



# ENEX12001 *Electrical Power and Machines*

## Term 2 - 2020

Profile information current as at 14/12/2025 04:56 am

All details in this unit profile for ENEX12001 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

In this unit you will model basic power system components and electrical machines using simplified linear equivalent circuits. You will explain the relationship between power and energy, and calculate power and energy in power networks and electrical machines. You will apply problem solving techniques in the analysis of balanced three-phase power circuits using per-unit methodology. You will also investigate and compare the construction and operational characteristics of direct current (DC) and alternating current (AC) electrical machines. You will explain different drive system topologies for the electrical machines. You will explain electrical machine protection and control schemes. Distance students are required to participate in the compulsory online Residential School.

#### 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

Prerequisite: (ENEG11009 Fundamentals of Energy and Electricity or PHYS11185 Engineering Physics B) AND MATH11218 Applied Mathematics

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 - 2020

- Mackay
- Mixed Mode

#### Attendance Requirements

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

#### Website

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

## Class and Assessment Overview

### Recommended Student Time Commitment

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

### Class Timetable

#### [Regional Campuses](#)

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

#### [Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

### Assessment Overview

#### 1. **Written Assessment**

Weighting: 20%

#### 2. **Online Quiz(zes)**

Weighting: 25%

#### 3. **Practical and Written Assessment**

Weighting: 25%

#### 4. **Take Home Exam**

Weighting: 30%

### 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 easiness of navigating in the Moodle of this unit.

##### **Recommendation**

This good practice will be continued.

#### Feedback from Unit evaluation

##### **Feedback**

Students found the resources provided in this unit supported their learning.

##### **Recommendation**

This good practice will be continued.

#### Feedback from Unit evaluation

##### **Feedback**

Students found the extra information provided in some of the lecture notes prevent them to completely understand the correlation between different unit materials.

##### **Recommendation**

Some unnecessary information in lecture materials will be removed or will be revised.

#### Feedback from Unit evaluation

##### **Feedback**

Students would like to receive more feedback and instruction on their assessment workings.

##### **Recommendation**

More instruction and feedback will be provided on the assessment markings in the next offering of this unit.

## Unit Learning Outcomes

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

1. Model basic power system components and machines using simplified linear equivalent circuits
2. Explain the relationship between power and energy; calculate power and energy in power networks and electrical machines
3. Compare and explain features of DC and AC electrical machines with regard to their construction and operational characteristics
4. Compare and explain features of drive systems, protection and control schemes for electric machines
5. Apply appropriate laboratory techniques and software tools to understand power systems and electrical machines
6. Create professional documentation of the solutions, designs and analysis processes using electrical terminology, diagrams and symbols that conform to Australian or International Standards
7. Work individually and collaboratively in a team to produce high quality outputs.

The learning outcomes are linked to Engineers Australia Stage 1 Competencies and also discipline capabilities. You can find the mapping for this on the [Engineering Undergraduate Course Website](#).

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



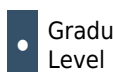
N/A  
Level



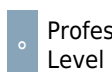
Introductory  
Level



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	7
1 - Written Assessment - 20%	•	•					•
2 - Online Quiz(zes) - 25%	•	•	•	•			
3 - Practical and Written Assessment - 25%					•	•	•
4 - Take Home Exam - 30%			•	•	•	•	

## Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes						
	1	2	3	4	5	6	7
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 Quiz(zes) - 25%	•	•	•	•						
3 - Practical and Written Assessment - 25%	•	•	•	•	•	•		•		
4 - Take Home Exam - 30%	•	•	•	•						

## Textbooks and Resources

### Textbooks

There are no required textbooks.

