



# ENEM13019 Fluid Machinery

## Term 1 - 2024

Profile information current as at 29/07/2024 03:53 pm

All details in this unit profile for ENEM13019 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

This project-based unit will introduce you to fluid drive systems and the design and control of integrated drive systems for use in industries. It covers comparison of characteristics, construction, selection, design and operation of fluid drives and control systems; use of mathematical models to analyse performance; machine protection and control schemes; and evaluation of drive system performance. You will apply formulas and explain and record calculations. You will adopt professional approaches to work in teams and learn collaboratively to manage and complete projects. You will manage your own learning; investigate, design and check designed works performed; and communicate professionally using discipline language to present designs and problem solutions. 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 3*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

### Pre-requisites or Co-requisites

Pre-requisites: ENEM12006 Fluid Mechanics and ENEM12010 Engineering Dynamics

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 1 - 2024

- 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 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. **Written Assessment**

Weighting: 20%

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

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 Student feedback

**Feedback**

Industry project loads are high

**Recommendation**

The scope of the projects should be reduced in the next offering.

#### Feedback from Unit coordinator's reflection

**Feedback**

Practicing the concept of team dynamics in projects can help to form good teams

**Recommendation**

The practice should be continued in the next offering.

#### Feedback from Unit coordinator's reflection

**Feedback**

The wording of some Lecture slides needs improving

**Recommendation**

The lecture slides should be improved in the next offering.

## Unit Learning Outcomes

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

1. Design and analyse the fluid drives using mathematical modeling
2. Evaluate the characteristics of different drive systems with regard to the application
3. Design protection and control systems
4. Analyse electro-mechanical power and energy conversion systems
5. Evaluate methods to improve energy efficiency
6. Create professional documentation using terminology, symbols and diagrams related to electric and fluid drives.

The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:

**Intermediate 1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 1I 2I 3I 4I 6I ) 2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 1I 2I 3I 4I 5N 6I )**

**Advanced 1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1A 2A 3I 4I 5N 6I ) 1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1A 2A 3I 4I 5I 6A ) 1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1A 2A 3A 4I 5N 6A ) 1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1I 2A 3I 4A 5N 6A ) 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 1A 2A 3I 4I 6I ) 2.1 Application of established engineering methods to complex engineering problem solving. (LO: 1A 2A 3I 4I 6A ) 2.2 Fluent application of engineering techniques, tools and resources. (LO: 1I 2A 3I 4I 5N 6I ) 2.3 Application of systematic engineering synthesis and design processes. (LO: 1A 2A 3I 4I 5N 6A ) 3.2 Effective oral and written communication in professional and lay domains. (LO: 1A 2A 3A 4A 6A ) 3.3 Creative, innovative and pro-active demeanour. (LO: 1I 2I 3I 4I 5N 6A ) 3.4 Professional use and management of information. (LO: 1A 2A 3A 4A 6A ) 3.5 Orderly management of self, and professional conduct. (LO: 1A 2A 3A 4A 6A ) 3.6 Effective team membership and team leadership. (LO: 1I 2A 3I 4I 6A )**

*Note: LO refers to the Learning Outcome number(s) which link to the competency and the levels: N - Introductory, I - Intermediate and A - Advanced.*

Refer to the Engineering Undergraduate Course Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping information <https://moodle.cqu.edu.au/course/view.php?id=1511>

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
<b>1 - Written Assessment - 20%</b>	•	•		•	•	•
<b>2 - Written Assessment - 20%</b>	•	•		•	•	
<b>3 - Practical and Written Assessment - 20%</b>			•			•

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
4 - Online Quiz(zes) - 40%			•			

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
1 - Communication		•	•	•		•
2 - Problem Solving	•		•	•		
3 - Critical Thinking	•	•	•	•		
4 - Information Literacy				•	•	
5 - Team Work	•	•	•	•	•	•
6 - Information Technology Competence		•	•			•
7 - Cross Cultural Competence						
8 - Ethical practice						•
9 - Social Innovation						
10 - 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 - Written Assessment - 20%	•	•	•	•	•	•		•		
3 - Practical and Written Assessment - 20%	•	•	•	•	•	•				
4 - Online Quiz(zes) - 40%		•	•	•						

## Textbooks and Resources

### Textbooks

ENEM13019

#### Prescribed

#### Fluid Power with Applications

Edition: 7th (2014)

Authors: Esposito

Pearson

Essex , Essex , UK

ISBN: 978-1-292-02387-8

Binding: Hardcover

[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](mailto:n.mandal@cqu.edu.au)

## Schedule

### Week 1 - 04 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Introduction to Fluid Power Tutorial: Four tute problems will be solved & demonstration of SimScape software, Project 1 scope of hydraulic power systems will be introduced. Team building activities will be finished.	Chapters 1~4 of Esposito	

### Week 2 - 11 Mar 2024

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic Pumps Tutorial: Four tute problems will be solved & SimScape Library tutorials, 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 - 18 Mar 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic motors Tutorial: Four tute problems will be solved and SimScape tutorials, 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 - 25 Mar 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic Cylinders, Cushioning and shock absorbers Tutorial: Four tute problems will be solved and SimScape tutorials, 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 - 01 Apr 2024**

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

**Vacation Week - 08 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Teaching free week	N/A	

**Week 6 - 15 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic Circuit Design and Analysis Tutorial: Four tute problems will be solved, For project 1, team presentation.	Chapter 9 of Esposito	<b>Project 1</b> Due: Week 6 Friday (19 Apr 2024) 11:45 pm AEST

