



ENEG11009 *Fundamentals of Energy and Electricity*

Term 3 - 2021

Profile information current as at 10/04/2024 07:42 am

All details in this unit profile for ENEG11009 have been officially approved by CQU University 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. In this unit, you must complete compulsory practical activities. Refer to the Engineering Undergraduate Course Moodle site for proposed dates.

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 - 2021

- 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. **Online Test**

Weighting: 25%

3. **Practical and Written Assessment**

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

Students appreciated sending assessment deadline reminders and providing sample exam papers & solutions.

Recommendation

Continue the same practice.

Feedback from Student Evaluation

Feedback

Students found Mid-term exams reduced the workload to a manageable level at the end of term.

Recommendation

Continue the same practice.

Feedback from Student Evaluation

Feedback

Students felt comfortable and easy to communicate with teaching staff.

Recommendation

Maintain the same practice.

Feedback from Student Evaluation

Feedback

Some students reported too much content taught within this unit.

Recommendation

This unit is under review and during this process content will be revamped.

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 for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:

Introductory

1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1N 2N 4N) 1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 1N 2N 6N) 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 6N) 2.2 Fluent application of engineering techniques, tools and resources. (LO: 7N) 1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 2I 3N 4N 5N) 1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1N 2I 3N 4N 7N) 2.1 Application of established engineering methods to complex engineering problem solving. (LO: 1N 2I 3N 4N 5N) 3.2 Effective oral and written communication in professional and lay domains. (LO: 6I 7I) 3.6 Effective team membership and team leadership. (LO: 6I 7I)
Note: LO refers to the Learning Outcome number(s) which link to the competency and the levels: N - Introductory, I - Intermediate and A - Advanced.

Refer to the Engineering Undergraduate Course Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping information <https://moodle.cqu.edu.au/course/view.php?id=1511>

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%						•	•

Assessment Tasks	Learning Outcomes						
	1	2	3	4	5	6	7
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 Limited

ISBN: 9781488616006

Binding: eBook

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

Narottam Das Unit Coordinator
n.das@cqu.edu.au

Schedule

Week 1 - 08 Nov 2021

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

Week 2 - 15 Nov 2021

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Thermodynamics	Part 1 - Chapter 11 Part 2 - Chapter 13, 14 & 15	<ul style="list-style-type: none">• Progressive Quiz 1 opens Monday 6:00 am AEST

Week 3 - 22 Nov 2021

Module/Topic	Chapter	Events and Submissions/Topic
Thermal Properties of Matter	Part 1 - Chapter 11 Part 2 - Chapter 13, 14 & 15	<ul style="list-style-type: none">• Progressive Quiz 1 due Week 3 Sunday 11:45 pm AEST• Laboratory Quiz 1 opens Monday 6:00 am AEST

Week 4 - 29 Nov 2021

Module/Topic	Chapter	Events and Submissions/Topic
Electric Charges and Fields	Part 1 - Chapter 20 & 21	<ul style="list-style-type: none">• Laboratory Quiz 1 due Sunday 11:45 pm AEST• Laboratory Quiz 2 opens Monday 6:00 am AEST

Vacation Week - 06 Dec 2021

Module/Topic	Chapter	Events and Submissions/Topic
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Week 5 - 13 Dec 2021

Module/Topic	Chapter	Events and Submissions/Topic
Electric Currents and DC Circuits	Part 1 - Chapter 22 & 23	<ul style="list-style-type: none">• Progressive Quiz 2 opens Monday 6:00 am AEST• Laboratory Quiz 2 due Sunday 11:45 pm AEST

Week 6 - 20 Dec 2021

Module/Topic	Chapter	Events and Submissions/Topic
Capacitors and RC circuits	Part 1 - Chapter 21 & 23	<ul style="list-style-type: none">• Online test - Due: Week 6• Progressive Quiz 2 due Week 6 Sunday 11:45 pm AEST• Laboratory Quiz 3 opens Monday 6:00 am AEST

Vacation Week - 27 Dec 2021

Module/Topic	Chapter	Events and Submissions/Topic
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Week 7 - 03 Jan 2022

Module/Topic	Chapter	Events and Submissions/Topic
Magnetism and Inductors	Part 1 - Chapter 24	<ul style="list-style-type: none">• Progressive Quiz 3 opens Monday 6:00 am AEST• Laboratory Quiz 3 due Sunday 11:45 pm AEST

Week 8 - 10 Jan 2022

Module/Topic	Chapter	Events and Submissions/Topic
Fundamentals of Alternating Current Circuits	Part 3 - Chapter 32	<ul style="list-style-type: none">• Progressive Quiz 3 due Week 8 Sunday 11:45 pm AEST• Laboratory Quiz 4 opens Monday 6:00 am AEST

Week 9 - 17 Jan 2022

Module/Topic	Chapter	Events and Submissions/Topic
Alternating Current Circuits Analysis	Part 3 - Chapter 32	<ul style="list-style-type: none">• Progressive Quiz 4 opens Monday 6:00 am AEST.• Virtual Residential School from 8:00 to 18:00 hours on Monday.• Laboratory Quiz 4 due Sunday 11:45 pm AEST

