ENEE13021 *Power System Analysis and Design*
Term 2 - 2026

Profile information current as at 12/11/2026 10:30 am

All details in this unit profile for ENEE13021 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
On the satisfactory completion of this unit, you will be able to work both individually and in a team to model, analyse and investigate design and operation options for electrical power networks to meet community service requirements. You will be able to analyse the steady-state performance of power systems, perform both symmetrical and unsymmetrical fault calculations, and conduct stability analysis of power systems. You will be using the industry standard power system simulation software to simulate different scenarios in the power network. As such, you will articulate the process of updating and maintaining power network assets to meet most safety, reliability, and quality requirements for both the present and future.

Details
Career Level: *Undergraduate*
Unit Level: *Level 3*
Credit Points: *6*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites
ENEE12015 Electrical Power Engineering.
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 - 2026
- Bundaberg
- Cairns
- Gladstone
- Mackay
- Online
- Rockhampton

Attendance Requirements
All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Website
This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.

Class and Assessment Overview

Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

Class Timetable

Regional Campuses
Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

Metropolitan Campuses
Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. Online Quiz: Power System Modeling (Weeks 1-3) (Online Quiz(zes))
Weighting: 30%
2. PROJECT (Written Assessment)
Weighting: 30%
3. End of Term Online Test (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
- Academic Progression Policy and Procedure
- Student Refund and Credit Balance Policy and Procedure
- Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the CQUniversity Policy site.

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from SUTE

Feedback
Focus workshops on working through examples rather than repeating lectures.

Recommendation
Should prioritise problem-solving and example-based activities in tutorials, and provide lecture material upon student request.

Feedback from SUTE

Feedback
Simply marking answers as wrong without explanation does not support learning.

Recommendation
Clear feedback explaining why an answer is incorrect to enhance student understanding should be provided.

Feedback from SUTE

Feedback
Student questions in lectures often did not receive explanations that supported understanding.

Recommendation
Ensure student questions should be addressed with clear, explanatory responses to improve comprehension.

Unit Learning Outcomes

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

1. Calculate fault currents of power systems across various scenarios to select suitable protection schemes
2. Solve power flow problems for power system planning and operation studies
3. Analyze the balanced and unbalanced operation of power systems utilising suitable software packages
4. Investigate power angle stability for both single and multi-machine power systems
5. Work both collaboratively and autonomously to analyse and solve problems
6. Communicate effectively using power systems terminology, symbols and diagrams to present design documents, solutions, and calculations.

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 1.5 Knowledge of engineering design practice and contextual factors impacting 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) 2.3 Application of systematic engineering synthesis and design processes. (LO: 3I 6I) 3.3 Creative, innovative and pro-active demeanour. (LO: 3I)

Advanced 1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences that underpin the engineering discipline. (LO: 1A 2I 3I 4A) 1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1A 2A 3A 4A 5A 6I) 2.1 Application of established engineering methods to complex engineering problem solving. (LO: 1I 2A 3A 4I 5A) 2.2 Fluent application of engineering techniques, tools and resources. (LO: 1I 2A 3A 4I) 3.2 Effective oral and written communication in professional and lay domains. (LO: 5I 6A) 3.4 Professional use and management of information. (LO: 1I 2I 3A 4I 5I) 3.6 Effective team membership and team leadership. (LO: 3A 5A 6A)

Note: LO refers to the Learning Outcome number(s) that 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 - Written Assessment - 30%	•	•	•		•	•
3 - 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 - First Nations Knowledges						

Textbooks and Resources

Textbooks

ENEE13021

Prescribed

Power system analysis and design: Si edition.
6TH EDITION (2016)
Authors: J. Duncan Glover, Thomas Overbye, and Mulukutla
CENGAGE Learning
ISBN: 9781305636187

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Access to a document scanner and a pdf converter
- Computer with Windows OS, headphones & microphone
- The free version of PowerWorld Simulator - downloadable from the internet

Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

Teaching Contacts

Jamshid Aghaei Unit Coordinator
j.aghaei@cqu.edu.au

Schedule

Week 1 - 13 Jul 2026

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to power systems analysis	Chapters1 & 2 of Glover, Sarma, and Overbye	

Week 2 - 20 Jul 2026

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Power System Modelling	Chapters 3 & 4 of Glover, Sarma, and Overbye	

Week 3 - 27 Jul 2026

Module/Topic	Chapter	Events and Submissions/Topic
Modelling of Power System Networks	Chapter 5 of Glover, Sarma, and Overbye	

Week 4 - 03 Aug 2026

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Load Flow Analysis	Chapter 6 of Glover, Sarma, and Overbye	The online Quiz will be opened on Monday this week.

