



ENEM14014 Capstone Thermofluid Engineering

Term 1 - 2019

Profile information current as at 14/12/2025 12:27 pm

All details in this unit profile for ENEM14014 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 unit provides you with opportunities to develop and demonstrate your professional capabilities in the field of thermofluid engineering. You will analyse, explain and evaluate the performance of air-conditioning and refrigeration plant; and mass, heat and energy transfer processes in industrial plant and processes. You will describe types and characteristics of fluid machinery, apply the theory of energy transfer to its operation, and analyse complex fluid flows using computational methods. You will then apply discipline theories and methods to design, implementation, operation and maintenance of industrial mechanical systems. You are required to show you can work both individually and collaboratively, to solve problems, and document and communicate their work clearly in a professional manner. Distance Education students will be required to attend a compulsory residential school to promote development of unit learning outcomes.

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

[ENEM13014 Thermodynamics or ENEM12003 Thermodynamics] and ENEM12006 Fluid Mechanics [or ENEM12001 Fluid Mechanics]

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 - 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).

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. **Presentation and Written Assessment**

Weighting: 20%

2. **Presentation and Written Assessment**

Weighting: 25%

3. **In-class Test(s)**

Weighting: 35%

4. **Practical and Written Assessment**

Weighting: 20%

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 Have your say

Feedback

Students at Rockhampton campus felt that staff support was not adequate for them as the lecturer moved to the Melbourne campus.

Recommendation

Adequate staff support will be employed at Rockhampton and other campuses as needed.

Unit Learning Outcomes

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

1. Analyse, explain and evaluate performance characteristics and determine load on air conditioning and refrigeration plants
2. Analyse, explain and evaluate mass, energy and heat transfer processes in industrial plant and components, and industrial processes
3. Describe types and characteristics fluid machinery and apply and explain the theory of energy transfer to its operation in engineering applications
4. Explain and analyse complex flows and computational fluid dynamics methods in such flows.
5. Apply discipline theories and methods to the problems of designing, implementing, operating and maintaining mechanical systems in industrial contexts
6. Communicate professionally and provide evidence of personal reflection on, and critical assessment of, team contributions and professional development, and development of technical competence in thermofluid engineering
7. Reflect upon, formulate and solve problems and record and communicate professionally the approach used to resolve problems and the reasons for adopting such approaches to problems

NA

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	7
1 - Presentation and Written Assessment - 25%	•	•		•	•	•	•
2 - Presentation and Written Assessment - 20%			•		•	•	•
3 - Practical and Written Assessment - 20%	•	•	•	•	•	•	
4 - In-class Test(s) - 35%	•	•	•	•	•		•

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 - Presentation and Written Assessment - 25%	•	•	•	•	•	•		•		
2 - Presentation and Written Assessment - 20%	•	•	•	•	•	•		•		
3 - Practical and Written Assessment - 20%	•	•	•	•	•			•		
4 - In-class Test(s) - 35%	•	•	•					•		

Textbooks and Resources

Textbooks

ENEM14014

Prescribed

Munson's Fluid Mechanics

8th Global Edition (2017)

Authors: P. M. Gerhart, A. L. Gerhart, J.I. Hochstein

John Wiley & Sons

Singapore , Singapore

ISBN: 978-1-119-24898-9

Binding: Hardcover

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Prescribed

Refrigeration and Air Conditioning

2nd Edition (1982)

Authors: Stoecker, Wilbert and Jones, Jerold

McGraw Hill Book Co

Singapore , Singapore

ISBN: 0-07-066591-5

Binding: Hardcover

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Supplementary

Applied Thermodynamics for Engineering Technologists

5th Edition (1993)

Authors: Eastop/McConkey

Pearson

England

ISBN: 978-0-582-09193-1

Binding: Hardcover

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Supplementary

Elementary Fluid Mechanics

7th Edition (1996)

Authors: Street, Watters and Vennard

John Wiley & Sons

USA

ISBN: 0-471-01310-2

Binding: Hardcover

Additional Textbook Information

The prescribed text by Stoecker is Out of Print. However, an eBook version can be purchased here:

<https://www.mheducation.com.au/9781307281668-aus-ebook-refrigeration-and-air-conditioning-2e>. The rest of the books should already be with the students from pre-requisite units, Fluid Mechanics and Thermodynamics.

