all the laboratory results (and printouts) and submit a report for each experiment.

Students need to attend **4** out of **5** lab sessions in order to pass the unit.

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 Type ¹: Project

Indicative Time on Task ²: 20 hours

Due: **Week 13 & 14**

Weighting: **50%**

This is the major assessment of this Unit. It will consist of 3 individual assessments and 1 team assessment, as follows:

- Individual assessments:
 - Oral presentation and demonstration of the project;
 - Peer assessment regarding the actual contribution of each team member;

- Evaluation of project logbook of each team member.
- Team assessment:
 - Project report to be submitted in iLearn by each team.

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 (Lectorials)

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 9 hours

Due: **Week 8**

Weighting: **20%**

A quiz is scheduled right after the midsemester break. The quiz will assess both factual knowledge and problem solving.

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
- the [Writing Centre](#) 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

Delivery and Resources

UNIT WEBSITE

- The iLearn website for this unit can be found at: <https://ilearn.mq.edu.au/login/>.
 - *Note! All information and communications relevant to this Unit will be via the iLearn website.*

TEXTBOOK

- Design of Smart Power Grid Renewable Energy Systems, 3rd Edition, , by A. Keyhani, Wiley, 2019. (Digital).
- Protection of Electricity Distribution Networks, 3rd edition, by Juan M. Gers, Edward J. Holmes, IET Power and Energy Series 47, 2011, (Digital).
 - *Note! Links will be provided to the Digital version of the text books in iLearn.*
 - *Remark: All students are expected to have access to both textbooks.*

LECTORIALS

- Lectorials take place twice a week (Weeks 1-7) according to the Unit schedule.
 - *Note! there is only **one Lectorial** in week 1.*
 - *Note! Students are strongly encouraged to participate in at least one of the two weekly Lectorials.*
- Lectorials are a combination of traditional lecture and tutorial teaching modes and are designed to improve student engagement.
- The Lectorials are organised in a [flipped classroom fashion](#).
- Prior to Lectorials
 - links to reading materials, brief videos and/or lecture notes are posted in iLearn each week.

- students are expected to read any posted notes or materials, try to solve any given examples, and watch any videos prior to attending the Lectorials.
- 'pre-class' mini quizzes to assess the basic understanding of smart power grids and the fundamental of power system protection and design.
- During Lectorials
 - brief discussion sessions on fundamental principles.
 - plenty of practical examples.
 - interactive problem solving involving students.

LABORATORIES

- PC Lab activities take place once a week (Weeks 3-7) according to the Unit schedule.
 - *Note! Students must enrol in one of the available weekly Lab sessions.*
- Interactive PC Labs use [DIGSI 5 Software](#) and/or [DigSilent Power Factory](#) software platform to assist with the Lab experiments.

PROJECTS

- Project activities take place once a week (Weeks 8-13) according to the Unit schedule.
 - *Note! Teams must enrol in one of the available weekly Project sessions.*
- The team Project is the core component of this Unit. The Projects cover practical aspects of smart power grids.
- Students are required to form teams and choose one project topic from a given list of projects.
 - *Note! When forming teams, students should agree in which weekly Project session they want to enrol.*
 - *All Project activities are performed in teams;*

TECHNOLOGY

- The laboratory work will rely on the use of hardware and [DIGSI 5 Software](#) and [DigSilent Power Factory](#) software platform.
 - The software platform are available through Web browser and/or Faculty Lab PCs.
 - The Project work will rely on the use of [DIGSI 5 Software](#) and/or [DigSilent Power Factory](#) software platform.
 - The software can be used on dedicated Lab PCs.

COMMUNICATIONS

- Students are reminded the University will communicate all official notices by email

to official MQ student's account. Students should read their @student.mq.edu.au email regularly or forward it to an account they check regularly.

- All announcements and other communications regarding this Unit will be via iLearn platform.

WEB RESOURCES

- **DIGSI 5 Software**
 - [DIGSI 5 Software](#)
- **DigSilent Power Factory support:**
 - <https://www.digsilent.de/en/>

NOTE! On campus activities may be subject to change depending on restrictions relating to COVID 19.

Unit Schedule

For details, please refer to the Unit Schedule on the ELCT4001 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](#)
- [Grade Appeal Policy](#)
- [Complaint Management 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 ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

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

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [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

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

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

This Unit has been revised compared to previous offering as follows:

- The traditional weekly Lectures and Tutorials have been combined into two weekly Lectorials
- All Lectorials and PC Labs take place in the first part of the semester (Weeks 1-7).
 - *Note! Assessment tasks for Lectorials and PC Labs will take place during and/or at the end of this time interval.*
- The final exam has been replaced by Project assessment
- All Project activities take place in the second part of the semester (Weeks 8-13).
 - *Note! Assessment tasks for Projects will take place at the end of this time interval.*