ENEE14007 *Electrical Machines and Drives Applications*

Term 2 - 2019

Profile information current as at 02/05/2024 08:25 am

General Information

Overview

In this project based learning unit, you will analyse and design systems and components that convert electrical energy into mechanical energy. You will investigate the construction and operational characteristics of various DC and AC electrical machines, analyse machine protection and control schemes and select and specify machines for particular applications. Furthermore, you will learn about components and materials for electrical machines, and use power electronics to optimise the performance of energy conversion. You are expected to learn and work individually and in teams to complete projects, to develop interpersonal and technical communication skills and to prepare professional documentation, including problem solutions, electrical designs and project reports. Distance education students are required to have access to a computer, to make frequent use of the Internet, and are required to participate in Residential School activities.

Details

Career Level: *Undergraduate*
Unit Level: *Level 4*
Credit Points: *12*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.25*

Pre-requisites or Co-requisites

Pre-requisite: (ENEG12004 Engineering Design & Management Planning OR ENEG12002 Engineering Design OR ENEG12007 Design & Project Management) AND 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 - 2019

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Mixed Mode
- Rockhampton

Attendance Requirements

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

Residential Schools

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

Website

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

Class and Assessment Overview

Recommended Student Time Commitment

Each 12-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 25 hours of study per week, making a total of 300 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: 15%
2. **Written Assessment**
Weighting: 15%
3. **Practical and Written Assessment**
Weighting: 15%
4. **Written Assessment**
Weighting: 40%
5. **Online Quiz(zes)**
Weighting: 15%

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 Student survey

Feedback

Students appreciated the lecture, workshop, project, assignment, quiz combination that supported their learning overall.

Recommendation

This good practice will be continued.

Feedback from Student survey

Feedback

Students also pointed out the need for the lectures and workshops to be more focused toward the assignment questions.

Recommendation

Links between class content and assignments will be strengthened.

Unit Learning Outcomes

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

1. Compare and explain features of DC and AC electrical machines
2. Design and justify innovative electrical drive systems for industrial applications
3. Apply protection and control schemes for electrical drives
4. Apply power electronic devices and circuits for optimising energy conversion in electrical drive system applications
5. Create professional documentation of the design, analysis process and solutions using electrical terminology, symbols and diagrams
6. Work collaboratively in a team to produce high quality outputs.

The learning outcomes are linked to Engineers Australia Stage 1 Competencies.

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 - 15%	•	•	•		•	
2 - Written Assessment - 15%	•	•	•		•	
3 - Practical and Written Assessment - 15%	•	•		•	•	•
4 - Written Assessment - 40%	•	•	•	•	•	•
5 - Online Quiz(zes) - 15%	•		•	•		

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 - 15%	•	•	•	•		•				
2 - Written Assessment - 15%	•	•	•	•		•				
3 - Practical and Written Assessment - 15%	•	•	•	•	•	•	•	•		
4 - Written Assessment - 40%	•	•	•	•	•	•	•	•		
5 - Online Quiz(zes) - 15%	•	•	•	•		•				

Textbooks and Resources

Textbooks

ENEE14007

Prescribed

Electrical machines, drives and power systems
6th edn - new international edition (2014)
Authors: Wildi, T
Pearson Education
Upper Saddle River , NJ , USA
Binding: Paperback

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

Kianoush Emami Unit Coordinator
k.emami@cqu.edu.au

Schedule

Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Fundamentals of Electrical Machines	Scan read Chapter 1, Chapter 2 and Chapter 3 as revision.	

Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
DC Machines	Chapter 4 and Chapter 5	

Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Induction (AC) Machines	Chapter 13, Chapter 14 and Chapter 18	**Online Quiz Part 1** opens Week 3 Monday (29 Jul 2019) 9:00 am AEST and closes Week 3 Sunday (4 Aug 2019) 11:45 pm AEST

Week 4 - 05 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Induction (AC) Machines	Chapter 13, Chapter 14 and Chapter 18	

Week 5 - 12 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Synchronous (AC) Machines	Chapter 16, Chapter 17	

Vacation Week - 19 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 26 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Synchronous (AC) Machines	Chapter 16, Chapter 17	**Online Quiz Part 2** opens Week 6 Monday (26 Aug 2019) 9:00 am AEST and closes Week 6 Sunday (1 Sep 2019) 11:45 pm AEST **Assignment 1** Due: Week 6 Monday (26 Aug 2019) 11:45 pm AEST

Week 7 - 02 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Fundamentals in Protection and Control of Electrical Machines	Chapter 20	**Residential school** of this unit will be held from 2 SEP - 4 SEP 2019 in Rockhampton B28/2.10.

