ENEE12015 *Electrical Power Engineering*
Term 2 - 2021

Profile information current as at 27/09/2024 10:17 am

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 modelling 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 Course 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 - 2021

- 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).

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 Test**
Weighting: 20%
3. **Practical and Written Assessment**
Weighting: 20%
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 Unit survey.

Feedback
Students appreciated the timely and clear responses from the lecturer.

Recommendation
This good practice will be continued.

Feedback from Unit survey.

Feedback
Students appreciated the combination of recorded lectures and consultation session together with detailed worked examples provided.

Recommendation
This good practice will be continued.

Feedback from Unit survey

Feedback
Students believe that the Labvolt simulation based experiments are not very productive.

Recommendation
The school has decided to continue this practice of using Labvolt simulations to be in line with the reduced residential school requirements policy in each course. Distance students may be able to attend scheduled lab sessions in any of the five campuses where engineering is offered from 2021 if they wish.

Feedback from Unit survey

Feedback
Students wanted more recent recordings for lectures and tutorials together with revision in uploaded content to eliminate repetition.

Recommendation
A complete revision of the uploaded content will be carried out.

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 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 modelling 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 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 Test - 20%	•	•	•			
3 - Practical and Written Assessment - 20%				•	•	•
4 - Examination - 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						

Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Written Assessment - 20%	•	•	•	•						
2 - Online Test - 20%		•	•							
3 - Practical and Written Assessment - 20%	•		•	•	•					
4 - Examination - 40%	•	•	•	•						

Textbooks and Resources

Textbooks

ENEE12015

Prescribed

Electrical Machines, Drives, and Power Systems Sixth (2014)
Edition: 6 (2014)
Authors: Theodore Wildi
Pearson Education Limited
Upper Saddle River, NJ, USA , NJ , USA
ISBN: 1-292-02458-5/978-1-292-02458-5
Binding: Hardcover
ENEE12015

Supplementary

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

Additional Textbook Information
Both paper and eBook versions can be purchased at 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
Sanath Alahakoon Unit Coordinator
s.alahakoon@cqu.edu.au

Schedule

Week 1 - 12 Jul 2021

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

Week 2 - 19 Jul 2021

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

Week 3 - 26 Jul 2021

Module/Topic	Chapter	Events and Submissions/Topic
Transformers – Ideal to Practical	Chapter 9, Chapter 10	**Online Quiz Part 1 (Open from 26 July 2021 Due by 11.59 pm AEST - 01 August 2021).**

Week 4 - 02 Aug 2021

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

Week 5 - 09 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
Special and Three-Phase Transformers	Chapter 11, Chapter 12	**Residential school option 1: Labs in this unit will be held in Gladstone and Mackay campuses from 11th till 13th August 2021. Online/Mixed Mode students may opt to attend in any campus depending on convenience.**

Vacation Week - 16 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 23 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
Generation of Electrical Energy	Chapter 24 & IEEE PES AND CIGRE Reports	**Online Quiz Part 2 (Open from 23 August 2021. Due by 11.59 pm AEST- 29 August 2021). Residential school option 2: Labs in this unit will be held in Bundaberg, Rockhampton and Cairns campuses from 25th till 27th August 2021. Online/Mixed Mode students may opt to attend in any campus depending on convenience.**

Week 7 - 30 Aug 2021

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 - 06 Sep 2021

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

Week 9 - 13 Sep 2021

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 13 September 2021. Due by 11.59 pm AEST-19 September 2021).**

Week 10 - 20 Sep 2021

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 (20 Sept 2021) 11:59 pm AEST
Week 11 - 27 Sep 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Direct-Current Transmission & Costing of Electricity and Electricity Supply Industry	Chapter 28 & Chapter 27	**Written Assessment** Due: Week 11 Monday (27 Sept 2021) 11:59 pm AEST
Week 12 - 04 Oct 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Unit Revision		**Online Quiz Part 4 (Open from 4 Oct. 2021. Due by 11.59 pm AEST- 10 Oct. 2021).**
Review/Exam Week - 11 Oct 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Exam Week - 18 Oct 2021		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
		Take home examination (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.

Assessment Tasks

1 Written Assessment

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 (27 Sept 2021) 11:59 pm AEST

Submit to the link in Week 9 of the unit website in Moodle as a WORD file. One submission per student.

Return Date to Students
Review/Exam Week Monday (11 Oct 2021)

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. Correct procedure and steps toward correct solutions: 50%; Correct answers and units: 30%; and 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

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

Learning Outcomes Assessed

- Model electrical components using simplified linear equivalent circuits
- Explain the relationship between power and energy; calculate power and energy in electrical machines and networks
- Describe electric and magnetic fields; explain their generation and application
- Discuss generation, transmission and utilisation of electrical energy
- Apply problem solving techniques in the analysis of balanced three-phase power network using per-unit methodology
- Use appropriate electrical engineering language in context

2 Online Test

Assessment Type
Online Test

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.

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 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 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.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

Learning Outcomes Assessed

- Model electrical components using simplified linear equivalent circuits
- Explain the relationship between power and energy; calculate power and energy in electrical machines and networks
- Describe electric and magnetic fields; explain their generation and application
- Discuss generation, transmission and utilisation of electrical energy
- Apply problem solving techniques in the analysis of balanced three-phase power network using per-unit methodology

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 (20 Sept 2021) 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 (4 Oct 2021)

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

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

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence

Learning Outcomes Assessed

- Model electrical components using simplified linear equivalent circuits
- Explain the relationship between power and energy; calculate power and energy in electrical machines and networks
- Describe electric and magnetic fields; explain their generation and application
- Discuss electrical distribution system components and configurations
- Apply appropriate laboratory techniques and software tools to the analysis of power systems
- Use appropriate electrical engineering language in context
- Document the process of modelling and analysis; present the information in a professional manner
- Communicate, work and learn both individually and in teams, in a professional manner.

4 Take Home Examination

Assessment Type
Take Home Exam

Task Description
This take home examination will be monitored through a ZOOM session and students will have to provide written answers to some questions similar to past examination questions in this unit.
1. Examination 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 examination (please make sure you have a device with these requirements functioning).
3. That ZOOM link needs to be open throughout the exam.
4. The examination paper will be loaded to the Moodle so that students only can access it during examination period.
5. The student uses blank A4 papers (single side) to write answers.
6. At the end of the examination, he/she first takes photos of all written pages and email invigilator.
7. Later he/she scan the pages and upload to Moodle within a specified time at the end of examination.
8. Examination date and time will be within the standard examination period for Term 2-2021.

Assessment Due Date

This will be held in the examination week. The exact date and time of the examination 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
Objectives
This assessment item relates to the course learning outcomes 1, 2, 3, 4, 5, 6, 8 and 9 as stated.
Assessment criteria
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 to the link provided in unit Moodle site.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

Learning Outcomes Assessed

- Model electrical components using simplified linear equivalent circuits
- Explain the relationship between power and energy; calculate power and energy in electrical machines and networks
- Describe electric and magnetic fields; explain their generation and application
- Discuss generation, transmission and utilisation of electrical energy
- Apply problem solving techniques in the analysis of balanced three-phase power network using per-unit methodology
- Discuss electrical distribution system components and configurations
- Use appropriate electrical engineering language in context
- Document the process of modelling and analysis; present the information in a professional manner

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