Week 10 - 24 Jan 2022

Module/Topic	Chapter	Events and Submissions/Topic
Rotational Motion	Part 1 - Chapter 7	<ul style="list-style-type: none">• Progressive Quiz 4 due Week 10 Sunday 11:45 pm AEST

Week 11 - 31 Jan 2022

Module/Topic	Chapter	Events and Submissions/Topic
Electrical Machines	Part 1 - Chapter 24 & 25	<ul style="list-style-type: none">• Progressive Quiz 5 opens Monday 6:00 am AEST Laboratory Activities, and Laboratory Report Due: Week 11 Friday (4 Feb 2022) 11:45 pm AEST

Week 12 - 07 Feb 2022

Module/Topic	Chapter	Events and Submissions/Topic
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Exam Week - 14 Feb 2022**Module/Topic****Chapter****Events and Submissions/Topic**

- Take-Home Examination

Take Home Examination Due: Exam Week Thursday (17 Feb 2022) 10:00 am AEST

Assessment Tasks

1 Online Progressive Quizzes

Assessment Type

Online Quiz(zes)

Task Description

- The assessment comprises a set of online multiple-choice questions on the topics covered each week.
- 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 quiz.
- 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.
- 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.

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 quiz.

Weighting

10%

Assessment Criteria

- You get the full mark for a correct answer and no mark for an incorrect answer.
- No partial marks are available.
- 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 Online test

Assessment Type

Online Test

Task Description

- The assessment comprises 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 test weighs 25% of your final mark.
- This test will be available for a limited time in Week 6, and students need to attend this online test in real-time. (For example, this exam will be available ONLY on Week 6 Monday from 8 AM to 10 AM).
- Further specific details (including day and time) of the test will be available on the unit Moodle site.
- The test will include questions randomly selected from a set of related problems from a question bank.
- The test 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 test before the test.

Assessment Due Date

The test will be conducted in week 6. Suggested date and time will be notified and confirmed via the unit Moodle site.

Return Date to Students

Feedback will be given through unit website in Moodle in two weeks after the test.

Weighting

25%

Minimum mark or grade

25%

Assessment Criteria

- All questions must be attempted and each question in the test will be assessed separately.
- You get the full mark for a correct answer and no mark for an incorrect answer.
- No partial marks are available.
- Need to score more than 25% to PASS this assessment.

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

3 Laboratory Activities, and Laboratory Report

Assessment Type

Practical and Written Assessment

Task Description

- This assessment item covers topics from weeks 1 to 9.
- All laboratory exercises must be attempted.
- All students need to attend compulsory virtual residential school and all the laboratory exercises must be familiarized. This includes watching videos and writing a team report using data provided by the unit coordinator.
- Students will be working in teams allocated by the unit coordinator during the laboratory sessions.
- Students need to submit one report per team based on the completed laboratory exercises by the due date.
- Each student needs to complete four online laboratory quizzes before due date and marks will be given for completing the quizzes correctly. This is an individual assessment.
- Students need to score equal or more than 50% for this assessment to PASS this unit.
- Further information regarding the laboratories will be provided to the students via the unit Moodle site.

Assessment Due Date

Week 11 Friday (4 Feb 2022) 11:45 pm AEST

Submit one PDF file through the unit Moodle website.

Return Date to Students

Exam Week Friday (18 Feb 2022)

Weighting

25%

Minimum mark or grade

50%

Assessment Criteria

- Marks scored from completing online quizzes, completing and submitting the team laboratory report will be used to calculate individual marks for this assessment.
- Laboratory reports of online students who did not attend the virtual residential school will not be accepted for marking and will be awarded zero marks.
- Follow proper formatting and structuring of reports.
- Have neat, legible, and tidy work and presentation in the laboratory work.
- Provide correct workings, answers, and solutions.
- Present an accurate description of laboratory procedures.
- Where appropriate, show the calculated values based on theory and compare them against the measured values.
- Provide an appropriate discussion of laboratory results.
- Refer to the resources appropriately.

Referencing Style

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

Submission

Online Group

Submission Instructions

Submit one PDF file through the unit Moodle website.

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

4 Take Home Examination

Assessment Type

Take Home Exam

Task Description

- This exam is an individual assessment accessible via the unit Moodle site and comprises 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 take-home exam weighs 40% of your final mark.
- This exam will be available for a limited time during the exam week and students need to attend this examination during that time.
- The take-home exam has a set start time, and the answer/workings submission link will be closed after the end time.
- All questions must be attempted.
- Students need to include all steps of workings and final answers.
- Students should scan the workings and answers into a PDF file and upload it.
- Students should submit their scanned detailed solutions and workings within the allowed time period through the unit Moodle site.
- Students are strongly advised to cover the material related to the exam sufficiently before the exam.
- Further specific details related to this assessment will be published on the unit Moodle site.

Assessment Due Date

Exam Week Thursday (17 Feb 2022) 10:00 am AEST

The examination date and time above are tentative.

Return Date to Students

Weighting

40%

Minimum mark or grade

50%

Assessment 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

Submit one PDF file through the unit Moodle website.

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

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