



# ENEG11009 *Fundamentals of Energy and Electricity*

## Term 3 - 2020

Profile information current as at 03/05/2024 11:30 am

All details in this unit profile for ENEG11009 have been officially approved by CQUUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

## General Information

### Overview

In this unit, you will learn how to apply fundamental laws of physics related to energy and electricity using authentic engineering problems. You will be introduced to the concepts of heat, energy, work, energy conversion and laws of thermodynamics. You will apply energy principles of rotational motion, simple harmonic motion and oscillations. You will learn the concepts of voltage and current and use Kirchhoff's laws to analyse simple direct current (DC) and alternating current (AC) electrical circuits. You will also learn the operation of electrical machines such as motors and generators and how to select a machine for a given application. Throughout this unit, you will be using experimental and measurement techniques to investigate relevant physical phenomena and learn how they can be used in practice to solve engineering problems. This unit will also provide you with opportunities to develop communication skills through collaborative teamwork and opportunities to create professional documentation through laboratory reports. Mixed-mode students are required to attend the compulsory Residential School.

### Details

Career Level: *Undergraduate*

Unit Level: *Level 1*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

### Pre-requisites or Co-requisites

There are no requisites for this unit.

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

### Offerings For Term 3 - 2020

- Mixed Mode

### Attendance Requirements

All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

### Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

## Class and Assessment Overview

### Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

### Class Timetable

#### [Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

#### [Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

### Assessment Overview

#### 1. **Online Quiz(zes)**

Weighting: 10%

#### 2. **Practical and Written Assessment**

Weighting: 25%

#### 3. **Online Test**

Weighting: 25%

#### 4. **Take Home Exam**

Weighting: 40%

### Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

## CQUniversity Policies

**All University policies are available on the [CQUniversity Policy site](#).**

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

## Previous Student Feedback

### Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

#### Feedback from Student Evaluation

##### **Feedback**

Transition from face-to-face to online laboratory sessions due to COVID-19 was not well accepted.

##### **Recommendation**

In 2021 it is planned to implement face-to-face block mode laboratory sessions throughout all campuses.

#### Feedback from Student Evaluation

##### **Feedback**

Lecturers are approachable and helpful.

##### **Recommendation**

Maintain the same good practices.

#### Feedback from Student Evaluation

##### **Feedback**

Progressive Tests were highly appreciated.

##### **Recommendation**

Continue with Online quizzes to maintain continuous engagement.

#### Feedback from Student evaluation

##### **Feedback**

Main Moodle page has many nested menus.

##### **Recommendation**

The new tile-based Moodle structure will be introduced.

## Unit Learning Outcomes

### **On successful completion of this unit, you will be able to:**

1. Solve well defined engineering problems in work, energy and heat transfer
2. Apply physical and circuit laws to find electric fields, electric potentials and currents in Direct Current (DC) circuits
3. Calculate simple capacitor and inductor dimensions and transient behaviour of Resistor-Capacitor (RC) and Resistor-Inductor (RL) circuits
4. Analyse simple Alternating Current (AC) circuits
5. Solve problems related to rotational motion and electrical machines
6. Conduct scientific experiments to investigate physical phenomena using safe work practices
7. Work individually and collaboratively in a team to produce professional laboratory documentation including error analyses.

The learning outcomes are linked to Engineers Australia Stage 1 Competencies and also discipline capabilities. You can find the mapping for this on the [Engineering Undergraduate Course Website](#).

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



## Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes						
	1	2	3	4	5	6	7
1 - Online Test - 25%	•	•					
2 - Practical and Written Assessment - 25%						•	•
3 - Online Quiz(zes) - 10%	•	•	•	•	•		
4 - Take Home Exam - 40%			•	•	•		

## Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes						
	1	2	3	4	5	6	7
1 - Communication	•	•	•	•	•	•	•
2 - Problem Solving	•	•	•	•	•	•	•
3 - Critical Thinking	•	•	•	•	•	•	•
4 - Information Literacy						•	•
5 - Team Work						•	•
6 - Information Technology Competence						•	•
7 - Cross Cultural Competence							
8 - Ethical practice							•
9 - Social Innovation							
10 - Aboriginal and Torres Strait Islander Cultures							

## Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Online Test - 25%	•	•	•	•		•				
2 - Practical and Written Assessment - 25%	•	•	•			•		•		
3 - Online Quiz(zes) - 10%		•	•			•				
4 - Take Home Exam - 40%	•	•	•							

