



ENEG11009 *Fundamentals of Sustainable Energy*

Term 3 - 2023

Profile information current as at 23/04/2024 08:16 pm

All details in this unit profile for ENEG11009 have been officially approved by CQUniversity 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

Sustainable engineering practices and climate change are critical topics in current socio-economic and political settings. Meeting the world 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 basic engineering problems. You will also learn the concepts of voltage, current and use Kirchhoff's laws to analyse simple direct current (DC) circuits, and learn the fundamentals of alternating current (AC) electrical circuits. This unit also investigates current and future sustainable energy sources comprising solar, wind, hydro, biomass, and hydrogen, and relevant production processes. This unit also explores the effects on climate change of 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 3 - 2023

- Online

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. **Case Study**

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 Unit Coordinator Reflection

Feedback

Too much contents were condensed in the first 3 weeks.

Recommendation

Unit contents should be distributed across all weeks.

Feedback from Unit Coordinator Reflection

Feedback

Some students found some contents taught within this unit too hard to comprehend.

Recommendation

Contents should be reviewed to suit a first-year introductory unit.

Feedback from Unit evaluation

Feedback

Students found usefulness of unit learning materials were little bit low

Recommendation

Learning resources should be reviewed.

Unit Learning Outcomes

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

1. Solve engineering problems incorporating work, energy, heat and heat transfer
2. Analyse simple Direct Current (DC) and Alternating Current (AC) circuits
3. Explore different sustainable energy sources and their applications
4. Identify energy production processes and storage systems
5. Explore the socio-economic and technical challenges with integrating renewable energy in existing systems
6. Work individually and collaboratively in a team to prepare professional reports by investigating authentic engineering problems.

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: 4N 5N)
- 1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 1N 6N)
- 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 1N 4N 5N 6N)
- 2.1 Application of established engineering methods to complex engineering problem solving. (LO: 1N 2N 3N 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: 5N)
- 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)
- 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)
- 3.6 Effective team membership and team leadership. (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



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
1 - Online Quiz(zes) - 30%	•	•				
2 - Case Study - 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 Australia

Sydney , NSW , Australia

ISBN: 9780132622516

Binding: eBook

Additional Textbook Information

Hardcopy (print) version of this book is also available for a higher price.

[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

Shaminda De Silva Unit Coordinator

s.desilva@cqu.edu.au

Schedule

Week 1 - 06 Nov 2023

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

Week 2 - 13 Nov 2023

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Heat, Heat Transfer, Work and Ideal Gas Law	Unit Resource Online	

Week 3 - 20 Nov 2023

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

Week 4 - 27 Nov 2023

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

Vacation Week - 04 Dec 2023

Module/Topic	Chapter	Events and Submissions/Topic

Week 5 - 11 Dec 2023

Module/Topic	Chapter	Events and Submissions/Topic
Fundamentals of Digital Electronics and AC/DC Conversion Principles of Renewable Energy and Renewable Energy Sources	Unit Resource Online, Chapter 1 and Chapter 2	Progressive Test 1: Due Week 5 Friday

Week 6 - 18 Dec 2023

Module/Topic	Chapter	Events and Submissions/Topic
Solar Energy	Chapter 3, 4, 5, and 6	

Vacation Week - 25 Dec 2023

Module/Topic	Chapter	Events and Submissions/Topic

Week 7 - 01 Jan 2024

Module/Topic	Chapter	Events and Submissions/Topic
Wind Energy	Chapter 7 and 8	Assignment 1 Due: Week 7 Friday (5 Jan 2024) 11:00 pm AEST

Week 8 - 08 Jan 2024

Module/Topic	Chapter	Events and Submissions/Topic
Hydro Power Generation	Chapter 11	Progressive Test 2: Due Week 8 Friday

Week 9 - 15 Jan 2024

Module/Topic	Chapter	Events and Submissions/Topic
Hydrogen based Energy Sources and Energy Storage	Chapter 12	

Week 10 - 22 Jan 2024

Module/Topic	Chapter	Events and Submissions/Topic
Biomass Energy and Alternative Fuels	Chapter 9	

Week 11 - 29 Jan 2024

Module/Topic	Chapter	Events and Submissions/Topic
The Electrical Power Grid and The Effects of using Renewable Energy	Chapter 14	Progressive Test 3: Due Week 11 Friday

Week 12 - 05 Feb 2024

Module/Topic	Chapter	Events and Submissions/Topic
Review and Q&A Session		

Exam Week - 12 Feb 2024

Module/Topic	Chapter	Events and Submissions/Topic
		Assignment 2 Due: Exam Week Monday (12 Feb 2024) 11:00 pm AEST

