ENEE12015 *Electrical Power Engineering*
Term 2 - 2024

Profile information current as at 29/07/2024 04:01 pm

General Information

Overview

In this unit, you will model basic electrical power system components using simplified linear equivalent circuits, explain the relationship between power and energy, and calculate power and energy in electrical power networks. You will review electric and magnetic fields and explain their application in power transformers and generation. You will discuss generation, transmission, and distribution of electrical energy. You will apply problem-solving techniques in the analysis of balanced three-phase power circuits using per-unit methodology. You will discuss electrical distribution system components and configurations and apply appropriate mathematical tools to the analysis of power systems. You are expected to use appropriate electrical engineering language in context and to document the process of modeling and analysis. You will present the information, communicate, work, and learn, both individually and in teams, in a professional manner. In this unit, you must complete compulsory practical activities. Refer to the Engineering Undergraduate Moodle site for proposed dates.

Details

Career Level: *Undergraduate*
Unit Level: *Level 2*
Credit Points: *6*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites

Pre-requisites: ENAE12013 Electrical Components and Circuit Analysis or ENEE12014 Electrical Circuit Analysis.
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
- Mixed Mode
- 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).

Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:
Click here to see your Residential School Timetable.

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. **Written Assessment**
Weighting: 20%
2. **Online Quiz(zes)**
Weighting: 20%
3. **Practical and Written Assessment**
Weighting: 20%
4. **Online Test**
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 evaluation.

Feedback
Students appreciated the lecturer for this unit was very cooperative, knowledgeable, and encouraged with a positive learning atmosphere.

Recommendation
Continue this good practice for student success.

Feedback from Unit evaluation.

Feedback
Students appreciated that the Quizzes were good and helped maintain attention to the subject material.

Recommendation
Continue this good practice.

Feedback from Unit evaluation and individual discussion.

Feedback
Students mentioned that the simulation software (MATLAB) to evaluate solar cell configurations took a bit longer time to understand the software. Requested a tutorial on this software.

Recommendation
Should provide a tutorial on this software (MATLAB).

Unit Learning Outcomes

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

1. Analyse single and three-phase power networks using relevant problem-solving techniques including per-unit methodology
2. Explain the application of the electric and magnetic fields in power transformers and power generation
3. Discuss generation, transmission, and distribution system components including renewable energy generation and integration
4. Use laboratory procedures and appropriate simulation tools for the analysis of power systems
5. Present the process of power system modeling and analysis professionally
6. Communicate, work, and learn, both individually and in teams, in a professional manner.

The Learning Outcomes for this unit are linked with the Engineers Australia's 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:

Intermediate 1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1I 2I 3I 4I) 1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1I 2I 3I 4I) 1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1I 2I 3I 4I) 1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1I 2I 3I 4I) 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 1I 2I 3I 4I) 2.1 Application of established engineering methods to complex engineering problem-solving. (LO: 1I 2I 3I 4I) 3.2 Effective oral and written communication in professional and lay domains. (LO: 5I 6I) 3.6 Effective team membership and team leadership. (LO: 6I)

Advanced

1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 3A 4N)

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 - Written Assessment - 20%	•	•	•		•	•
2 - Online Quiz(zes) - 20%	•	•				
3 - Practical and Written Assessment - 20%				•	•	•
4 - Online Test - 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

ENEE12015

Prescribed

Electrical Machines, Drives, and Power Systems
Edition: 6th (2014)
Authors: Theodore Wildi
Pearson Education Limited
Upper Saddle River , NJ , USA
ISBN: 9781292024585
Binding: Hardcover
ENEE12015

Supplementary

Power System Analysis and Design SI
Edition: 6th (2016)
Authors: Glover, G, Overbye, T & Sarma, M
Cengage Learning
Boston , MA , USA
ISBN: 9781305636187
Binding: Hardcover

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

Schedule

Week 1 - 08 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Electrical Power Systems	Chapter 7	

Week 2 - 15 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Electrical Power Measurement and Three Phase Circuits	Chapter 7, Chapter 8	

Week 3 - 22 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Transformers – Ideal to Practical	Chapter 9, Chapter 10	**Online Quiz Part 1** (Open from 22 July 2024 Due by 11.59 pm AEST - 28 July 2024).

Week 4 - 29 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Per-Unit system methodology	Chapter 10	

Week 5 - 05 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Special and Three-Phase Transformers	Chapter 11, Chapter 12	

Vacation Week - 12 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
		Residential school option 1: Labs in this unit will be held in Bundaberg, Gladstone and Mackay campuses from 12th till 14th (Mon. Tue. Wed.) August 2024. Online/Mixed Mode students may opt to attend in any campus depending on convenience.

