ENEM20002 *Fluid Power Engineering and Control*
Term 2 - 2020

Profile information current as at 01/07/2022 02:10 pm

General Information

Overview
This project-based unit is about designing fluid power systems for automated and semiautomated industrial plants. This unit deals with exploring fluid power elements and their ISO standard symbols, designing fluid power circuits using actuators, directional control, and other valves, sensors, and control systems. Control technology may include both hydraulic and pneumatic systems integrated with programmable controllers (PLCs and micro-controllers). In small teams, you will undertake project work involving solving real-life industrial problems. There are also several laboratory experiments in areas of hydraulic and pneumatic operating system design and control circuit design integrated with PLCs for automated machines. You will use simulation software (SimScape and/or FluidSim) for confirming the functionality of designed projects prior to prototyping. You will communicate professionally using discipline-specific terminology to present designs and problem solutions. Students enrolled in online mode must attend a compulsory residential school to facilitate peer collaboration and attainment of the unit learning outcomes.

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

Pre-requisites or Co-requisites
There are no requisites for this unit.
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

- Melbourne
- Perth
- 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 Postgraduate 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: 20%
2. **Written Assessment**
Weighting: 20%
3. **Laboratory/Practical**
Weighting: 20%
4. **Online Quiz(zes)**
Weighting: 40%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the University's Grades and Results Policy for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the CQUniversity Policy site.
You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

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

Previous Student Feedback

Feedback, Recommendations and Responses

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

Feedback from Students

Feedback
PLC programming training would be more fruitful if it was done before study break week.

Recommendation
Recommended to organise PLC program training earlier rather than at the end of the term. Earlier communication with OMRON Electronics can help to get a PLC expert for guest lecture delivery.

Feedback from Student

Feedback
Pneumatic control integrated with PLCs was a good experience.

Recommendation
It is recommended to continue with the developed structure of the unit (fluid power, pneumatics, and PLCs together). This may help students graduate with job-ready skills in industrial automation and production.

Feedback from Student

Feedback
Fluid power simulation with SimScape was very helpful.

Recommendation
Continue teaching simulation of fluid power circuits using SimScape and FluidSim facing the current challenges of industry automation.

Feedback from Unit Coordinator

Feedback
Exam (replacing quiz) is essential

Recommendation
In the post-COVID period, an exam carrying 40% value should be introduced. This will improve the quality of assessment of students' knowledge and skills.

Unit Learning Outcomes

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

1. Design complex fluid drives and analyse their performance
2. Evaluate advanced applications of drive systems in industrial plants
3. Design fluid control circuits integrated with programmable controllers for automated machine systems
4. Design and analyse electro-mechanical and fluid control power and energy conversion systems
5. Design protection and control systems for fluid power machines
6. Analyse electro-mechanical power and energy conversion
7. Create professional documentation using terminology, symbols and diagrams related to electric and fluid drives.

The learning outcomes are linked to Engineers Australia Stage 1 Competency Standard and Australian Qualification Framework (AQF) 9 Level.

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 - Written Assessment - 20%			•		•	•	
3 - Laboratory/Practical - 20%		•	•	•			•
4 - Online Quiz(zes) - 40%	•			•	•	•	

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes						
	1	2	3	4	5	6	7
1 - Knowledge	○	○			○		
2 - Communication						○	○
3 - Cognitive, technical and creative skills		○	○	○			○
4 - Research					○		
5 - Self-management						○	
6 - Ethical and Professional Responsibility							
7 - Leadership							
8 - 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
1 - Written Assessment - 20%	○	○	○	○	○			
2 - Written Assessment - 20%	○		○	○				
3 - Laboratory/Practical - 20%		○				○		
4 - Online Quiz(zes) - 40%	○		○					

Textbooks and Resources

Textbooks

ENEM20002

Prescribed

Fluid Power with Applications
Authors: Anthony Esposito
Pearson
Essex , UK , UK
ISBN: 13:978-1-292-02387-8
Binding: Paperback

Additional Textbook Information
If you prefer to study with a paper copy, they are available at the CQUni Bookshop here: http://bookshop.cqu.edu.au (search on the Unit code). eBooks are available at the publisher's website.