Week 8 - 09 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Power Electronics and Power Converters	Chapter 21	

Week 9 - 16 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Electronic Control of DC machines	Chapter 22	**Online Quiz Part 3** opens Week 9 Monday (16 Sep 2019) 9:00 am AEST and closes Week 9 Sunday (22 Sep 2019) 11:45 pm AEST

Week 10 - 23 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Electronic Control of AC machines	Chapter 23	**Assignment 2** Due: Week 10 Friday (27 Sept 2019) 11:45 pm AEST

Week 11 - 30 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Unconventional and Special Machines	Chapter 19	**Laboratory/Residential School and Lab Reports** Due: Week 11 Friday (4 Oct 2019) 11:45 pm AEST

Week 12 - 07 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
Reflection and completion and submission of Team project report		**Online Quiz Part 4** opens Week 12 Monday (7 Oct 2019) 9:00 am AEST and closes Week 12 Sunday (13 Oct 2019) 11:45 pm AEST **Team Project** Due: Week 12 Friday (11 Oct 2019) 11:45 pm AEST

Review/Exam Week - 14 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
Reflection and completion of online quiz		

Exam Week - 21 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Assignment 1

Assessment Type
Written Assessment

Task Description
This compulsory assessment will have 6 - 8 numerical problems where students are expected to workout answers and present their working demonstrating logical steps of calculations. The questions will cover their learning during Weeks 01 till Week 05. The questions of this assignment will be published in Moodle site in the beginning of the term.

Assessment Due Date
Week 6 Monday (26 Aug 2019) 11:45 pm AEST
To be submitted as WORD or PDF file to course Website, one submission per student

Return Date to Students
Week 8 Monday (9 Sept 2019)
Feedback given through course website in Moodle

Weighting
15%

Minimum mark or grade
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 this assignment will be assessed separately for the criterion accuracy and correct results and given a mark from zero to 20 marks. 10% of the total marks for this assignment are based on accuracy and correct results, including:

- Correct application of maths and arithmetic
- Answers clearly identified
- Correct results

In addition, the assignment as a whole will be assessed against the following criteria:
Evidence of correct procedures (50% of the total marks for the assignment)

- All necessary steps in analysis are present on correct order
- Clear presentation of mathematical and arithmetical working linking given details of the problem to the results obtained.
- Evidence of checking results (mathematical, graphical, logic-common sense)

Evidence of understanding of the topic (30% of the total marks for the assignment)

- Explanation of choices made in the analysis (why is procedure required, why this particular procedure)
- Interpretation of results, eg limitations, direction of vectors

Professional presentation (10% of the total marks for the assignment)

- The work (job) is clearly identified (problem, date, analyst)
- Clear statement of each problem and its details and requirements
- Logical layout of analysis
- Appropriate use of diagrams, clear diagrams
- Correct use of terminology, conventions
- Clear English in the explanation of procedure and interpretation of results.

Referencing of authoritative sources of equations and data

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
To be submitted online through course website in Moodle

Learning Outcomes Assessed

- Compare and explain features of DC and AC electrical machines
- Design and justify innovative electrical drive systems for industrial applications
- Apply protection and control schemes for electrical drives
- Create professional documentation of the design, analysis process and solutions using electrical terminology, symbols and diagrams

Graduate Attributes

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

2 Assignment 2

Assessment Type
Written Assessment

Task Description
This compulsory assessment will have 6 - 8 numerical problems where students are expected to workout answers and present their working demonstrating logical steps of calculations. The questions will cover their learning during Weeks 06 till Week 10. The questions of this assignment will be published in Moodle site in the beginning of the term.

Assessment Due Date
Week 10 Friday (27 Sept 2019) 11:45 pm AEST
To be submitted as WORD or PDF file to course Website, one submission per student

Return Date to Students
Week 12 Friday (11 Oct 2019)
Feedback given through course website in Moodle

Weighting
15%

Minimum mark or grade
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 this assignment will be assessed separately for the criterion accuracy and correct results and given a mark from zero to 20 marks. 10% of the total marks for this assignment are based on accuracy and correct results, including:

- Correct application of maths and arithmetic
- Answers clearly identified
- Correct results

In addition, the assignment as a whole will be assessed against the following criteria:
Evidence of correct procedures (50% of the total marks for the assignment)

- All necessary steps in analysis are present on correct order
- Clear presentation of mathematical and arithmetical working linking given details of the problem to the results obtained.
- Evidence of checking results (mathematical, graphical, logic-common sense)

Evidence of understanding of the topic (30% of the total marks for the assignment)

- Explanation of choices made in the analysis (why is procedure required, why this particular procedure)

- Interpretation of results, eg limitations, direction of vectors

Professional presentation (10% of the total marks for the assignment)

- The work (job) is clearly identified (problem, date, analyst)
- Clear statement of each problem and its details and requirements
- Logical layout of analysis
- Appropriate use of diagrams, clear diagrams
- Correct use of terminology, conventions
- Clear English in the explanation of procedure and interpretation of results.
- Referencing of authoritative sources of equations and data

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
To be submitted online through course website in Moodle

Learning Outcomes Assessed

- Compare and explain features of DC and AC electrical machines
- Design and justify innovative electrical drive systems for industrial applications
- Apply protection and control schemes for electrical drives
- Create professional documentation of the design, analysis process and solutions using electrical terminology, symbols and diagrams

Graduate Attributes

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

3 Laboratory/Residential School and Lab Reports

Assessment Type
Practical and Written Assessment

Task Description
This compulsory assessment item covers the laboratory experiment component of the unit. On-campus students will carry out the experiments during laboratory experiment sessions scheduled each week (attendance is compulsory) while the distance students are supposed to attend a compulsory residential school. Students will be formed into teams and each team must submit separate professional technical laboratory reports on each experiment. The details of the experiments will be notified to students through the course Website. Please also refer to assessment criteria for more details.