Week 5 - 10 Aug 2026

Module/Topic	Chapter	Events and Submissions/Topic

Load Flow Algorithms	Chapter 6 of Glover, Sarma, and Overbye	Online Quiz: Power System Modeling (Weeks 1-3) Due: Week 5 Monday (10 Aug 2026) 5:00 pm AEST Online Quiz: Power System Modeling (Weeks 1-3) Due: Week 5 Monday (10 Aug 2026) 5:00 pm AEST

Week 6 - 17 Aug 2026

Module/Topic	Chapter	Events and Submissions/Topic
Load Flow Studies, Modelling and Voltage Control	Chapter 6 of Glover, Sarma, and Overbye	

Vacation Week - 24 Aug 2026

Module/Topic	Chapter	Events and Submissions/Topic

Week 7 - 31 Aug 2026

Module/Topic	Chapter	Events and Submissions/Topic
Symmetrical Components	Chapter 8 of Glover, Sarma, and Overbye	

Week 8 - 07 Sep 2026

Module/Topic	Chapter	Events and Submissions/Topic
Fault Analysis (1)	Chapter 8 of Glover, Sarma, and Overbye	

Week 9 - 14 Sep 2026

Module/Topic	Chapter	Events and Submissions/Topic
Fault Analysis (2)	Chapter 9 of Glover, Sarma, and Overbye	

Week 10 - 21 Sep 2026

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Transient Stability	Chapter 11 of Glover, Sarma, and Overbye	The Project Submission will be closed on Monday this week. PROJECT Due: Week 10 Monday (21 Sept 2026) 11:59 pm AEST

Week 11 - 28 Sep 2026

Module/Topic	Chapter	Events and Submissions/Topic
Multi-machine systems, small-signal stability	Chapters 11 of Glover, Sarma, and Overbye	

Week 12 - 05 Oct 2026

Module/Topic	Chapter	Events and Submissions/Topic
Stability controls, modelling of renewables	Chapters 11 and 12 of Glover, Sarma, and Overbye	

Exam Week - 12 Oct 2026

Module/Topic	Chapter	Events and Submissions/Topic
		End of Term Online Test is scheduled Week 13 or 14 (EXAM WEEK). The exact date will be annonced later after approving with CoEA. End of Term Online Test Due: Exam Week Friday (16 Oct 2026) 6:00 pm AEST

Vacation/Exam Week - 19 Oct 2026

Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Online Quiz(zes)

Assessment Title
Online Quiz: Power System Modeling (Weeks 1-3)

Task Description
Overview
This compulsory assessment has 10-20 multiple-choice problems where students are expected to choose correct answers.
Content Coverage:
The questions cover the unit contents from Weeks 1 to 3:
- Introduction to Power Systems (Chapters1 & 2 of Power System Analysis and Design (5th Edition) written by Glover, Sarma, and Overbye)
- Introduction to Power System Modelling (Chapters 3 & 4 of Power System Analysis and Design (5th Edition) written by Glover, Sarma, and Overbye)
- Modelling of Power System Networks (Chapter 5 of Power System Analysis and Design (5th Edition) written by Glover, Sarma, and Overbye)
Preparation
To optimise quiz performance, it is recommended that students thoroughly review the lecture recordings and notes from Weeks 1 to 3. Additionally, the quiz may include content derived from Chapters 1 to 5 of the main textbook of the unit, i.e., Power System Analysis and Design (5th Edition) written by Glover, Sarma, and Overbye.
Quiz Format:
- Question Type: Multiple-choice questions
- Number of Questions: 10-20 random questions
- Number of Attempts: Two attempts allowed
- Duration: 40-60 minutes per attempt

Feedback
Students will receive automated feedback upon completion of the quiz.
Timing and Submission
Completion Deadline: Students must complete the quiz by the specified deadline to ensure their scores are recorded.
Late Submissions: Late submissions will not be accepted, and students are encouraged to manage their time effectively to avoid last-minute issues.
Grading
Scoring: Each question carries equal weight. The final grade will be based on the highest score achieved across the two attempts.
Grade Recording: The highest score from the two attempts will be automatically recorded in the grade book.
Guidelines on AI Tool Usage
AI Assessment Scale: No AI
This assessment must be completed without the use of AI tools such as ChatGPT, Copilot, or other generative technologies, even if completed outside a controlled environment. However, students may use basic grammar and spelling aids (e.g., Grammarly) to refine written expression, provided these tools do not assist with solving the numerical problems or generating content.
Please ensure your submission reflects your own understanding and problem-solving process.