## Textbooks and Resources

### Textbooks

ENEG11009

#### Prescribed

##### Fundamentals of Energy and Electricity

1st Edition (2016)

Authors: R. Knight

Pearson Education Australia

ISBN: 9781488616006

Binding: eBook

#### Additional Textbook Information

This is a custom design eBook, especially for this unit. This textbook includes material from the following 3 Physics textbooks. "College Physics: A Strategic Approach" by Knight, Jones, and Field. "Physics: Principles with Applications", by Giancoli, and "Principles and Practice of Physics" by Mazur. This book only available in eBook format and you need to purchase this directly through Pearson Education online. More information about purchasing the book will be available on the unit Moodle site.

### IT Resources

**You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

## Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)  
For further information, see the Assessment Tasks.

## Teaching Contacts

**Ehsan Pashajavid** Unit Coordinator  
[e.pashajavid@cqu.edu.au](mailto:e.pashajavid@cqu.edu.au)

## Schedule

### Week 1 - 09 Nov 2020

Module/Topic	Chapter	Events and Submissions/Topic
Work, Energy and Power	Part 1 - Chapter 10 & 11	

### Week 2 - 16 Nov 2020

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Thermodynamics	Part 1 - Chapter 11 Part 2 - Chapter 13, 14 & 15	• Progressive Quiz 1 opens Monday 6:00 am AEST

### Week 3 - 23 Nov 2020

Module/Topic	Chapter	Events and Submissions/Topic
Thermal Properties of Matter	Part 1 - Chapter 11 Part 2 - Chapter 13, 14 & 15	• Progressive Quiz 1 due Week 3 Sunday 11:45 pm AEST

### Week 4 - 30 Nov 2020

Module/Topic	Chapter	Events and Submissions/Topic
Electric Charges and Fields	Part 1 - Chapter 20 & 21	
<b>Vacation Week - 07 Dec 2020</b>		
Module/Topic	Chapter	Events and Submissions/Topic
		<ul style="list-style-type: none"> <li>• Online Residential School, 7 - 11 Dec, 2020</li> </ul>
<b>Week 5 - 14 Dec 2020</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Electric Currents and DC Circuits	Part 1 - Chapter 22 & 23	<ul style="list-style-type: none"> <li>• Progressive Quiz 2 opens Monday 6:00 am AEST</li> </ul>
<b>Week 6 - 21 Dec 2020</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Capacitors and RC circuits	Part 1 - Chapter 21 & 23	<ul style="list-style-type: none"> <li>• Progressive Quiz 2 due Week 6 Sunday 11:45 pm AEST</li> </ul>
<b>Vacation Week - 28 Dec 2020</b>		
Module/Topic	Chapter	Events and Submissions/Topic
<b>Week 7 - 04 Jan 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Magnetism and Inductors	Part 1 - Chapter 24	<ul style="list-style-type: none"> <li>• Mid-term Examination - Due: Week 7</li> <li>• Progressive Quiz 3 opens Monday 6:00 am AEST</li> </ul>
<b>Week 8 - 11 Jan 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
DC circuit Analysis	Part 1 - Chapter 22 & 23	<ul style="list-style-type: none"> <li>• Progressive Quiz 3 due Week 8 Sunday 11:45 pm AEST</li> </ul>
<b>Week 9 - 18 Jan 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Fundamentals of Alternating Current Circuits	Part 3 - Chapter 32	<ul style="list-style-type: none"> <li>• Progressive Quiz 4 opens Monday 6:00 am AEST</li> </ul>
<b>Week 10 - 25 Jan 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Alternating Current Circuits Analysis	Part 3 - Chapter 32	<ul style="list-style-type: none"> <li>• Progressive Quiz 4 due Week 10 Sunday 11:45 pm AEST</li> </ul>
<b>Week 11 - 01 Feb 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
		<ul style="list-style-type: none"> <li>• Progressive Quiz 5 opens Monday 6:00 am AEST</li> </ul>
Rotational Motion	Part 1 - Chapter 7	<p><b>Laboratory Activities, and Laboratory Report</b> Due: Week 11 Friday (5 Feb 2021) 11:45 pm AEST</p>
<b>Week 12 - 08 Feb 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Electrical Machines	Part 1 - Chapter 24 & 25	<ul style="list-style-type: none"> <li>• Progressive Quiz 5 due Week 12 Sunday 11:45 pm AEST</li> </ul>
<b>Exam Week - 15 Feb 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
		<ul style="list-style-type: none"> <li>• Take-Home Examination</li> </ul>