Assessment Due Date
Week 11 Friday (4 Oct 2019) 11:45 pm AEST
Submit to the link in the course website in Moodle as a WORD or PDF file. one submission per student

Return Date to Students
Week 12 Friday (11 Oct 2019)
Feedback given through course website in Moodle

Weighting
15%

Minimum mark or grade
Minimum mark or grade - In order to pass, students must score more than 50% out of the allocated marks for this assignment

Assessment Criteria
Marking of the team reports will be done according to the following criteria.

- The accuracy and relevance of information
- Application of knowledge
- Language and grammar used in answering questions
- Proper referencing of sources of information
- Inclusion of all relevant Equations, images, data and tables, and the quality of presentation and layout.
- The marking scheme will be published in Moodle site together with Laboratory instruction sheets.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit to the link in the course website in Moodle as a WORD or PDF file.

Learning Outcomes Assessed

- Compare and explain features of DC and AC electrical machines
- Design and justify innovative electrical drive systems for industrial applications
- Apply power electronic devices and circuits for optimising energy conversion in electrical drive system applications
- Create professional documentation of the design, analysis process and solutions using electrical terminology, symbols and diagrams
- Work collaboratively in a team to produce high quality outputs.

Graduate Attributes

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

4 Team Project

Assessment Type
Written Assessment

Task Description
This compulsory assessment item is the project component of the unit. Students will carry out this in teams. Complete details of an Electrical machines and drive system design project will be provided in unit Moodle site in the beginning of the term. Students will be carrying out the project in teams through out the term and submit a professionally done team report. The project is carried out by the teams like a team of electrical engineering consulting engineers. It requires the student teams to submit an expression of interest before a specified deadline communicated to the students through Moodle site at the early stages of the term. Afterwards, the teams are supposed to attend a debriefing meeting in the mid-way of the project execution. Final reports that must be prepared as one submission per team are expected before the deadline specified below.

Assessment Due Date
Week 12 Friday (11 Oct 2019) 11:45 pm AEST
Submit to the link in the course website in Moodle as a WORD or PDF file. one submission per student

Return Date to Students

Feedback given through course website in Moodle after 2 weeks from the submission deadline

Weighting
40%

Minimum mark or grade
Minimum mark or grade - In order to pass, students must score more than 50% out of the allocated marks for this assignment

Assessment Criteria
Marks for the project will be given based on the quality of each project activity; i.e. Expression of interest, debriefing

meeting, project report. The marking schemes for each of those will be published in the Moodle site.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit to the link in the course website in Moodle as a WORD or PDF file.

Learning Outcomes Assessed

- Compare and explain features of DC and AC electrical machines
- Design and justify innovative electrical drive systems for industrial applications
- Apply protection and control schemes for electrical drives
- Apply power electronic devices and circuits for optimising energy conversion in electrical drive system applications
- Create professional documentation of the design, analysis process and solutions using electrical terminology, symbols and diagrams
- Work collaboratively in a team to produce high quality outputs.

Graduate Attributes

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

5 Online Quiz

Assessment Type
Online Quiz(zes)

Task Description
The On-line Quiz (with several Multiple Choice Questions - MCQs) will generally be in the form of problems that require simple calculations to find the correct answer. Students are expected to work individually.
To ensure continuous engagement of the students with the learning of this unit, the quiz has been separated to 4 parts and distributed over the 12 week term as indicated in the unit schedule. Each part of the quiz will cover 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 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 for the students through Moodle site. Marks of all 4 parts of the quiz will be added and scaled to a score out of 15 to be added to the unit total.
Students are expected to submit the working for the questions through submission links provided in Moodle site for each of the quarterly quizzes.

Number of Quizzes
4

Frequency of Quizzes

Assessment Due Date

Please see the weekly schedule for information about due dates for the 4 quizes

Return Date to Students

Students will know their marks immediately after completing each quiz.

Weighting
15%

Minimum mark or grade
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 quiz will be setup as 4 parts distributed over the 12 week term as below:
Part 1 - Open during Week 3
Part 2 - Open during Week 6
Part 3 - Open during Week 9
Part 4 - Open during Week 12
Each correct answer to a question will carry 1 mark. Marks of all 4 parts of the quiz will be added and scaled to a score out of 15 to be added to the unit total.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Complete the online quiz through the links provided in Moodle site.

Learning Outcomes Assessed

- Compare and explain features of DC and AC electrical machines
- Apply protection and control schemes for electrical drives
- Apply power electronic devices and circuits for optimising energy conversion in electrical drive system applications

Graduate Attributes

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

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