ELCT3006

Electrical Machines

Session 2, Weekday attendance, North Ryde 2020

School of Engineering

Contents

Disclaimer

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Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and other small group learning activities on campus for the second half-year, while keeping an online version available for those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face and online activities for your unit, please go to timetable viewer. To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff
Mihai Ciobotaru
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Credit points
10

Prerequisites
(ELEC2070 or ELEC270) and ((ELEC2075 or ELEC275) or (ELCT2005 or ELEC295))

Corequisites

Co-badged status

Unit description
This unit develops fundamental knowledge and skills in the area of electrical machines (motors, generators) and their applications in modern electrical systems. This unit will equip students with the knowledge and skills necessary for designing, analysing, controlling and selecting appropriate machines for various applications, and to operate them in a safe, efficient and economical manner. Topics include: modelling, efficiency analysis, dynamics, and pros/cons of DC machines (generator and motor - self and separately excited, PMDC), single and three-phase AC machines (Induction motor - squirrel-cage and wound rotor), synchronous machines, special machines (reluctance motor, stepper motor, brushless DC motor, etc). Applications will include electrical and hybrid electrical vehicles, renewable energy systems and high-speed drives.

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 operational characteristics of typical electrical machines for a range of industrial applications.

> **ULO2:** Analyse and critically assess key aspects of DC and AC machines for a range of

typical applications.

ULO3: Design, model and analyse a complete electrical machine application based on a set of specifications;

ULO4: Work effectively in teams by: identifying individual roles and responsibilities, sharing knowledge through peer-led learning, writing technical reports and logbooks, and effective communication.

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 **5 of the 6 weekly PC Labs** (Weeks 2-7) to pass this unit.
- Students must attend and participate in at least **4 of the 5 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 di

sruption 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
Assessment (Project)	60%	No	Weeks 13 & 14
Class Quiz (Lectorials)	10%	No	Week 8
Assignments (PC Labs)	20%	No	Weeks 2-7
Pre-Class Quiz (Lectorials)	10%	No	Weeks 2-7

Assessment (Project)

Assessment Type [1]: Project
Indicative Time on Task [2]: 20 hours
Due: **Weeks 13 & 14**
Weighting: **60%**

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 operational characteristics of typical electrical machines for a range of industrial applications.
- Analyse and critically assess key aspects of DC and AC machines for a range of typical applications.
- Design, model and analyse a complete electrical machine application based on a set of specifications;

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

Class Quiz (Lectorials)

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 5 hours
Due: **Week 8**
Weighting: **10%**

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

On successful completion you will be able to:

- Identify operational characteristics of typical electrical machines for a range of industrial applications.
- Analyse and critically assess key aspects of DC and AC machines for a range of typical applications.

Assignments (PC Labs)

Assessment Type [1]: Lab book
Indicative Time on Task [2]: 12 hours
Due: **Weeks 2-7**
Weighting: **20%**

Evaluation of PC Lab activities and submission of a Lab book by the end of the semester. This evaluation focuses on students ability to perform analysis, modelling and implementation of typical electrical machines using simulation tools.

On successful completion you will be able to:

- Identify operational characteristics of typical electrical machines for a range of industrial applications.
- Analyse and critically assess key aspects of DC and AC machines for a range of typical applications.
- Design, model and analyse a complete electrical machine application based on a set of

specifications;

Pre-Class Quiz (Lectorials)

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 5 hours
Due: **Weeks 2-7**
Weighting: **10%**

Students are expected to go through the iLearn content, understand the theory and attempt the online quiz each week prior to participating in class activities of that week.

On successful completion you will be able to:

- Identify operational characteristics of typical electrical machines for a range of industrial applications.
- Analyse and critically assess key aspects of DC and AC machines for a range of typical applications.

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[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

- Recommended book: Electric Machinery Fundamentals (Digital or Print), 5thEdition, by Stephen J. Chapman, McGraw Hill Int., 2012, ISBN-978-0-07-352954-7 (Digital version recommended).
  - *Note! Links will be provided to specific sections of the Digital version in iLearn for*

> *each Lectorial.*
>
> > ◦ *Remark: All students are expected to have access to this textbook.*
> >
> > ◦ Support Website: http://www.mhhe.com/chapman

- Supplementary book: Electric Machines and Drives: A Fist Course (2012), by Ned Mohan, Wiley, ISBN: 978-1-118-21529-6 (Digital version suggested).

  > ◦ *Note! This textbook comes accompanied with slide presentations and videos by the author, Prof. Ned Mohan.*

LECTORIALS

- Lectorials take place twice a week (Weeks 1-7) according to the Unit schedule.

  > ◦ *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 E-Text specific sections, brief videos and/or lecture notes are posted in iLearn each week.
  >
  > ◦ students are expected to read these E-Text sections, try to solve any given examples, and watch any videos and/or read any posted notes prior to attending the Lectorials.
  >
  > ◦ 'pre-class' mini quizzes to assess the basic understanding of fundamental principles in electrical machines.

- 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 2-7) according to the Unit schedule.

  > ◦ *Note! Students must enrol in one of the available weekly Lab sessions.*

- Interactive PC Labs use LVSIM-EMS 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 electrical machines.
- 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 LVSIM-EMS software platform.
    - The software platform is available through a Web browser and/or Faculty Lab PCs.
- The Project work will rely on the use of PLECS software platform.
    - PLECS Standalone software can be downloaded for free from Plexim website and/or or 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

- **LVSIM-EMS**
    - https://lvsim.labvolt.com/
- **PLECS support:**
    - https://plexim.com/support
        - PLECS videos
        - Application examples
        - Technical solutions
        - Installation help

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

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.*