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

Nirmal Mandal Unit Coordinator
n.mandal@cqu.edu.au

Schedule

Week 1 - 13 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Introduction to Fluid Power Tute: Four tute problems will be solved Workshop: Project 1 scope of hydraulic power systems will be introduced. Team building activities will be finished.	Chapter 1~4 of Esposito	

Week 2 - 20 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic Pumps Tute: Four tute problems will be solved Workshop: For project 1, the progress of it will be monitored and recorded using meeting minutes, 4-square charts, agenda items, and weekly planning documents.	Chapter 5 of Esposito	

Week 3 - 27 Jul 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic motor (rotary actuators) Tute: Four tute problems will be solved Workshop: For project 1, the progress of it will be monitored and recorded using meeting minutes, 4-square charts, agenda items, and weekly planning documents.	Chapter 7 of Esposito	

Week 4 - 03 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic Cylinders (linear actuators), Cushioning and shock absorbers Tute: Four tute problems will be solved Workshop: For project 1, the progress of it will be monitored and recorded using meeting minutes, 4-square charts, agenda items, and weekly planning documents.	Chapter 6 of Esposito	

Week 5 - 10 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic valves and controls Tute: Four tute problems will be solved Workshop: For project 1, the progress of it will be monitored and recorded using meeting minutes, 4-square charts, agenda items, and weekly planning documents.	Chapter 8, 16 of Esposito	

Vacation Week - 17 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
No activities		

Week 6 - 24 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic Circuit Design and Analysis Tute: Four tute problems will be solved Workshop: Project 1 progress formal presentation in the workshop section and getting ready to submit the team project on Friday, Week 6 in the submission link set in Moodle.	Chapter 9 of Esposito	**Assignment 1 (Project 1)** Due: Week 6 Friday (28 Aug 2020) 11:45 pm AEST

Week 7 - 31 Aug 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic Accumulators and receivers Tute: Four tute problems will be solved Workshop: For project 2, the progress scopes delivered	Chapter 11 of Esposito	

Week 8 - 07 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic

Lecture: Hydraulic Conductors and fittings Tute: Four tute problems will be solved Workshop: For project 2, the progress of it will be monitored and recorded using meeting minutes, 4-square charts, agenda items, and weekly planning documents.	Chapter 10 of Esposito	

Week 9 - 14 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Pneumatics: components - compressors, circuits, and applications Tute: Four tute problems will be solved Workshop: For project 2, the progress of it will be monitored and recorded using meeting minutes, 4-square charts, agenda items, and weekly planning documents.	Chapter 13, 14 of Esposito	

Week 10 - 21 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Electrical Machines and controls Tute: no tute Workshop: For project 2, the progress of it will be monitored and recorded using meeting minutes, 4-square charts, agenda items, and weekly planning documents	Chapter 15, 17 of Esposito, Lecture notes	**Assignment 3 (Laboratory Experiments and Report Submission)** Due: Week 10 Friday (25 Sept 2020) 11:45 pm AEST

Week 11 - 28 Sep 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Maintenance of Hydraulic Systems Tute: Four tute problems will be solved Workshop: For project 2, the progress of it will be monitored and recorded using meeting minutes, 4-square charts, agenda items, and weekly planning documents.	Chapter 12 of Esposito	An online quiz will be held in Week 11 Workshop time. The total time is 2 hours.

Week 12 - 05 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Review of the unit Tute: no tute Workshop: Project 2 formal progress presentation in the workshop section and getting ready to submit the team project on Friday, Week 12 in the submission link set in Moodle.	Chapter covered	

Review/Exam Week - 12 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic
		Assignment 2 (Project 2) Due: Review/Exam Week Monday (12 Oct 2020) 11:45 pm AEST

Exam Week - 19 Oct 2020

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

The delivery of this unit will be fully online. Students are connected by Zoons.

Assessment Tasks

1 Assignment 1 (Project 1)

Assessment Type
Written Assessment

Task Description
Assignment 1 is a team project. It focuses on the content of the unit covered in week 1 to week 6. The scope of Assignment 1 will be populated in the unit Moodle before term starts and will be discussed in the week 1 workshop session. It is a team submission. A team project presentation of this project will be held on Week 6 in Workshop time and venue.
It is a compulsory team submission.

Assessment Due Date
Week 6 Friday (28 Aug 2020) 11:45 pm AEST
AEST

Return Date to Students
Week 8 Friday (11 Sept 2020)
After two weeks of submission date

Weighting
20%

Minimum mark or grade
50%

Assessment Criteria
This team-based project will be assessed considering both technical and professional aspects. The technical aspects cover a wide range of applications of design and analysis of a hydraulic system, comparison and safety checking of the new design using proper engineering procedures. The professional skills cover a higher level of teamwork, leadership, research, and communication skills. Students should refer to the Unit Moodle site for team project report assessment criteria and individual marking criteria of the team-based projects. A detailed description of both marking schemes will be provided in the Moodle site on time. It is based on some factors such as Team Charter and/or peer assessments.