Number of Quizzes
1

Frequency of Quizzes
Other

Assessment Due Date
Week 5 Monday (10 Aug 2026) 5:00 pm AEST
The exam takes 40-60 minutes.

Return Date to Students
Week 5 Monday (10 Aug 2026)
Students will receive automated feedback upon completion of the quiz.

Weighting
30%

Minimum mark or grade
Students must score 50% of the allocated marks!

Assessment Criteria
No Assessment Criteria

Referencing Style
Harvard (author-date)

Submission
Online

Learning Outcomes Assessed
- Communicate effectively using power systems terminology, symbols and diagrams to present design documents, solutions, and calculations.

2 Written Assessment

Assessment Title
PROJECT

Task Description
Overview
The second assessment item in this unit is a comprehensive written assessment designed to address the majority of the unit's learning outcomes. This assessment will contribute 30% towards your final mark. Students will work in teams of up to three members to complete a power system modelling and simulation exercise using the PowerWorld Simulator. The exercise will encompass power system modelling, load flow analysis, and fault calculations, covering the content from weeks 1 to 12.
Content Coverage
- Overview of power system components and operations.
- Basic principles and definitions.
- Mathematical modelling of generators, transformers, and loads.
  Understanding and application of the per-unit system.
- Formation and analysis of impedance and admittance matrices (Z-bus and Y-bus).
- Network representation and single-line diagrams.
- Load flow studies using iterative methods.
- Short-circuit and fault analysis, including the calculation of fault currents and post-fault voltages.

Preparation
To prepare for this assessment, students are expected to:
- Organise into teams of no more than three members. Ensure diverse skill sets within the team to cover various aspects of the project.
- Install the free edition of PowerWorld Simulator using the instructions provided on Moodle.
- Watch the available video tutorials to achieve basic competency in using the software.
- Revisit lecture notes, textbook chapters, and tutorial exercises from weeks 1 to 9.
- Practice load flow and fault analysis problems using PowerWorld Simulator.
- Collect necessary data for the assigned power system model. This may include system parameters, load data, and network configurations.

Guidelines on AI Tool Usage
AI Assessment Scale: AI Planning
AI can be used for pre-task activities like brainstorming, outlining, and research. Tools such as speech-to-text, note converters, and image generators (for design) are allowed but must not replace core skills. If you significantly refine AI-generated ideas using your own knowledge, the content is considered your own and doesn’t require citation. However, if there’s no clear evidence of substantial changes, the work will be treated as AI-assisted at the idea stage.
Assessment Format
The assessment consists of a written report and a simulation file, both to be submitted via Moodle. The report should follow the structure of the sample project report available in the Moodle.

Feedback:
- Detailed comments on each section of the report, highlighting strengths and areas for improvement.
- Each team will receive collective feedback, while individual contributions will be acknowledged and assessed.
- Opportunity for a follow-up meeting with the unit coordinator to discuss the feedback in detail.

Assessment Due Date
Week 10 Monday (21 Sept 2026) 11:59 pm AEST
Submit the report as a PDF file to the link in the Assessment tile of the unit website in Moodle together with relevant simulation files.

Return Date to Students
Week 12 Friday (9 Oct 2026)
Feedback will be given through unit website in Moodle.

Weighting
30%

Minimum mark or grade
Students must score 50% of the allocated marks!

Assessment Criteria
The written assessment for the power system modelling and simulation exercise will be evaluated based on the marking sheet available in the Moodle page.

Referencing Style
Harvard (author-date)

Submission
Online Group

Submission Instructions
Submit the report as a PDF file to the link in the Assessment tile of the unit website in Moodle together with relevant simulation files.