### 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

**Kianoush Emami** Unit Coordinator  
[k.emami@cqu.edu.au](mailto:k.emami@cqu.edu.au)

## Schedule

### Week 1 - 13 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Units and fundamentals of Electricity	Chapters 1 and 2	

### Week 2 - 20 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Fundamentals of Magnetism, Circuits and Mechanics	Chapters 2 and 3	

### Week 3 - 27 Jul 2020

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

### Week 4 - 03 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Transformers – Ideal to Practical	Chapters 9 and 10	<b>Online Quiz Part 1</b> opens Week 4 Monday (3 Aug 2020) 9:00 am AEST

### Week 5 - 10 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Special and Three Phase Transformers	Chapters 11 and 12	<b>Online Quiz Part 1</b> closes Week 5 Tuesday (11 Aug 2020) 11:45 pm AEST

### Vacation Week - 17 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 24 Aug 2020		
Module/Topic	Chapter	Events and Submissions/Topic
DC Machines	Chapters 4 and 5	
Week 7 - 31 Aug 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Induction Machines	Chapters 13 and 15	<b>Online Quiz Part 2</b> opens Week 7 Monday (31 Aug 2020) 9:00 am AEST
Week 8 - 07 Sep 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Induction Machines	Chapters 15 and 18	<b>Online Quiz Part 2</b> closes Week 8 Tuesday (8 Sep 2020) 11:45 pm AEST <b>Residential school</b> of this unit will be delivered online from 9 SEP - 11 SEP 2019.
Week 9 - 14 Sep 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Synchronous Machines	Chapters 16 and 17	
Week 10 - 21 Sep 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Synchronous Machines	Chapters 16 and 17	<b>Written Assessment</b> Due: Week 10 Friday (25 Sept 2020) 11:45 pm AEST
Week 11 - 28 Sep 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Fundamentals of Industrial Motor Control	Chapters 20 and 21	
Week 12 - 05 Oct 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Electronic Control of DC and AC Motors	Chapters 22 and 23	<b>Practical and Written Assessment</b> Due: Week 12 Friday (9 Oct 2020) 11:45 pm AEST
Review/Exam Week - 12 Oct 2020		
Module/Topic	Chapter	Events and Submissions/Topic
Exam Week - 19 Oct 2020		
Module/Topic	Chapter	Events and Submissions/Topic

## Assessment Tasks

### 1 Written Assessment

#### Assessment Type

Written Assessment

#### Task Description

This will include 6-8 problems from the content covered in weeks 1-9. Problems will be similar to the tutorial problems. The assignment will be uploaded to Unit Moodle site in the beginning of the term. This assessment item covers Learning Outcomes 1, 2, 3, 4, 6, 7.

In order to pass, students must score more than 50% out of the allocated marks for this assignment.

#### Assessment Due Date

Week 10 Friday (25 Sept 2020) 11:45 pm AEST

Submit to the link provided in unit Moodle site as a PDF/WORD file

**Return Date to Students**

Week 12 Friday (9 Oct 2020)

Feedback will be provided within 2 weeks

**Weighting**

20%

**Minimum mark or grade**

In order to pass, students must score more than 50% out of the allocated marks for this assignment.

**Assessment Criteria**

The assignments will be graded using the following criteria:

- Correct Answers and methods;
  - Correct format;
  - All working must be shown clearly;
  - Assignments must be neat, tidy and legible;
  - Attempt all questions.
- 15% - defining the problems properly, correct diagrams etc.  
35% - applying correct models formulae  
40% - correct steps  
10% - correct answers

**Referencing Style**

- [Harvard \(author-date\)](#)

**Submission**

Online

**Submission Instructions**

Submit to the link provided in unit Moodle site as a PDF/WORD file

**Learning Outcomes Assessed**

- Model basic power system components and machines using simplified linear equivalent circuits
- Explain the relationship between power and energy; calculate power and energy in power networks and electrical machines
- Work individually and collaboratively in a team to produce high quality outputs.

**Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

## 2 Online Quiz(zes)

**Assessment Type**

Online Quiz(zes)

**Task Description**

The quiz has two parts, Part 1 of this assessment will include short numerical and multi choice problems from content covered in weeks 1-3. Part 2 of this assessment will include short numerical and multi choice problems from content covered in weeks 4-6. This assessment item covers Learning outcomes 1, 2, 3, 4, 6, 7.

**Number of Quizzes**

2

**Frequency of Quizzes**

Other

**Assessment Due Date**

Complete the online test by going into the links provided in Week 04 and Week 07. Upload the scanned workings to the upload links provided in those respective weeks.

**Return Date to Students**

Feedback will be provided within 2 weeks.

**Weighting**

25%

**Assessment Criteria**

No Assessment Criteria

**Referencing Style**

- [Harvard \(author-date\)](#)

**Submission**

Online

**Submission Instructions**

Complete the online test by going into the links provided in Week 04 and Week 07.

