ENEG11009 *Fundamentals of Sustainable Energy*
Term 3 - 2022

Profile information current as at 27/04/2024 08:09 pm

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 - 2022

- 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: 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

— 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 - 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
Paper copies can be purchased, if preferred, from the CQUni Bookshop here: http://bookshop.cqu.edu.au (search on the Unit code)

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

Narottam Das Unit Coordinator
n.das@cqu.edu.au
Benjamin Taylor Unit Coordinator
ben.taylor@cqu.edu.au

Schedule

Week 1 - 07 Nov 2022

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

Week 2 - 14 Nov 2022

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Heat, Heat transfer and Work	Unit Resource Online and Chapter 10	

Week 3 - 21 Nov 2022

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

Week 4 - 28 Nov 2022

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Rotational motion	Unit Resource Online	**Progressive Test 1** Due: Week 4 Friday 11:00 pm AEST (2 Dec 2022)

Vacation Week - 05 Dec 2022

Module/Topic	Chapter	Events and Submissions/Topic
Break week		

Week 5 - 12 Dec 2022

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to AC circuit analysis, Principles of Renewable Energy and Renewable Energy sources	Chapter 1 and Unit Resource Online	

Week 6 - 19 Dec 2022

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

Vacation Week - 26 Dec 2022

Module/Topic	Chapter	Events and Submissions/Topic
Year end vacation		

Week 7 - 02 Jan 2023

Module/Topic	Chapter	Events and Submissions/Topic
Wind Energy	Chapter 7 and 8	

Week 8 - 09 Jan 2023

Module/Topic	Chapter	Events and Submissions/Topic
Hydro Power Generation	Chapter 11	**Assignment 2** Due: Week 8 Friday (13 Jan 2023) 11:00 pm AEST

Week 9 - 16 Jan 2023

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

Week 10 - 23 Jan 2023

Module/Topic	Chapter	Events and Submissions/Topic
Digital System and Boolean Algebra		**Progressive Test 2** Due: Week 8 Friday 11:00 pm AEST (27 Jan 2023)

Week 11 - 30 Jan 2023

Module/Topic	Chapter	Events and Submissions/Topic
Digital System Fundamentals and Energy Storage, Biomass Energy and Alternative Fuels	Chapter 6, 9, 10, 11, 12 and 13	

Week 12 - 06 Feb 2023

Module/Topic	Chapter	Events and Submissions/Topic
Effects of using Renewable Energy	Chapter 13 and Chapter 14	**Progressive Test 3** Due: Week 10 Friday 11:00 pm AEST (10 Feb 2023)

Exam Week - 13 Feb 2023

Module/Topic	Chapter	Events and Submissions/Topic
		Assignment 3 Due: Exam Week Friday (17 Feb 2023) 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 test are an integral part of the study to test the concepts of 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 several times, but the score for Progressive test will be the score for your first 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%

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 2

Assessment Type
Case Study

Task Description
This assignment is an individual assessment.
Students are expected to analyse and evaluate two renewable energy Case Studies 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 both case studies.
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 two renewable energy case studies 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 Studies, researching your chosen renewable energy as necessary to comprehend the context of each Case Study.
4. Evaluate each 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 Studies. 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 8 Friday (13 Jan 2023) 11:00 pm AEST

Return Date to Students
Week 10 Friday (27 Jan 2023)
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 Moodle 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 3

Assessment Type
Project (applied)

Task Description
This assignment is a group 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 work with the other students that choose the same location.
2. Communicate with your team members and work together to complete the Teamwork Agreement Template. 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, work as a team to complete and submit the Group Report. (Template available via the 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, 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 Friday (17 Feb 2023) 11:00 pm AEST

Return Date to Students
Exam Week Friday (17 Feb 2023)
We strive to release the assessment marks in 2 weeks after 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