## Assessment Tasks

### 1 Online Progressive Quizzes

**Assessment Type**

Online Quiz(zes)

**Task Description**

- The assessment is accessible via the unit Moodle site and comprises of a set of online multiple-choice questions on the topics covered each week. These progressive quizzes are an important activity to check and enhance your comprehension.
- The progressive quizzes are an integrated part of the study to test the key aspects of each topic. Accurately completing the progressive quizzes are vital for proper preparation for In-class test and end of term examination.
- Each online progressive quiz weighs (2%) of your final mark (10% in total).
- Each progressive quiz will be available up to 1 week after the relevant fortnight to allow some study flexibility. For example, a progressive quiz on topics covered in Week 1 and 2 will close at the end of Week 3.
- Each attempt will include questions randomly selected from a set of related problems.
- Correct answers will be available immediately after you complete the test.
  - Each progressive quiz has a set time to complete and once a student starts a quiz, it will close after the set time.
  - Once started, a quiz cannot be paused in the middle. Students are strongly advised to sufficiently cover the material related to each quiz before starting time.
  - You can attempt each quiz 2 times, within the given time frame as specified in the schedule.
  - The final mark will be the highest of all the attempts
- Further details of the assessment will be available on the unit Moodle site.
- If you encounter any difficulty with network access during a quiz, contact the unit coordinator at your earliest convenience.

**Number of Quizzes**

5

**Frequency of Quizzes**

Other

**Assessment Due Date**

Suggested date and time will be notified and confirmed via the unit Moodle site.

**Return Date to Students**

Results are available immediately after the completion of each progressive test

**Weighting**

10%

**Minimum mark or grade**

50%

**Assessment Criteria**

- Correct answers
- All questions must be attempted.

**Referencing Style**

- [Harvard \(author-date\)](#)

**Submission**

Online

**Learning Outcomes Assessed**

- Solve well defined engineering problems in work, energy and heat transfer
- Apply physical and circuit laws to find electric fields, electric potentials and currents in Direct Current (DC) circuits

- Calculate simple capacitor and inductor dimensions and transient behaviour of Resistor-Capacitor (RC) and Resistor-Inductor (RL) circuits
- Analyse simple Alternating Current (AC) circuits
- Solve problems related to rotational motion and electrical machines

### **Graduate Attributes**

- Problem Solving
- Critical Thinking
- Information Technology Competence

## **2 Laboratory Activities, and Laboratory Report**

### **Assessment Type**

Practical and Written Assessment

### **Task Description**

- This assessment item covers topics from 1 to 10.
- Online (Zoom based) laboratory sessions will be held on 7-11 Dec 2020 (Residential school period).
- All the information regarding the laboratories will be provided to the students via the unit Moodle site.
  - Attendance to Online laboratory sessions is compulsory.
  - Students need to submit one report individually for this assessment by the due date.
  - Students need to score equal or more than 50% for this assessment to PASS this unit.
- Further details of the laboratory exercises will be posted on the unit Moodle site.

### **Assessment Due Date**

Week 11 Friday (5 Feb 2021) 11:45 pm AEST

Submit the reports as a single PDF document

### **Return Date to Students**

By two weeks after submission

### **Weighting**

25%

### **Minimum mark or grade**

All the online laboratory sessions must be attended, and marks for laboratory reports need to be more than 50% to PASS this unit.

### **Assessment Criteria**

Laboratory exercises will be graded using the following criteria:

- Attendance to Online laboratory sessions is compulsory, and all the laboratory exercises must be attempted.
- Laboratory reports of students who did not attend the online laboratory sessions will not be accepted for marking.
- Proper formatting and structuring of reports.
- Have neat, legible, and tidy work and presentation in the laboratory work.
- Correct workings, answers, and solutions.
- A correct description of laboratory procedures.
- Where appropriate show the calculated values based on theory and compare them against the measured values.
- Appropriate discussion of laboratory results.
- Proper use of references.