[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

Ashfaque Chowdhury Unit Coordinator
a.chowdhury@cqu.edu.au

Schedule

Week 1 - 11 Mar 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Overview of the unit and assessment Workshop: Release of Project 1; Project Introduction		

Week 2 - 18 Mar 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Fluid flow - steady & unsteady flows, compressible & incompressible flows; Tutorial: Fluid Flows Workshop: Team discussion & feedback on Project 1		

Week 3 - 25 Mar 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Fluid flows-flow in pipes Tutorial: Pipe flows, flow losses Workshop: Team discussion & feedback on Project 1		

Week 4 - 01 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Fluid machinery- analysis and performance characteristics Tutorial: Fluid machinery & characteristics Workshop: Team Presentation on Project 1		

Week 5 - 08 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Pumps and turbines, energy transfer calculations Tute: Pumps and turbines, energy transfer calculations Workshop: Finalising Project 1		Project One Due: Week 5 Friday (12 Apr 2019) 11:45 pm AEST

Vacation Week - 15 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 22 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
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Lecture: Thermal comfort, Thermal principles, Psychrometry
 Tute: Thermal comfort, Thermal principles, Psychrometry
 Workshop: Release of Project 2, Project Introduction, Getting started with Energy Simulation, Influence of Weather

Week 7 - 29 Apr 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Mass-energy & heat transfer, cooling and dehumidification Tute: Mass-energy & heat transfer, cooling and dehumidification Workshop: Project 2 Discussion; Heat Transfer, Thermal Zone, Impact of Geometry, Materials and Constructions on Energy Simulation		Residential school for distance students (as per handbook)

Week 8 - 06 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Cooling Tower and Heat Exchangers Tute: Cooling tower and Heat Exchangers Workshop: Project 2 Discussion; Heating and Cooling Design		

Week 9 - 13 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Air conditioning- cooling & heating systems Tutorial: Air conditioning systems Workshop: Project 2 Discussion; Evaluating the impact of Unitary and Central HVAC Systems		

Week 10 - 20 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Air conditioning Systems (continue) Tutorial: Air conditioning systems (continue) Workshop: Project 2 Discussion; Evaluating the impact of Simulation Parameters		

Week 11 - 27 May 2019

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Refrigeration- types/systems, coefficient of performance Tutorial: Refrigerant systems Workshop: Project 2 Discussion, CFD Airflow Modelling using CFD		

Week 12 - 03 Jun 2019

Module/Topic	Chapter	Events and Submissions/Topic
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Lecture: Computational Fluid Dynamics (CFD)-Basic equations & Navier-Stokes equation and course review
 Tutorial: Navier-Stokes equations and review
 Workshop: Finalising Project 2

Project Two Due: Week 12 Friday (7 June 2019) 11:45 pm AEST

Review/Exam Week - 10 Jun 2019

Module/Topic	Chapter	Events and Submissions/Topic
Review Period		Suggested date and time will be confirmed and notified Class Test Due: Review/Exam Week Tuesday (11 June 2019) 11:45 pm AEST

Exam Week - 17 Jun 2019

Module/Topic	Chapter	Events and Submissions/Topic
		Laboratory Test and Report Due: Exam Week Monday (17 June 2019) 11:45 pm AEST

Assessment Tasks

1 Project One

Assessment Type

Presentation and Written Assessment

Task Description

Students are required to undertake this project which will allow them to exercise and demonstrate their knowledge on fluid machinery and flows, and application skills in a fluid transportation system. In particular, they will be required to analyse and design a fluid flow/transportation system using fluid dynamics principles and piping systems and pumps. The project scope and task will be uploaded on Moodle as per the schedule.