Week 6 - 19 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
		Online Quiz Part 2 (Open from 19 August 2024. Due by 11.59 pm AEST - 25 August 2024).
Generation of Electrical Energy	Chapter 24 & IEEE PES AND CIGRE Reports	**Residential school option 2:** Labs in this unit will be held in Cairns and Rockhampton campuses from 21st till 23rd (Wed. Thu. Fri.) August 2024. Online/Mixed Mode students may opt to attend in any campus depending on convenience.

Week 7 - 26 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Renewable Energy and Storage System Overview & Transmission of Electrical Energy	Chapter 25 & IEEE PES AND CIGRE Reports	

Week 8 - 02 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Transmission Line Models	Chapter 25	

Week 9 - 09 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Transmission Line Models & Distribution of Electrical Energy	Chapter 25 and Chapter 26	**Online Quiz Part 3** (Open from 9 September 2024. Due by 11.59 pm AEST - 15 September 2024).

Week 10 - 16 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Distribution of Electrical Energy & Direct-Current Transmission	Chapter 26 & Chapter 28	**Practical and Written Assessment** Due: Week 10 Monday (16 Sept 2024) 11:59 pm AEST

Week 11 - 23 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Direct-Current Transmission & Costing of Electricity and Electricity Supply Industry	Chapter 28 & Chapter 27	**Written Assesment** Due: Week 11 Monday (23 Sept 2024) 11:59 pm AEST

Week 12 - 30 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Unit Revision		**Online Quiz Part 4** (Open from 30 Sep. 2024. Due by 11.59 pm AEST - 6 Oct. 2024).

Review/Exam Week - 07 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 14 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
		End of Term Online Test (Date and time will be notified later).

Term Specific Information

Students may require MATLAB/Simulink in order to complete Assignment 1. MATLAB/Simulink can be installed free of charge by logging into Mathworks website through an account created using the CQUni email ID.

=== Important Information =====
Online Test: This unit ENEE12015 has no formal Examination. It has an End of Term "Online Test" between Week 13 and 14 (Examination Weeks). The date and time will be announced in due course.
Online Test Conditions: Closed Book.

Res School: Residential school in different campuses are subject to the enrollment of student numbers. It will be notified the students via Moodle. Students can contact to the UC directly via email.

Assessment Tasks

1 Written Assesment

Assessment Type
Written Assessment

Task Description
Written Assessment will constitute a number of questions (usually 5 to 8), similar to the unit tutorial questions, on the topics covered in the first 10 weeks of the term's work. They will require the calculation of electrical quantities pertaining to various electrical circuits in power engineering. The assessment may also have a simulation project. The assignment will be made available in Moodle by the time the unit website becomes active. Please submit as a single word/PDF file together with any simulation models/ codes as requested.

Assessment Due Date
Week 11 Monday (23 Sept 2024) 11:59 pm AEST

Return Date to Students
Review/Exam Week Monday (7 Oct 2024)
Marked Assignment will be returned for student's feedback within two weeks of the due date.

Weighting
20%

Minimum mark or grade
Students must score at least 50% of the allocated marks for this assignment.

Assessment Criteria
Each question in this assignment will be assessed separately for the criterion accuracy and correct results and given a

mark from zero to 20 marks.
1) Correct procedure and steps toward correct solutions: 50%; 2) Correct answers and units: 30%; and 3) Professional presentation and layout: 20%.
In addition, the assignment as a whole will be assessed against the following criteria:

- All necessary steps in the analysis are presented in correct order.
- Clear presentation of mathematical and arithmetical works.
- Explanation of choices made in the analysis.
- Interpretation of results.
- Appropriate use of diagram, clear diagrams.
- Correct use of terminology.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
The assignment should be submitted electronically via the unit Moodle Site by the due date and time.

Learning Outcomes Assessed

- Analyse single and three-phase power networks using relevant problem-solving techniques including per-unit methodology
- Explain the application of the electric and magnetic fields in power transformers and power generation
- Discuss generation, transmission, and distribution system components including renewable energy generation and integration
- Present the process of power system modeling and analysis professionally
- Communicate, work, and learn, both individually and in teams, in a professional manner.

2 Online Quizzes

Assessment Type
Online Quiz(zes)

Task Description
The On-line Quiz (with several Multiple Choice Questions - MCQs) will generally be in the form of problems that require simple calculations to find the correct answer. Students are expected to work individually. To ensure continuous engagement of the students with the learning of this unit, the quiz has been separated into 4 parts and distributed over the 12-week term as indicated in the unit schedule. Each part of the quiz will test the students on the unit content covered in each quarter. More information on this will be provided through the unit Moodle site. Each part of the online quiz will be open on the Unit Moodle Website 5-6 clear working days prior to the respective due dates. The online quiz will randomly draw questions from a pre-designed question bank for each individual student. This will be a time-limited assignment and more details will be made available to the students through Moodle site. Marks of all four parts of the quiz will be added and scaled to a score out of 20 to be added to the unit total.