**Learning Outcomes Assessed**

- Model basic power system components and machines using simplified linear equivalent circuits
- Explain the relationship between power and energy; calculate power and energy in power networks and electrical machines
- Compare and explain features of DC and AC electrical machines with regard to their construction and operational characteristics
- Compare and explain features of drive systems, protection and control schemes for electric machines

**Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

### 3 Practical and Written Assessment

**Assessment Type**

Practical and Written Assessment

**Task Description**

This assessment item relates to learning outcomes 1,2,3,4,5,6,7 of the unit as stated. 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. On-campus students will have scheduled 3-hour laboratory session per Week in the term and these will be conducted online through ZOOM in T2-2020 and attendance in those sessions is compulsory for all on-campus students. Please check the class time table for the information about the scheduled session.
2. All distance students must attend the compulsory residential school held through ZOOM in T2-2020. The dates for this residential school are the same as the residential school dates mentioned in the handbook
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 12 Friday (9 Oct 2020) 11:45 pm AEST

Upload to the Link provided in unit Moodle site as a PDF/WORD file.

**Return Date to Students**

Feedback will be available in 2 Weeks.

**Weighting**

25%

**Minimum mark or grade**

In order to pass, students must score more than 50% out of the allocated marks for this assignment.

**Assessment Criteria**

This assessment item relates to learning outcomes 1,2,3,4,5,6,7 of the unit as stated. This assessment task will be marked according to the active contribution of each student in the group work (if applicable) and the following criteria:



1. Correct procedure and steps towards collecting data from the experiments: 60%
2. Correct computations, answers and units: 20%
3. Proper use of reference 5%
4. Professional presentation and layout of the report: 15%

### Referencing Style

- [Harvard \(author-date\)](#)

### Submission

Online Group

### Submission Instructions

Upload to the Link provided in unit Moodle site as a PDF/WORD file.

### Learning Outcomes Assessed

- Apply appropriate laboratory techniques and software tools to understand power systems and electrical machines
- Create professional documentation of the solutions, designs and analysis processes using electrical terminology, diagrams and symbols that conform to Australian or International Standards
- Work individually and collaboratively in a team to produce high quality outputs.

### Graduate Attributes

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

## 4 Take Home Exam

### Assessment Type

Take Home Exam

### Task Description

The Take Home Exam is an individual assessment task conducted via the unit Moodle website and during the University examination period. The exam questions will be available in Moodle during the Take Home Exam period. The exam duration is three hours plus two additional hours for uploading and developing the answer sheet. The exam covers all contents of the unit from Week 1 to 12. Students are required to solve between 6 and 9 questions to demonstrate the theoretical knowledge they have learnt in this unit. Student must use blank A4 papers to write the answers and the final answer sheet must be submitted through the Take home Exam link in Moodle as a single pdf file.

In order to pass, students must score more than 50% out of the allocated marks for the Take Home Exam.

### Assessment Due Date

This will be held during examination week. The date and time of the examination will be notified later.

### Return Date to Students

Feedback will be available in 2 Weeks.

### Weighting

30%

### Minimum mark or grade

In order to pass, students must score more than 50% out of the allocated marks for this assignment.

### Assessment Criteria

Each question in the exam will be graded separately against the following criteria:

- Correct Answers and methods;
- Correct format;
- All working must be shown clearly;
- Assignments must be neat, tidy and legible;
- Attempt all questions.

15% - defining the problems properly, correct diagrams etc.

35% - applying correct models formulae

40% - correct steps

10% - correct answers

### **Referencing Style**

- [Harvard \(author-date\)](#)

### **Submission**

Online

### **Submission Instructions**

Upload to the Link provided in unit Moodle site as a PDF file.

### **Learning Outcomes Assessed**

- Compare and explain features of DC and AC electrical machines with regard to their construction and operational characteristics
- Compare and explain features of drive systems, protection and control schemes for electric machines
- Apply appropriate laboratory techniques and software tools to understand power systems and electrical machines
- Create professional documentation of the solutions, designs and analysis processes using electrical terminology, diagrams and symbols that conform to Australian or International Standards

### **Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

## 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