Learning Outcomes Assessed
- Calculate fault currents of power systems across various scenarios to select suitable protection schemes
- Solve power flow problems for power system planning and operation studies
- Analyze the balanced and unbalanced operation of power systems utilising suitable software packages
- Work both collaboratively and autonomously to analyse and solve problems
- Communicate effectively using power systems terminology, symbols and diagrams to present design documents, solutions, and calculations.

3 Online Test

Assessment Title
End of Term Online Test

Task Description
Overview
The third assessment item for this unit is the End of Term Online Test, which constitutes 40% of your final mark.
Content Coverage
The End of Term Online Test will cover the following key topics:
1. Weeks 4 to 6: Load Flow Studies
2. Weeks 7 to 9: Symmetrical Components and Fault Analysis
3. Weeks 10 to 12: Transient Stability

Preparation
To effectively prepare for the End of Term Online Test, students should:
- Thoroughly review all relevant lecture notes and corresponding chapters in "Power System Analysis and Design (5th Edition)" by Glover, Sarma, and Overbye.
  Focus on understanding key concepts and methodologies discussed during the lectures.
- Solve practice problems from the textbook and previous assignments, focusing on load flow studies, fault analysis, and transient stability.
  Watch tutorial videos on Moodle.
- Attend any review sessions or office hours offered by the unit coordinator for additional support.

Assessment Format
The End of Term Online Test consists of two parts:
1. Part-1: True/False Questions (10 questions) (20 %)
2. Part-2: Numerical Problems (3 to 4 problems) (80%) including load flow analysis, fault current calculations, and transient stability.
  - You will need to show all work clearly, including intermediate steps, formulas used, and final answers.
  - Ensure accuracy in numerical calculations and proper use of units.

Feedback
Feedback on your performance will be provided in the following ways:
- Detailed scores for each part of the online test will be available on the university’s Moodle platform.
  Breakdown of scores for each question in Part-1 and each numerical problem in Part-2.
- An overview of common mistakes and areas for improvement will be posted on the course page.
- An answer sheet of the exam will be provided to aid understanding.
- Optional follow-up sessions may be scheduled upon written request (via email) from each student to review the exam and address any questions or concerns.

Guidelines on AI Tool Usage
AI Assessment Scale: No AI
This assessment must be completed without the use of AI tools such as ChatGPT, Copilot, or other generative technologies, even if completed outside a controlled environment. However, students may use basic grammar and spelling aids (e.g., Grammarly) to refine written expression, provided these tools do not assist with solving the numerical problems or generating content.

Please ensure your submission reflects your own understanding and problem-solving process.

Assessment Due Date
Exam Week Friday (16 Oct 2026) 6:00 pm AEST

Return Date to Students
Vacation/Exam Week Friday (23 Oct 2026)
Students will receive thorough feedback at the end of exam week after completion of the test. This feedback is intended to provide insights into areas of strength and those requiring further review.

Weighting
40%

Minimum mark or grade
Students must score 50% of the allocated marks!

Assessment Criteria
The written assessment for the End of Term Online Test will be evaluated based on the marking sheet available in the Moodle page.

Referencing Style
Harvard (author-date)

Submission
Online

Submission Instructions
Please consider the following instructions: (1) The online test will be conducted on Moodle. (2) Ensure you have access to the Moodle and are familiar with its use. (3) Log in using your university credentials before the start time of the online test. (4) The online test will be available on the declared time. (5) Ensure you complete the online test within this time frame. Late submissions will not be accepted. (6) Make sure you have a stable internet connection before starting the online test. (7) Scan your work out answers and upload frequently to avoid data loss in case of connectivity issues. (8) Answers could be typed or handwritten and calculations must be shown in detail. You may need to scan or photograph handwritten steps if calculations cannot be typed. Ensure the images are clear and legible. Combine all parts of your answers into a single PDF file for submission. Tools such as Microsoft Word or Google Docs can be used to compile your answers, which can then be saved as a PDF. (9) Name your submission file as follows: LastName_FirstName_StudentID_EoTExam.pdf (Example: Doe_John_12345678_EoTExam.pdf)

Learning Outcomes Assessed
- Calculate fault currents of power systems across various scenarios to select suitable protection schemes
- Solve power flow problems for power system planning and operation studies
- Analyze the balanced and unbalanced operation of power systems utilising suitable software packages
- Investigate power angle stability for both single and multi-machine 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