ENEG11009 *Fundamentals of Sustainable Energy*
Term 2 - 2024

Profile information current as at 16/07/2025 06:56 am

General Information

Overview

Sustainable engineering practices and climate change are critical topics in current socio-economic and political settings. Meeting the world's energy demand through renewable energy sources and exploring carbon-free alternative energy sources are the highly sought-after solutions. In this unit, you will learn how to apply fundamental laws of physics related to energy and electricity to solve engineering problems. You will also learn the concepts of voltage, and current and use Kirchhoff's laws to analyse simple direct current (DC) circuits, and learn the fundamentals of alternating currents (AC). This unit also investigates current and future sustainable energy sources comprising solar, wind, hydro, and hydrogen, and relevant production processes. This unit also explores the effects of climate change on using renewable energy and the challenges faced in integrating renewable energy into the primary grid. This unit will promote progress toward the United Nation's Sustainable Development Goal 7 - Affordable and Clean Energy.

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 2 - 2024

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Online
- Rockhampton

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: 30%
2. **Online Test**
Weighting: 30%
3. **Project (applied)**
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 SUTE

Feedback
Students found it difficult to coordinate with team members to complete team project-based assessments.

Recommendation
The suitability of team-based assessment should be assessed.

Feedback from SUTE

Feedback
Learning material needs improvement and needs structure.

Recommendation
Learning resources should be reviewed and more organised.

Feedback from In-class discussion

Feedback
Progressive quizzes provided a good way to self-check progress and provide an understanding of the content.

Recommendation
This practice should be continued.

Feedback from SUTE

Feedback
Some students found it difficult to understand the content's relevance to the degree.

Recommendation
Unit content should be reviewed.

Feedback from SUTE

Feedback
Students need more detailed feedback on assessments

Recommendation
Detailed feedback should be given to assessments.

Unit Learning Outcomes

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

1. Solve engineering problems incorporating energy, work, heat, and heat transfer.
2. Understand the electrical fundamentals, including current, voltage, and resistance.
3. Analyse basic direct current (DC) circuits.
4. Understand the fundamentals of alternating currents (AC) and voltages, their generation, and applications.
5. Explore different renewable energy sources, their production processes, storage, applications, and integration into existing systems.
6. Produce a professional report by investigating technical and socio-economic aspects on a given renewable energy application.

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 3N 4N)
1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 5N 6N)
1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 5N)
1.6 Understanding of the scope, principles, norms, accountabilities, and bounds of sustainable engineering practice in the specific discipline. (LO: 5N 6N)
2.1 Application of established engineering methods to complex engineering problem solving. (LO: 5N 6N)
2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 6N)
3.1 Ethical conduct and professional accountability. (LO: 6N)
3.3 Creative, innovative, and pro-active demeanour. (LO: 6N)
Intermediate
1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 2I 3I)
1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1N 2I 3N 4N 5N)
3.2 Effective oral and written communication in professional and lay domains. (LO: 6I)

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

— N/A Level | ◦ Introductory Level | • Intermediate Level | • Graduate Level | ◦ Professional Level | ◦ Advanced Level

Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
1 - Online Quiz(zes) - 30%	•	•	•	•	•	
2 - Online Test - 30%	•	•	•	•		
3 - Project (applied) - 40%					•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
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						

Textbooks and Resources

Textbooks

ENEG11009

Prescribed

Renewable Energy Systems
1st Edition (2014)
Authors: David M. Buchla Thomas E. Kissell Thomas L. Floyd
Pearson
ISBN: 9780132622516
e-Textbook ISBN: 9780133082012
Print Textbook ISBN: 9780132622516

View textbooks at the CQUniversity Bookshop

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

Sujeewa Hettiwatte Unit Coordinator
s.hettiwatte@cqu.edu.au

Schedule

Week 1 - 08 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to the Unit: ENEG11009 Introduction to Energy and Energy Conversion	Unit Resource Online	

Week 2 - 15 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Heat, Heat Transfer, and Work	Unit Resource Online	**Guest Lecture** (30 to 45 minutes) during lecture time

Week 3 - 22 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Electrical Fundamentals	Unit Resource Online and Chapter 2	

Week 4 - 29 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Rotational Motion and Alternating Current Fundamentals	Unit Resource Online, Chapter 2, and Chapter 5	

Week 5 - 05 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Generators and Principles of Renewable Energy and Renewable Energy Sources	Chapter 13 and Chapter 1	**Progressive Quiz 1**: Due Week 5 Friday