Number of Quizzes
4

Frequency of Quizzes
Other

Assessment Due Date

Please see the weekly schedule for information about due dates for the 4 quizzes.

Return Date to Students

Students will know their marks after completing each quiz.

Weighting
20%

Minimum mark or grade
Students must score at least 50% of the allocated marks for this assignment.

Assessment Criteria
Each correct answer of the online quiz will receive full marks assigned for the particular question. The allotted marks will be visualized for the students when they access each of the quizzes. Marks of all four parts of the online quiz will be

added and scaled to a score out of 20 to be added to the unit total.

- Part 1 - Open during week 3
- Part 2 - Open during week 6
- Part 3 - Open during week 9
- Part 4 - Open during week 12

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
All parts of the On-line Test will be posted on the Unit's Website 5-6 working days prior to the due date and is to be completed and submitted by that date.

Learning Outcomes Assessed

- Analyse single and three-phase power networks using relevant problem-solving techniques including per-unit methodology
- Explain the application of the electric and magnetic fields in power transformers and power generation

3 Practical and Written Assessment

Assessment Type
Practical and Written Assessment

Task Description
Students will be formed into teams of generally 2-3 members for this assessment item. The laboratory experiments will be conducted in the following manner:

1. Both on-campus students and Online/Mixed Mode students will have scheduled laboratory blocks in 5 CQUniversity campuses (Bundaberg, Gladstone, Rockhampton, Mackay and Cairns). Students can enroll to complete the laboratory experiments in any of those campuses.
2. Please check the class time table for the information about the scheduled sessions.
3. All students will submit team laboratory reports for this assessment. More information on the experiments and lab sheets will be made available on the unit Moodle site.

Assessment Due Date
Week 10 Monday (16 Sept 2024) 11:59 pm AEST
Submit to the link in Week 10 of the unit website in Moodle as a WORD/PDF file. This is a Team Submission (i.e. one report per team).

Return Date to Students
Week 12 Monday (30 Sept 2024)
Marked report will be returned for student's feedback within two weeks of the due date.

Weighting
20%

Minimum mark or grade
Students must score at least 50% of the allocated marks for this assignment.

Assessment Criteria

1. Correct procedure and steps towards collecting data from the experiments: 55%.
2. Correct computations, answers and units: 20%.
3. Proper use of reference 10%.
4. Professional presentation and layout of the report: 15%.

Referencing Style

- Harvard (author-date)

Submission
Online Group

Submission Instructions
Report is to be submitted through the appropriate link on the Moodle Website by the due date and time.

Learning Outcomes Assessed

- Use laboratory procedures and appropriate simulation tools for the analysis of power systems
- Present the process of power system modeling and analysis professionally
- Communicate, work, and learn, both individually and in teams, in a professional manner.

4 Online Test

Assessment Type
Online Test

Task Description
This Online Test will be conducted via/through a ZOOM session and students will have to provide written answers to some questions similar to past examination questions in this unit.

1. Online Test will be time scheduled and will take place for everyone at the same time.
2. Each student stays home with a device (preferably a laptop) essentially having a camera through which we can watch the student in a ZOOM session during the Online Test (please make sure you have a device with these requirements functioning).
3. That ZOOM link needs to be connected throughout the Online Test.
4. The Online Test paper will be loaded to the Moodle so that students only can access it during Online Test period.
5. The student uses blank A4 papers (single side) to write answers.
6. At the end of the Online Test, student (he/she) first takes photos of all written pages and email the UC.
7. Later student (he/she) scan the pages and upload to Moodle within a specified time at the end of Online Test.
8. Online Test date and time will be within the standard examination period for Term 2, 2024.

Assessment Due Date

This will be held in the examination week. The exact date and time of the Online Test will be notified later.

Return Date to Students

Outcomes will be published with the grade certification.

Weighting
40%

Minimum mark or grade
Students must score at least 50% of the allocated marks for this assignment.

Assessment Criteria
This assessment item relates to the course learning outcomes 1, 2, 3, 4, 5, 6, 8 and 9 as stated.

- Correct procedure and steps toward correct solutions: 60%
- Correct answers and units: 20%
- Professional presentation and layout: 20%

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Scan and upload the Online Test Script to the link provided in unit Moodle site.

Learning Outcomes Assessed

- Discuss generation, transmission, and distribution system components including renewable energy generation and integration
- Use laboratory procedures and appropriate simulation tools for the analysis of power systems

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