**Week 7 - 22 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Hydraulic Accumulators and receivers, further controls of fluid power systems Tutorial: Four tute problems will be solved, Project 2 scope of fluid power systems will be introduced. The same Team will be employed if it is ok	Chapters 11, 15, 16 of Esposito	

**Week 8 - 29 Apr 2024**

Module/Topic	Chapter	Events and Submissions/Topic

Lecture: Hydraulic Conductors and fittings  
 Tutorial: Four tute problems will be solved, 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 - 06 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Pneumatics: components - compressors, circuits, and applications Tutorial: Four tute problems will be solved, For project 2, the progress of it will be monitored and recorded using meeting minutes, 4-square charts, agenda items, and weekly planning documents	Chapters 13, 14 of Esposito	<b>Laboratory Team Report</b> Due: Week 9 Friday (10 May 2024) 11:45 pm AEST

### Week 10 - 13 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Electrical Machines and controls by guest lecturers Tutorial: For project 2, the progress of it will be monitored and recorded using meeting minutes, 4-square charts, agenda items, and weekly planning documents	Chapters 15, 17 of Esposito, lecture notes	

### Week 11 - 20 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Maintenance of Hydraulic System Tutorial: An online quiz will be held	Chapter 12 of Esposito	<b>Online Test</b> Due: Week 11 Friday (24 May 2024) 3:00 pm AEST

### Week 12 - 27 May 2024

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Review of the unit Tutorial: 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 the Moodle.	Chapters: all	<b>Project 2</b> Due: Week 12 Friday (31 May 2024) 11:45 pm AEST

### Review/Exam Week - 03 Jun 2024

Module/Topic	Chapter	Events and Submissions/Topic

### Exam Week - 10 Jun 2024

Module/Topic	Chapter	Events and Submissions/Topic

## Assessment Tasks

### 1 Project 1

**Assessment Type**  
 Written Assessment



**Task Description**

Project 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 tutorial session. It is a team submission. A team project presentation of this project will be held on Week 6 in tutorial time and venue.

**Assessment Due Date**

Week 6 Friday (19 Apr 2024) 11:45 pm AEST  
Compulsory team submission

**Return Date to Students**

Week 8 Friday (3 May 2024)  
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

**Submission Instructions**

Students can scan their handwritten calculations for online submission

**Learning Outcomes Assessed**

- Design and analyse the fluid drives using mathematical modeling
- Evaluate the characteristics of different drive systems with regard to the application
- Analyse electro-mechanical power and energy conversion systems
- Evaluate methods to improve energy efficiency
- Create professional documentation using terminology, symbols and diagrams related to electric and fluid drives.

**Graduate Attributes**

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

## 2 Project 2

**Assessment Type**

Written Assessment

**Task Description**

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

**Assessment Due Date**

Week 12 Friday (31 May 2024) 11:45 pm AEST  
Compulsory team submission

**Return Date to Students**

Exam Week Friday (14 June 2024)  
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 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

**Submission Instructions**

Students can scan their handwritten calculations for online submission

**Learning Outcomes Assessed**

- Design and analyse the fluid drives using mathematical modeling
- Evaluate the characteristics of different drive systems with regard to the application
- Analyse electro-mechanical power and energy conversion systems
- Evaluate methods to improve energy efficiency

**Graduate Attributes**

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

## 3 Laboratory Team Report

**Assessment Type**

Practical and Written Assessment

**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.

**Assessment Due Date**

Week 9 Friday (10 May 2024) 11:45 pm AEST  
Compulsory Team submission

**Return Date to Students**

Week 11 Friday (24 May 2024)  
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, and validation of results obtained by properly interpreting 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 other marking schemes are considered for individual student marking. All students on a team will get the same marks as those on the team lab report. A detailed description of the marking scheme for lab report marking will be provided on the Moodle site on time.

### Referencing Style

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

### Submission

Online

### Submission Instructions

Students can scan their handwritten calculations for online submission

### Learning Outcomes Assessed

- Design protection and control systems
- Create professional documentation using terminology, symbols and diagrams related to electric and fluid drives.

### Graduate Attributes

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

## 4 Online Test

### Assessment Type

Online Quiz(zes)

### Task Description

This is an invigilated individual online class test that will be held in Week 11 of this unit during tutorial time. The duration will be 2.5 hours. The detailed description and important information relating to this individual online test will be populated on the unit Moodle site.

### Number of Quizzes

1

### Frequency of Quizzes

Other

### Assessment Due Date

Week 11 Friday (24 May 2024) 3:00 pm AEST

Due date and time is based on the tutorial time of this unit set by the timetable team. It will be held in Week 11. Information on it will be populated in Moodle site and weekly e-mails.

### Return Date to Students

Review/Exam Week Friday (7 June 2024)

After a few days or the selected day stated above

### Weighting

40%

### Minimum mark or grade

40%

### Assessment Criteria

You have to employ your technical knowledge and problem-solving skills to answer the questions. There are yes/no, multiple-choice questions. You have to get answers to some questions by proper calculations focusing on units of parameters. For a right answer, you will get 1 (one) and for a wrong answer, you will get a 0 (zero).

### Referencing Style

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

### Submission

Online

**Submission Instructions**

an automatic submission when it is done.

**Learning Outcomes Assessed**

- Design protection and control systems

**Graduate Attributes**

- 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