Assessment Due Date

Week 5 Friday (12 Apr 2019) 11:45 pm AEST

Return Date to Students

It is expected that the assessment item will be returned in 2 weeks after the due date

Weighting

20%

Minimum mark or grade

You must participate and contribute to successful completion of the project and should meet the set criteria of satisfying the Learning Objectives

Assessment Criteria

This is a Team Project and initially team submission will be assessed and a grade will be given for each team. Then individual grade will be determined based on their contribution and performance. Team members will need to indicate their individual contribution. It may be possible that individual grade could be higher than the team mark, but capped at the maximum mark for the assessment. Details project marking criteria will be provided on Moodle.

Example: Individual contributions of 3 students in Team A are given below. This Team A received 36 marks (out of 40) for their project.

S1 - 30%; S2 - 33%; S3 - 37% (Total 100% contribution)

Based on the contribution, Individual marks are given as follow.

S1 = $36 \times (30/33.3) = 32.4$ (out of 40)

S2 = $36 \times (33/33.3) = 35.6$ (out of 40)

S3 = $36 \times (37/33.3) = 40.0$ (out of 40)

Referencing Style

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

Submission

Online Group

Learning Outcomes Assessed

- Describe types and characteristics fluid machinery and apply and explain the theory of energy transfer to its operation in engineering applications
- Apply discipline theories and methods to the problems of designing, implementing, operating and maintaining mechanical systems in industrial contexts
- Communicate professionally and provide evidence of personal reflection on, and critical assessment of, team contributions and professional development, and development of technical competence in thermofluid engineering
- Reflect upon, formulate and solve problems and record and communicate professionally the approach used to resolve problems and the reasons for adopting such approaches to problems

Graduate Attributes

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

2 Project Two

Assessment Type

Presentation and Written Assessment

Task Description

Students are required to undertake this project which will allow them to exercise and demonstrate their theoretical thermo-fluid knowledge and skills in a practical application in the area of building HVAC systems. In particular, they will be required to investigate energy and thermal performance of a reference building and develop energy management strategies for a reference building. The project task and scope will be uploaded on Moodle as per the schedule.

Assessment Due Date

Week 12 Friday (7 June 2019) 11:45 pm AEST

Return Date to Students

It is expected that the assessment item will be returned in 2 weeks after the due date

Weighting

25%

Minimum mark or grade

You must participate and contribute to successful completion of the project and should meet the set criteria of satisfying the Learning Objectives

Assessment Criteria

This is a Team Project and initially, team submission will be assessed and a grade will be given for each team. Then individual grade will be determined based on their contribution and performance. Team members will need to indicate their individual contribution. It may be possible that individual grade could be higher than the team mark, but capped at the maximum mark for the assessment. Details project marking criteria will be provided on Moodle.

Example: Individual contributions of 3 students in Team A are given below. This Team A received 36 marks (out of 40) for their project.

S1 - 30%; S2 - 33%; S3 - 37% (Total 100% contribution)

Based on the contribution, Individual marks are given as follow.

S1 = $36 \times (30/33.3) = 32.4$ (out of 40)

S2 = $36 \times (33/33.3) = 35.6$ (out of 40)

S3 = $36 \times (37/33.3) = 40.0$ (out of 40)

Referencing Style

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

Submission

Online Group

Learning Outcomes Assessed

- Analyse, explain and evaluate performance characteristics and determine load on air conditioning and refrigeration plants
- Analyse, explain and evaluate mass, energy and heat transfer processes in industrial plant and components, and industrial processes
- Explain and analyse complex flows and computational fluid dynamics methods in such flows.
- Apply discipline theories and methods to the problems of designing, implementing, operating and maintaining mechanical systems in industrial contexts
- Communicate professionally and provide evidence of personal reflection on, and critical assessment of, team contributions and professional development, and development of technical competence in thermofluid engineering
- Reflect upon, formulate and solve problems and record and communicate professionally the approach used to resolve problems and the reasons for adopting such approaches to problems

Graduate Attributes

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

3 Class Test

Assessment Type

In-class Test(s)

Task Description

This assessment covers weekly topics from Week 1 to Week 11. Students are required to answer analytical and numerical questions to demonstrate their theoretical knowledge and analytical and solving skills in thermo-fluid processes.

