

#### Profile information current as at 03/05/2024 04:32 pm

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

Students should be able to work in teams to model, analyse and investigate design and operation options for electrical power networks to meet community service requirements. On satisfactory completion students should be able to analyse steady state power system performance and articulate the process of updating and maintaining power network assets in order so they meet safety, reliability, availability, security, and quality requirements for both present and future society needs.

## 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 <u>Assessment Policy and</u> <u>Procedure (Higher Education Coursework)</u>.

## Offerings For Term 2 - 2020

- 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

 Practical and Written Assessment Weighting: 15%
Online Quiz(zes) Weighting: 20%
Written Assessment Weighting: 30%
Take Home Exam Weighting: 35%

## 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 <u>University's Grades and Results Policy</u> for more details of interim results and final grades.

## **CQUniversity Policies**

### All University policies are available on the <u>CQUniversity Policy site</u>.

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 <u>CQUniversity Policy site</u>.

## 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 Student survey

#### Feedback

Students request publication of more detailed assessment rubrics in advance.

#### Recommendation

Publish more detailed assessment rubrics along with assessment items at the start of term.

## Feedback from Student survey

#### Feedback

Students request faster assessment return.

### Recommendation

Involve markers to do this if necessary. Also structure assessment will be re-visited to avoid two assessments being due on the same day.

## Unit Learning Outcomes

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

- 1. Discuss the difference between balanced and unbalanced operation of power systems
- 2. Analyse, using appropriate software tools, power system performance in both balanced and unbalanced modes of operation
- 3. Calculate fault currents and power flow in power systems and discuss the selection of appropriate protection schemes
- 4. Understand the power flow problem along with the methods of solutions and appreciate the relevance of power flow studies in power system planning and operation
- 5. Investigate and report the process of updating and maintaining power network assets in order so they meet safety, reliability, availability, security, and quality requirements for both present and future society needs
- 6. Explain the difference between dynamic stability and transient stability and investigate tools that could be used to analyse the power system for voltage and power angle stability performance
- 7. Communicate effectively using power systems terminology, symbols and diagrams adhering to Australian Standards and present design documents, solutions, and calculations professionally
- 8. Work collaboratively and autonomously to solve problems and record and communicate clearly and professionally the approach used to solve problems.

The Learning Outcomes for this unit are linked with Engineers Australia's Stage 1 Competency Standard for Professional Engineers.

## Alignment of Learning Outcomes, Assessment and Graduate Attributes

N/A	•	Introductory	•	Intermediate	Grad
Level	-	Level	-	Level	Leve

luate



Advanced Level

## Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes								
	1	2	3	4	5	6	7	8	
1 - Practical and Written Assessment - 15%	•	٠	٠		٠		٠	•	

Assessment Tasks	Learning Outcomes								
	1	2	3	4	5	6	7	8	
2 - Written Assessment - 30%	•	•	•	•	•	•	•	•	
3 - Online Quiz(zes) - 20%		•		•	•	•			
4 - Take Home Exam - 35%				٠	•	•	٠	٠	

# Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes Learning Outcomes								
	1	2	3	4	5	6	7	8
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 - Practical and Written Assessment - 15%	•	•	•					•			
2 - Written Assessment - 30%	•	•	•		•			•			

## Textbooks and Resources

## Textbooks

ENEE13021

### Prescribed

### Power System Analysis and Design

Edition: 6th edn (2016) Authors: J. Duncan Glover, Thomas Overbye, and Mulukutla Sarma CENGAGE Learning Boston , MA , USA ISBN: 9781305636187 Binding: Paperback

#### **Additional Textbook Information**

Copies can be purchased 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)
- 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: <u>Harvard (author-date)</u> For further information, see the Assessment Tasks.

## **Teaching Contacts**

Ehsan Pashajavid Unit Coordinator e.pashajavid@cqu.edu.au

## Schedule

Week 1 - 13 Jul 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Introduction to power systems analysis	Chapters1 & 2 of Glover, Sarma, and Overbye	
Week 2 - 20 Jul 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Introduction to Power System Modelling	Chapters 3 & 4 of Glover, Sarma, and Overbye	
Week 3 - 27 Jul 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Symmetrical Components	Chapter 8 of Glover, Sarma, and Overbye	