Vacation Week - 12 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 19 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Solar Energy: Solar Photovoltaics (PV) and Solar Power Systems	Chapter 3, and 4	**Online Test**

Week 7 - 26 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Solar Energy: Solar Power Systems, Solar Tracking, Charge Controllers, and Inverters	Chapter 4, 5 and 6	

Week 8 - 02 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Wind Energy: Wind Power Systems and Wind Turbine Control	Chapter 7 and 8	**Progressive Quiz 2:** Due Week 8 Friday

Week 9 - 09 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Energy from Water	Chapter 11	

Week 10 - 16 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Fuel Cells and Energy Storage	Chapter 12 and Unit Resource Online	

Week 11 - 23 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
The Electrical Power Grid	Chapter 13 and 14	**Progressive Quiz 3:** Due Week 11 Friday

Week 12 - 30 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Effects of using Renewable Energy Sources and Review		

Review/Exam Week - 07 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
		Project report submission

Exam Week - 14 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Progressive Quizzes

Assessment Type
Online Quiz(zes)

Task Description
This assessment item is a set of online quizzes that can be accessed via the unit Moodle site.

- Progressive Quizzes are an integral part of the study to test the concepts studied each week.
- Details of the assessment can be found on the unit Moodle site at the beginning of the term.
- Each Progressive Quiz will be available for up to 2 weeks to allow students who cannot find the time each week to study. For example, Progressive Quiz One will open in Week 3 and close at the end of Week 5.
- Each Progressive Quiz can be attempted a maximum of 3 times, the score for each Progressive Quiz will be the score for your highest attempt. The correct answer for the Progressive Quiz questions will be available immediately after you submit your answers.
- If you encounter any network access issues during the Progressive Quiz, the unit coordinator should be notified at your earliest convenience.

Number of Quizzes
3

Frequency of Quizzes
Other

Assessment Due Date

Return Date to Students

Weighting
30%

Minimum mark or grade
25%

Assessment Criteria
Full marks will be awarded for each correct answer, with no penalties for wrong answers. Each assessment can be attempted a maximum of 3 times, and the score for each Progressive Quiz will be based on the maximum mark obtained.

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Solve engineering problems incorporating energy, work, heat, and heat transfer.
- Understand the electrical fundamentals, including current, voltage, and resistance.
- Analyse basic direct current (DC) circuits.
- Understand the fundamentals of alternating currents (AC) and voltages, their generation, and applications.
- Explore different renewable energy sources, their production processes, storage, applications, and integration into existing systems.

2 Online Test

Assessment Type
Online Test

Task Description

- This online test would assess you on what you have learnt from Week 1 to Week 5.
- It will be held during Week 6.
- The duration is 2 hours.
- Hand written solutions on A4 sheets and uploading to the Unit Moodle site is required immediately after the test.

Assessment Due Date

Return Date to Students

Weighting
30%

Minimum mark or grade
25%

Assessment Criteria
It is essential to show all steps in the solution.
Each answer will be marked based on the calculation accuracy.

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Solve engineering problems incorporating energy, work, heat, and heat transfer.
- Understand the electrical fundamentals, including current, voltage, and resistance.
- Analyse basic direct current (DC) circuits.
- Understand the fundamentals of alternating currents (AC) and voltages, their generation, and applications.

3 The Project

Assessment Type
Project (applied)

Task Description
In this project you are expected to:

- Select a location from a given list of locations and
- Analyse the energy needs of the selected location,
- Evaluate renewable energy options, and
- Recommend a renewable energy solution.
- Apply taught theories and processes for quantifying energy production to justify your recommendations.
- Finally, you will need to produce a professional report and submit it on or before the deadline through the Unit Moodle site.

Assessment Due Date

Return Date to Students

Weighting
40%

Minimum mark or grade
50%

Assessment Criteria

- A Marking Rubric is provided on Moodle that includes indicators of attainment at the 'Excellent', 'Very Good', 'Good', and 'Unacceptable' for the Project based assignment.
- The rubric explains expectations through indicators of attainment at various attainment levels.
- Understanding the marking rubric is critical to achieve good grades for this assessment.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit your report as a single pdf file.

Learning Outcomes Assessed

- Explore different renewable energy sources, their production processes, storage, applications, and integration into existing systems.
- Produce a professional report by investigating technical and socio-economic aspects on a given renewable energy application.

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