ELCT4001
Smart Power Grids
Session 2, Weekday attendance, North Ryde 2021
School of Engineering

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Notice
Some on-campus classes have moved online for the first two weeks of Session, before returning to campus in Week 3. If you are studying a unit outside of the primary Session 2 timetable, please contact your teaching staff team for further details.

Some classes/teaching activities cannot be moved online and must be taught on campus. To find out if you are enrolled in one of these classes/teaching activities, you can check to see if your unit is on the list of units with mandatory on-campus classes/teaching activities.

Your Unit Convenor will provide more information via an iLearn announcement when your iLearn unit becomes available.
General Information

Unit convenor and teaching staff
Convener/Lecturer
Sara Deilami
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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://students.mq.edu.au/important-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 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
### Assessment Tasks

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Hurdle</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre- Class Quiz (Lectorial)</td>
<td>10%</td>
<td>No</td>
<td>Week 2-7</td>
</tr>
<tr>
<td>Practical Lab</td>
<td>20%</td>
<td>No</td>
<td>Week 3-7</td>
</tr>
<tr>
<td>Project</td>
<td>50%</td>
<td>No</td>
<td>Week 13 &amp; 14</td>
</tr>
<tr>
<td>Class Quiz (Lectorials)</td>
<td>20%</td>
<td>No</td>
<td>Week 8</td>
</tr>
</tbody>
</table>

### Pre-Class Quiz (Lectorial)

**Assessment Type**: Quiz/Test  
**Indicative Time on Task**: 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: Practice-based task
Indicative Time on Task: 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: Project
Indicative Time on Task: 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 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: Quiz/Test
Indicative Time on Task: 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 Learning Skills Unit 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
  ◦ 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://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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** *(Note: The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

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

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).
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 Enquiry Service
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

Equity 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.

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.*