Week 4 - 03 Aug 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Fault Analysis	Chapter 8&9 of Glover, Sarma, and Overbye	
Week 5 - 10 Aug 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Modelling of Power System Networks	Chapter 5 of Glover, Sarma, and Overbye	
Vacation Week - 17 Aug 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Week 6 - 24 Aug 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Introduction to Load Flow Analysis	Chapter 6 of Glover, Sarma, and Overbye	Assignment 1 (Individual Submission) Due: Week 6 Friday (28 Aug 2020) 11:45 pm AEST
Week 7 - 31 Aug 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Load Flow Algorithms	Chapter 6 of Glover, Sarma, and Overbye	
Week 8 - 07 Sep 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Load Flow Studies, Modelling and Voltage Control	Chapter 6 of Glover, Sarma, and Overbye	
Week 9 - 14 Sep 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Introduction to Transient Stability	Chapter 11 of Glover, Sarma, and Overbye	
Week 10 - 21 Sep 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Multi-machine systems, small-signal stability	Chapter 11 of Glover, Sarma, and Overbye	
Week 11 - 28 Sep 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
Stability controls, modelling of renewables	Chapters 11 and 12 of Glover, Sarma, and Overbye	
Week 12 - 05 Oct 2020		
Module/Topic	Chapter	<b>Events and Submissions/Topic</b>
		Online test (Open book) Due: Week 12 Monday (5 Oct 2020) 10:00 am
Revision		PROJECT ( GROUP SUBMISSION) Due: Week 12 Friday (9 Oct 2020) 11:45 pm AEST
Review/Exam Week - 12 Oct 2020		
Module/Topic	Chapter	Events and Submissions/Topic
		Take home exam Due: Review/Exam Week Tuesday (13 Oct 2020) 10:00 am AEST
Exam Week - 19 Oct 2020		
Module/Topic	Chapter	Events and Submissions/Topic

## Assessment Tasks

## 1 Assignment 1 (Individual Submission)

### Assessment Type

### Practical and Written Assessment

### **Task Description**

Students are expected to successfully complete the exercises specified in the unit website in Moodle. This assignment may contain 3-4 problems which will require the theoretical knowledge gained through your learning during the first five weeks. The topics covered by these questions will be symmetrical components, balanced and unbalanced fault analysis, and transmission line modelling.

The marking scheme for each question will be published with the assignment and the marks for this assignment will contribute to 15% of the overall marks of this unit. Assignment questions will be published in the unit Moodle site in due course. Please also refer to the assessment criteria for more details.

#### Assessment Due Date

Week 6 Friday (28 Aug 2020) 11:45 pm AEST Submit to the link in Week 6 of the unit website in Moodle as a WORD or PDF file.

### **Return Date to Students**

Week 8 Friday (11 Sept 2020) Feedback sheet provided through unit website in Moodle

Weighting

15%

#### **Assessment Criteria**

A total of 100 marks is allocated to this assignment. Students are assessed on the accuracy of calculated results, the correctness of the method used and presentation

#### **Referencing Style**

• Harvard (author-date)

## Submission

Online

#### Learning Outcomes Assessed

- Discuss the difference between balanced and unbalanced operation of power systems
- Analyse, using appropriate software tools, power system performance in both balanced and unbalanced modes of operation
- Calculate fault currents and power flow in power systems and discuss the selection of appropriate protection schemes
- Investigate and report the process of updating and maintaining power network assets in order so they meet safety, reliability, availability, security, and quality requirements for both present and future society needs
- Communicate effectively using power systems terminology, symbols and diagrams adhering to Australian Standards and present design documents, solutions, and calculations professionally
- Work collaboratively and autonomously to solve problems and record and communicate clearly and professionally the approach used to solve problems.

### **Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Ethical practice

## 2 Online test (Open book)

#### **Assessment Type** Online Quiz(zes)

### Task Description

This is an online test covering week 6 up to week 9 lectures.

### Number of Quizzes

#### **Frequency of Quizzes**

### Assessment Due Date

Week 12 Monday (5 Oct 2020) 10:00 am AEST

#### **Return Date to Students**

Review/Exam Week Friday (16 Oct 2020) Feedback given through unit website in Moodle

### Weighting

20%

#### **Assessment Criteria**

A total of 100 marks is allocated to this assignment. Students are assessed on the accuracy of calculated results and the correctness of the method used.

#### **Referencing Style**

• Harvard (author-date)

### Submission

Online

#### Learning Outcomes Assessed

- Analyse, using appropriate software tools, power system performance in both balanced and unbalanced modes of operation
- Understand the power flow problem along with the methods of solutions and appreciate the relevance of power flow studies in power system planning and operation
- Investigate and report the process of updating and maintaining power network assets in order so they meet safety, reliability, availability, security, and quality requirements for both present and future society needs
- Explain the difference between dynamic stability and transient stability and investigate tools that could be used to analyse the power system for voltage and power angle stability performance

## 3 PROJECT (GROUP SUBMISSION)

### Assessment Type

Written Assessment

### **Task Description**

This assessment item will address all learning outcomes of this unit and will contribute to 30% of the final marks of the unit.