Assessment Tasks

1 Progressive Tests

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 Tests 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 Test will be available for up to 2 weeks to allow students who cannot find the time each week to study. For example, Progressive Test One will open in Week 3 and close at the end of Week 5.
- Each Progressive Test can be attempted a maximum of 3 times, the score for each Progressive Test will be the score for your highest attempt. The correct answer for the Progressive Test questions will be available immediately after you submit your answers.
- If you encounter any network access issues during the Progressive Test, 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

Immediate Feedback

Weighting

30%

Minimum mark or grade

25%

Assessment Criteria

No Assessment Criteria

Referencing Style

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

Submission

Online

Learning Outcomes Assessed

- Solve engineering problems incorporating work, energy, heat and heat transfer
- Analyse simple Direct Current (DC) and Alternating Current (AC) circuits

2 Assignment 1

Assessment Type

Case Study

Task Description

This assignment is an individual assessment.

Students are expected to analyse and evaluate a renewable energy Case Study and compare them with the conventional energy sources. Students are required to research the emerging renewable technologies and appraise the availability, cost, safety, performance, and emissions for the case study.

To complete this task:

1. Choose a renewable energy focus using the " Renewable Energies Case Study Focus' activity in the unit Moodle site. Upon completing this activity, the renewable energy case study can be selected from Assessment Tile. You are required to analyse, evaluate and compare with conventional energy sources.
2. Download the Case Study Report Template (available via the Assessment Tile).
3. Analyse the Case Study, researching your chosen renewable energy as necessary to comprehend the context of Case Study.
4. Evaluate the Case Study, making conclusions about which context was more efficient in terms of cost, safety,

performance and emissions.

5. Use the template headings and prompts as a guide to write your analysis and evaluation of the Case Study. Remember, technical writing conventions include simple concise sentences and the use of visual communication (e.g. headings, dot points, and graphs).
6. Submit the completed Case Study report as a .pdf file on or before the due date.

Assessment Due Date

Week 7 Friday (5 Jan 2024) 11:00 pm AEST

Return Date to Students

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

Weighting

30%

Minimum mark or grade

25%

Assessment Criteria

A Marking Rubric is provided on the unit Moodle site that includes indicators of attainment at the 'Excellent', 'Very Good', 'Good', and 'Unacceptable' for Case Study analysis report. 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. Students are strongly advised to look at the marking rubric before starting the assessment and as a final check before submitting the assessment.

Referencing Style

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

Submission

Online

Submission Instructions

As a single .pdf document

Learning Outcomes Assessed

- Explore different sustainable energy sources and their applications
- Identify energy production processes and storage systems
- Explore the socio-economic and technical challenges with integrating renewable energy in existing systems
- Work individually and collaboratively in a team to prepare professional reports by investigating authentic engineering problems.

3 Assignment 2

Assessment Type

Project (applied)

Task Description

This assignment is a team assessment and has two parts namely Part A and Part B.

Part A: Team Project Report

In your team it is expected to analyse the energy needs of a chosen location, evaluate renewable energy options, and recommend a renewable energy solution. Apply taught theories and processes for quantifying energy production to justify your recommendations.

To complete this task:

1. Choose a location using the 'Group and Location Choice' activity in the unit Moodle site. You will cooperate with the other students that choose the same location.
2. Communicate with your team members and work together to complete the Team work agreement. As part of this process you will all have to agree on roles, responsibilities, assessment deadlines, and communication channel(s).
3. In accordance with the Teamwork Agreement, cooperate as a team to complete and submit a Team Project Report.
4. Each team member need to complete an agreed individual section of the Team Project Report (Template available via the unit Moodle Assessment Tile).

Part B: Self and Team member Evaluation

Students are expected to evaluate themselves and team member contributions in completing the team project. This includes participating to team meetings, meeting activity deadlines set with in the team and by the unit profile, researching, contributing technical knowledge, report writing, and leadership.

To complete this task:

1. You are expected to self evaluate your contributions to the team project.

2. You are expected to evaluate the contribution of your team members.

Assessment Due Date

Exam Week Monday (12 Feb 2024) 11:00 pm AEST

Return Date to Students

We strive to release the assessment marks within 2 weeks from the due date.

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 Team 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.

Students are strongly advised to look at the marking rubric before starting the assessment and as a final check before submitting the assessment.

Referencing Style

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

Submission

Online Group

Submission Instructions

As a single pdf document.

Learning Outcomes Assessed

- Solve engineering problems incorporating work, energy, heat and heat transfer
- Analyse simple Direct Current (DC) and Alternating Current (AC) circuits
- Explore different sustainable energy sources and their applications
- Identify energy production processes and storage systems
- Explore the socio-economic and technical challenges with integrating renewable energy in existing systems
- Work individually and collaboratively in a team to prepare professional reports by investigating authentic engineering problems.

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