### **Referencing Style**

- [Harvard \(author-date\)](#)

### **Submission**

Online

### **Submission Instructions**

As a single PDF document

### **Learning Outcomes Assessed**

- Conduct scientific experiments to investigate physical phenomena using safe work practices
- Work individually and collaboratively in a team to produce professional laboratory documentation including error analyses.



## Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Technology Competence
- Ethical practice

## 3 Mid-term Examination

### Assessment Type

Online Test

### Task Description

- This exam is accessible via the unit Moodle site and comprises of a set of online multiple-choice questions on the topics covered from Week 1 to Week 5. Students are required to answer analytical and numerical questions to demonstrate their theoretical knowledge and analytical and problem-solving skills.

- This exam is an important activity to check and enhance your comprehension.

- This exam is an integrated part of the study to test the key aspects of each topic.

- This exam will be available for a limited time in Week 7 and students need to attend this Moodle-based online test in real-time. (For example, this exam will be available **ONLY** on Week 7 Monday from 9 AM to 11 AM). Further specific details (including day and time) of the exam will be available on the unit Moodle site.

- The exam will include questions randomly selected from a set of related problems.
- The exam has a set start time and end time. It will close after the set end time.
- Students are strongly advised to sufficiently cover the material related to the exam before starting time.

- If you encounter any difficulty with network access during the exam, contact the unit coordinator at your earliest convenience.

### Assessment Due Date

In Week 7. Suggested date and time will be notified and confirmed via the unit Moodle site.

### Return Date to Students

We strive to release the assessment marks in 2 weeks after due date

### Weighting

25%

### Minimum mark or grade

40%

### Assessment Criteria

- Correct answers
- Correct format
- Application of correct methods and procedures.
- All questions must be attempted and each question in the test will be assessed separately.

### Referencing Style

- [Harvard \(author-date\)](#)

### Submission

Online

### Learning Outcomes Assessed

- Solve well defined engineering problems in work, energy and heat transfer
- Apply physical and circuit laws to find electric fields, electric potentials and currents in Direct Current (DC) circuits

## Graduate Attributes

- Communication

- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

## 4 Take Home Examination

### Assessment Type

Take Home Exam

### Task Description

- This is an individual assessment accessible via the unit Moodle site and comprises of a set of questions on the topics covered from Week 6 to Week 12.
- Students are required to answer analytical and numerical questions to demonstrate their theoretical knowledge and analytical and problem-solving skills.
- This exam is an important activity to check and enhance your comprehension. This exam is an integrated part of the study to test the key aspects of each topic.
- This exam will be available for a limited time during Exam week.
- Exam answers should be submitted to Moodle within the specified time period. In addition, students should submit their scanned detailed solution and workings within the allowed time period to Moodle.

- The Take-home exam will have essay type questions.
- Students are supposed to answer all the questions through the unit Moodle site.
- Students need to copy the questions to a workbook (or blank papers) and solve the problems on the paper.
- Students need to include all steps of workings and final answers.
- Students should scan the workings and answers to a single PDF file and upload it.
- The Take-home examination has a set start time and the answer/workings submission link will be closed after the end time.
- Students are strongly advised to sufficiently cover the material related to the exam before starting time.

- Further specific details (including days and times) related to this exam will be published on the unit Moodle site.
- If you encounter any difficulty with network access during the exam, contact the unit coordinator at your earliest convenience.

### Assessment Due Date

During the University examination period

### Return Date to Students

Two weeks after submission

### Weighting

40%

### Minimum mark or grade

50%

### Assessment Criteria

Take-home examination will be graded using the following criteria:

- Correct workings, answers, and solutions.
- Appropriate discussion of results.
- On-time submission.
- Proper formatting and structuring.
- Have neat, legible, and tidy work and presentation.
- A correct description of procedures.
- Proper use of references.
- All questions must be attempted.

### Referencing Style

- [Harvard \(author-date\)](#)

### Submission

Online

### Submission Instructions

As a single PDF file

### Learning Outcomes Assessed

- Calculate simple capacitor and inductor dimensions and transient behaviour of Resistor-Capacitor (RC) and Resistor-Inductor (RL) circuits
- Analyse simple Alternating Current (AC) circuits
- Solve problems related to rotational motion and electrical machines

### Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking

## Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

### What is a breach of academic integrity?

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

### Why is academic integrity important?

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

### Where can I get assistance?

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

### What can you do to act with integrity?

**Be Honest**

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own

**Seek Help**

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)

**Produce Original Work**

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem