



# ELCT2005

## Fundamentals of Energy Conversion and Storage

Session 2, Special circumstance 2020

*School of Engineering*

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#### **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

Lecturer

Binesh Puthen Veetil

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9WW Room-362

Wednesday 1pm-3pm (in 9WW- 362)

Leonardo Callegaro

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Credit points

10

Prerequisites

(PHYS1520 or ENGG150) and (MATH1010 or MATH1015 or MATH135 or MATH132)

Corequisites

Co-badged status

Unit description

This unit develops fundamental knowledge and skills in the area of energy conversion and storage technologies and their applications. Foundation knowledge and skill in physics and mathematics is assumed. Topics covered include: Forms of energy - electric, magnetic, chemical, thermal, pneumatic, kinetic, etc. Sources of energy (especially renewable energy) - photovoltaics, wind generation, fuel cells, etc. Energy conversion - methods, efficiency, limitations. Storage of energy - batteries, supercapacitors, thermal energy, mechanical energy, embodied energy, etc. The concepts studied in this unit, and the knowledge and skills gained, will be used in advanced area of electrical and/or energy systems engineering.

## 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:** Describe the physical basis for, and associated performance characteristics of, various energy conversion and storage technologies.

**ULO2:** Outline the safety, and economic issues concerning energy technology and systems.

**ULO3:** Identify, formulate and provide solutions to complex problems with intellectual independence for finding the performance of energy conversion from one form to another

**ULO4:** Analyse energy conversion and storage systems in terms of accepted performance parameters

**ULO5:** Evaluate energy conversion and storage requirements and design or select suitable solutions to those requirements.

## General Assessment Information

### Grading and passing requirement for unit

In order to pass this unit, a student must obtain an aggregate mark of 50 or more for the unit **and** at least 40 marks in the final exams. For further details about grading, please refer below in the policies and procedures section.

### Late submissions and resubmissions

Tutorial quiz and lab reports are to be submitted via iLearn. Late submissions will attract a penalty of 50% marks per day. Extenuating circumstances will be considered upon lodgment of an application for special consideration. Practicals must be completed within the allocated time slot.

Resubmissions of work are not allowed.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#">Final Exam</a>	50%	Yes	TBA
<a href="#">Problem Solving</a>	25%	No	check iLearn
<a href="#">Practical</a>	25%	No	check iLearn

### Final Exam

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **TBA**

Weighting: **50%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

The final exam will cover all of the course content. This involves short answers and problem solving. This is an hurdle exam and to receive a passing grade, the student must achieve at least 40% in the final exam and an aggregate mark of at least 50% overall.

On successful completion you will be able to:

- Describe the physical basis for, and associated performance characteristics of, various energy conversion and storage technologies.
- Outline the safety, and economic issues concerning energy technology and systems.
- Identify, formulate and provide solutions to complex problems with intellectual independence for finding the performance of energy conversion from one form to another
- Analyse energy conversion and storage systems in terms of accepted performance parameters
- Evaluate energy conversion and storage requirements and design or select suitable solutions to those requirements.

## Problem Solving

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 12 hours

Due: **check iLearn**

Weighting: **25%**

In each tutorial/ small group teaching activity session, there are several questions. A few example questions will be solved in the scheduled session by the tutor. Students will be asked to solve remaining questions with the help of lecture materials. The problems will be designed to help students enhance their understanding of the topics covered in lectures and provide them with an opportunity to apply the knowledge they have learned from lectures to solve practical problems. In the scheduled session, they will analyse the performance characteristics of various energy conversion and storage technologies. Criteria & Marking: (i) calculation accuracy; (ii) communications of assumptions; (iii) methodology; (iv) completeness.

In each session, there will be a tutorial assessment test (online assessment through iLearn) to examine students' learning achievements at different stages of the course.

On successful completion you will be able to:

- Identify, formulate and provide solutions to complex problems with intellectual independence for finding the performance of energy conversion from one form to another
- Analyse energy conversion and storage systems in terms of accepted performance parameters

## Practical

Assessment Type <sup>1</sup>: Practice-based task

Indicative Time on Task <sup>2</sup>: 36 hours

Due: **check iLearn**

Weighting: **25%**

The laboratories are strongly recommended; attendance, participation, and completion of all the laboratory activities are required in order to satisfactorily complete the course. You are required to record all the laboratory results (and printouts) and submit a complete report for each experiment. Criteria & Marking: (i) design decision, (ii) completeness (iii) analyse results, (iv) accuracy and (v) structure and quality of the report. Detail of the marking criteria will also be notified on iLearn.

On successful completion you will be able to:

- Describe the physical basis for, and associated performance characteristics of, various energy conversion and storage technologies.
- Outline the safety, and economic issues concerning energy technology and systems.
- Evaluate energy conversion and storage requirements and design or select suitable solutions to those requirements.

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<sup>1</sup> 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.

<sup>2</sup> 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

**Recommended texts:**

Aldo Vieira da Rosa, Fundamentals of Renewable Energy Processes, Third Edition, Academic

Press (Elsevier), ISBN: 978-0-12-397219-4

Fuchs and Masoum, Power Conversion of Renewable Energy Systems. Springer 2011, ISBN 978-1-4419-7979-7.

The material will also cover other books and journal articles. Reading recommendations will be provided through iLearn.

### **Technology used:**

Classrooms lectures will be conducted online via Zoom. Laboratory activities will be conducted in the electrical laboratory on campus. All the learning and assessment resources will be made available on iLearn.

Typical electrical power sources and measurement instruments will be used in the lab. LabVolt electromechanical systems simulation software will be used in the lab.

You will need a logbook (a bound notebook only for this purpose and no loose sheets) for the lab.

You will need a scientific calculator for various numerical exercises throughout the session. Note that only calculators with no text-recall function are permitted for the final exam.

The lectures will be recorded and will be made available via Echo360

## **Unit Schedule**

A detailed unit schedule is available on the iLearn page. Note that there will be **no practicals or tutorials in week1**.

## **Policies and Procedures**

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](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 \(https://students.mq.edu.au/unit\\_offerings/129610/unit\\_guide/print\)](https://students.mq.edu.au/unit_offerings/129610/unit_guide/print)

[mq.edu.au/support/study/student-policy-gateway](http://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](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://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](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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](http://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](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto: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/](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

- \* Reduced the number of lab report assessment items from three to two
- \* Tutorial quizzes will be in the form of iLearn quizzes.