Students will be formed into teams of no more than 3 members for this assessment item.

Each team will be assigned a power system modeling and simulation exercise related to power systems stability, fault calculations, load flow etc.

The project will be based on the free edition of PowerWorld Simulator. The free edition is a version of it specifically for the use of students in university units. In this unit, you will achieve a basic competency in the use of PowerWorld Simulator. Video tutorials on the use of this software and instructions on installation are available on Moodle and Youtube.

### Assessment Due Date

Week 12 Friday (9 Oct 2020) 11:45 pm AEST Submit to the link in Week 12 of the unit website in Moodle as a WORD or PDF file with the simulation files included

#### **Return Date to Students**

Exam Week Friday (23 Oct 2020) Feedback given through unit website in Moodle

## Weighting

30%

### Minimum mark or grade

The minimum mark to pass is 50% of the allocated mark for this exam.

### Assessment Criteria

**Objectives** 

This assessment item relates to ALL unit learning outcomes as stated.

### **Assessment Criteria**

Correct procedure and steps towards constructing necessary models using modeling and simulation exercise: 60% Correct answers and units: 30%

Professional presentation and layout of the report: 10%

#### **Referencing Style**

• Harvard (author-date)

### Submission

**Online Group** 

#### **Submission Instructions**

Submit as a pdf or Word document using the link provided on Moodle together with relevant simulation files

#### Learning Outcomes Assessed

- Discuss the difference between balanced and unbalanced operation of power systems
- Analyse, using appropriate software tools, power system performance in both balanced and unbalanced modes of operation
- Calculate fault currents and power flow in power systems and discuss the selection of appropriate protection schemes
- Understand the power flow problem along with the methods of solutions and appreciate the relevance of power flow studies in power system planning and operation
- Investigate and report the process of updating and maintaining power network assets in order so they meet safety, reliability, availability, security, and quality requirements for both present and future society needs
- Explain the difference between dynamic stability and transient stability and investigate tools that could be used to analyse the power system for voltage and power angle stability performance
- Communicate effectively using power systems terminology, symbols and diagrams adhering to Australian Standards and present design documents, solutions, and calculations professionally
- Work collaboratively and autonomously to solve problems and record and communicate clearly and professionally the approach used to solve problems.

#### **Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Team Work
- Ethical practice

## 4 Take home exam

### Assessment Type

Take Home Exam

### **Task Description**

- The students are to solve four problems on the associated power system analysis topics covering all the lectures and tutorials.
- The exam duration will be 150min.
- The take-home exam will be monitored through a Zoom session and students will have to provide written answers to the exam questions.
- The examination will be time scheduled and will take place for everyone at the same time.
- The examination date and time will be within the standard examination period for Term 2-2020.
- Each student stays home with a device (preferably a laptop) essentially having a camera through which the student will be invigilated in a Zoom session during the examination.
- The examination paper will be loaded to Moodle.
- The student uses blank A4 papers (single side) to write answers.
- At the end of the examination, each student first takes photos of all written pages and emails invigilator.
- Later students scan the pages and upload them to Moodle within a specified time at the end of the examination.

### Assessment Due Date

Review/Exam Week Tuesday (13 Oct 2020) 10:00 am AEST Examination will be time scheduled and will take place for everyone at the same time.

### Return Date to Students

Exam Week Friday (23 Oct 2020) Feedback given through unit website in Moodle

Weighting

35%

### Minimum mark or grade

The minimum mark to pass is 50% of the allocated mark for this exam.

#### Assessment Criteria

A total of 100 marks is allocated to this assessment. Students are assessed on the accuracy of calculated results and the correctness of the method used.

#### **Referencing Style**

• Harvard (author-date)

#### Submission

Online

#### Learning Outcomes Assessed

- Understand the power flow problem along with the methods of solutions and appreciate the relevance of power flow studies in power system planning and operation
- Investigate and report the process of updating and maintaining power network assets in order so they meet safety, reliability, availability, security, and quality requirements for both present and future society needs
- Explain the difference between dynamic stability and transient stability and investigate tools that could be used to analyse the power system for voltage and power angle stability performance
- Communicate effectively using power systems terminology, symbols and diagrams adhering to Australian Standards and present design documents, solutions, and calculations professionally
- Work collaboratively and autonomously to solve problems and record and communicate clearly and professionally the approach used to solve 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 <u>Academic Learning Centre (ALC)</u> can support you in becoming confident in completing assessments with integrity and of high standard.

#### What can you do to act with integrity?





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