ELCT4004

Electrical Networks

Session 1, Weekday attendance, North Ryde 2020

School of Engineering

Contents

General Information

Unit convenor and teaching staff
Convenor
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office No. 119

Credit points
10

Prerequisites
(ELEC3024 or ELEC324) and (ELCT3005 or ELEC395) and (ELCT3006 or ELEC396)

Corequisites

Co-badged status

Unit description
The course will provide students with essential knowledge in the mathematical techniques to analyse power systems during steady-state and transient operations of power systems with large-scale distributed generation and energy storage systems. It will provide strong foundation in classical methods and modern techniques in power systems for senior level electrical engineering students for analysing system's performance with low-inertia renewable generators, new loads (EV) and storage. Topics covered comprise: review of the basic concepts used in power system analysis: phasors, complex power, three phase systems and per-unit; application of network matrices techniques and power flow analysis to study the steady-state and dynamic behaviour of power systems with distributed energy resources; power system fault calculations including: symmetrical components, symmetrical faults, and unsymmetrical faults with large-scale PV systems; power system stability and control in the presence of variable sources, loads and storage; power system protection principles; voltage stability in smart grids, the impact of power system analysis in the context of smart grid, transmission and distribution systems, insulators, substation; electrical safety, Australian electrical standards; the Australian electricity market and operation, and planning of power systems.

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:

ULO2: Calculate the steady state and transient responses of power systems and investigate the impact of renewable energy integration.
ULO1: Model and analyse major types of components including renewable generators and battery energy storage systems used in distributed power systems.
ULO3: Analyse the stability of power systems with symmetrical and unsymmetrical faults and design controllers for reliable operations.
ULO4: Determine the economic dispatch in power systems and articulate an advanced knowledge of the Australian power market mechanism.
ULO5: Conduct experiments in an Electrical Engineering Laboratory in accordance with Health and Safety Regulations and to record, interpret and report on the experimental results.
ULO6: Write a range of technical reports for professional engineering projects which include diverse contexts.

Assessment Tasks

Coronavirus (COVID-19) Update

Assessment details are no longer provided here as a result of changes due to the Coronavirus (COVID-19) pandemic.

Students should consult iLearn for revised unit information.

Find out more about the Coronavirus (COVID-19) and potential impacts on staff and students

General Assessment Information

Regarding the Labs:

- There are ten laboratory sessions through out the semester.

- Labs will be assessed based on pre-lab work and lab work.

Passing Requirement:

- Achieve an overall mark of at least 50%.

Delivery and Resources

Coronavirus (COVID-19) Update

Any references to on-campus delivery below may no longer be relevant due to COVID-19.

Please check here for updated delivery information: https://ask.mq.edu.au/account/pub/

display/unit_status

Learning Resources:

-J. Duncan Glover, M. S. Sarma and T. J. Overbye, Power System Analysis and Design, Sixth Edition SI, Cengage Learning, 2015, ISBN 978- 1111425777 S.

- Sivanagaraju, Electric Power Transmission and Distribution, Pearson Education India, 978-81-317-0791-3.

Here are list of **online resources** for this course of study:

- Australian Power Institute (API). http://api.edu.au/

- Australian Electricity Market Operator (AEMO). http://www.aemo.com.au/

- TransGrid. https://www.transgrid.com.au/

- Endeavour Energy www.endeavourenergy.com.au/

- AGL | Electricity Providers | Gas Suppliers | Solar Energy https://www.agl.com.au/

- IEEE Power and Energy Society. http://www.ieee-pes.org/

- Power Globe. https://listserv.nodak.edu/cgi-bin/wa.exe?A0=POWER-GLOBE

Unit Schedule

Coronavirus (COVID-19) Update

The unit schedule/topics and any references to on-campus delivery below may no longer be relevant due to COVID-19. Please consult iLearn for latest details, and check here for updated delivery information: https://ask.mq.edu.au/account/pub/display/unit_status

For unit schedule, please refer to iLearn and teaching plan.

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/study/getting-started/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

Lectures have been modified and improved according to the student feedback.