Referencing Style

- Harvard (author-date)

Submission
Online Group

Submission Instructions
Students can scan their handwritten calculations for online submission

Learning Outcomes Assessed

- Design complex fluid drives and analyse their performance
- Evaluate advanced applications of drive systems in industrial plants
- Create professional documentation using terminology, symbols and diagrams related to electric and fluid drives.

Graduate Attributes

- Knowledge
- Communication
- Cognitive, technical and creative skills
- Research
- Self-management

2 Assignment 2 (Project 2)

Assessment Type
Written Assessment

Task Description
Assignment 2 is a team project. It focuses on the content of the unit covered in week 1 to week 12. The scope of Assignment 2 will be populated in the unit Moodle in Week 7 and will be discussed in the week 7 workshop session. It is a team submission. A team project presentation of this project will be held on Week 12 in Workshop time and venue.
It is a compulsory team submission

Assessment Due Date
Review/Exam Week Monday (12 Oct 2020) 11:45 pm AEST
AEST

Return Date to Students
Exam Week Friday (23 Oct 2020)
After two weeks of submission

Weighting
20%

Minimum mark or grade
50%

Assessment Criteria
This team-based project will be assessed considering both technical and professional aspects. The technical aspects cover a wide range of applications of design and analysis of a fluid powered system, comparison and safety checking of the new design using proper engineering procedures. The professional skills cover a higher level of teamwork, leadership, research and communication skills. Students should refer to the Unit Moodle site for team project report assessment criteria and individual marking criteria of the team-based projects. A detailed description of both marking schemes will be provided in the Moodle site on time. It is based on some factors such as Team Charter and/or peer assessments.

Referencing Style

- Harvard (author-date)

Submission
Online Group

Submission Instructions
Students can scan their handwritten calculations for online submission

Learning Outcomes Assessed

- Design fluid control circuits integrated with programmable controllers for automated machine systems
- Design protection and control systems for fluid power machines
- Analyse electro-mechanical power and energy conversion

Graduate Attributes

- Knowledge
- Cognitive, technical and creative skills
- Research

3 Assignment 3 (Laboratory Experiments and Report Submission)

Assessment Type
Laboratory/Practical

Task Description
It is based on the content covered in Hydraulic Test rig experiments. It is a team submission. For any change of date and time, the students will be notified before in the Moodle site. Pl. see the information in the Moodle site regularly.
It is a compulsory team submission.

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

Return Date to Students
Week 12 Friday (9 Oct 2020)
After two weeks of submission date

Weighting
20%

Minimum mark or grade
50%

Assessment Criteria
Assessment criteria are based on detailed calculations and presentations of data obtained in the hydraulic test rig experiments. It is based on accuracy in calculations, validation of results obtained by a proper interpretation of results. It is also based on the way how students are putting symbols and hydraulic diagrams to present the sequence of operations in the experiments. No team charter approach or any other marking schemes are considered for individual student marking. All students on a team will get the same marks as that of the team lab report. A detailed description of the marking scheme for lab report marking will be provided in the Moodle site on time.

Referencing Style

- Harvard (author-date)

Submission
Online Group

Submission Instructions
Students can scan their handwritten calculations for online submission

Learning Outcomes Assessed

- Evaluate advanced applications of drive systems in industrial plants
- Design fluid control circuits integrated with programmable controllers for automated machine systems
- Design and analyse electro-mechanical and fluid control power and energy conversion systems
- Create professional documentation using terminology, symbols and diagrams related to electric and fluid drives.

Graduate Attributes

- Communication
- Ethical and Professional Responsibility

4 Online Quiz

Assessment Type
Online Quiz(zes)

Task Description
This is an individual online quiz that will be held in Week 11 during workshop time. The duration will be 2 hours. A zoom link for this quiz will be set to carry out this quiz.
It is a compulsory individual assessment item.

Number of Quizzes
1

Frequency of Quizzes
Other

Assessment Due Date

It is in Week 11 workshop time

Return Date to Students
Week 12 Friday (9 Oct 2020)
Automatic

Weighting
40%

Minimum mark or grade
50%

Assessment Criteria
Assessment criteria are based on the choice of selecting the right answers from multiple answers. There will be one right answer. Finding the right answers needs detailed technical calculations, knowledge of unit content, and interpretations of data, graph and concepts.

Referencing Style

- Harvard (author-date)

Submission
No submission method provided.

Submission Instructions
online

Learning Outcomes Assessed

- Design complex fluid drives and analyse their performance
- Design and analyse electro-mechanical and fluid control power and energy conversion systems
- Design protection and control systems for fluid power machines
- Analyse electro-mechanical power and energy conversion

Graduate Attributes

- Knowledge
- Cognitive, technical and creative skills

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