Assessment Due Date

Review/Exam Week Tuesday (11 June 2019) 11:45 pm AEST

Suggested date and time will be confirmed and notified

Return Date to Students

It is expected that the assessment item will be returned in 2 weeks after the due date

Weighting

35%

Minimum mark or grade

You must get a minimum 50% on this assessment item to secure a Pass in this course.

Assessment Criteria

Each question in the test will be assessed separately for the criterion accuracy and correct results. A question will be deemed to have been completed if the student has shown correct procedure and sound understanding of the work.

Referencing Style

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

Submission

Offline

Learning Outcomes Assessed

- Analyse, explain and evaluate performance characteristics and determine load on air conditioning and refrigeration plants
- Analyse, explain and evaluate mass, energy and heat transfer processes in industrial plant and components, and

- industrial processes
- Describe types and characteristics fluid machinery and apply and explain the theory of energy transfer to its operation in engineering applications
- Explain and analyse complex flows and computational fluid dynamics methods in such flows.
- Apply discipline theories and methods to the problems of designing, implementing, operating and maintaining mechanical systems in industrial contexts
- Reflect upon, formulate and solve problems and record and communicate professionally the approach used to resolve problems and the reasons for adopting such approaches to problems

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Ethical practice

4 Laboratory Test and Report

Assessment Type

Practical and Written Assessment

Task Description

Each student will be required to complete the laboratory exercises as per the instruction sheets which will be available in the unit website. Laboratory sessions are compulsory, and each session will be up to 2 hours in duration. The timetable of laboratories will be supplied separately via unit website (Moodle).

Statement on Safety

According to the Workplace Health and Safety Act, 1995, it is a legal requirement that all persons at a workplace must not act in a manner that endangers the health or safety of any person at that workplace. As a student, your University is your workplace. When attending laboratories, workshops and field activities, fully enclosed footwear covering the whole foot must be worn at all times. Other personal protective equipment must be worn when required, or as directed by the lecturer or technical officer-in-charge. All requirements of the School Workplace Clothing Policy must also be observed. In the laboratory clothing must fully cover the torso, and have at least a short sleeve (i.e. no singlets). Failure to comply with any of the above health and safety requirements may result in your exclusion from laboratory, workshop or activities - most of which are compulsory.

At laboratory session

Arrive early; communicate with other members of the groups, discuss individual tasks/contribution in readiness for the laboratory experiment.

Ensure to bring

Laboratory instruction sheets if any; Graph paper (A4 linear, 10 div/cm); Notebook (A4 hard bound); Ruler (30 cm clear plastic); Pen and pencil; Scientific calculator; Correct footwear.

Students are expected to complete the entire laboratory exercise including the drawing of graphs and calculating the final answer. All raw data must be entered in the notebook immediately.

Laboratory submission cover sheet

Softcopy (electronic) submissions must be compiled as one single pdf file and submitted through the unit website (Moodle). The first page of the assignment must show the following information: Names, Student Numbers, Group No, Year, Term, Unit Code, Assessment item details.

Assessment Due Date

Exam Week Monday (17 June 2019) 11:45 pm AEST

Return Date to Students

It is expected that the assessment item will be returned in 2 weeks after the due date

Weighting

20%

Minimum mark or grade

You must get a minimum 50% on this assessment item to secure a Pass in this unit.

Assessment Criteria

- Reporting of major elements/steps (eg. Theory, Objective, Procedures, Results etc) taken to undertake the laboratory sessions (40% of total marks)
- Clarity of expression, including correct grammar, spelling, punctuation and appropriate referencing of sources (10% of total marks).
- Accurate and correct use and presentation of mathematical equations or graphs, tables, diagrams and/or drawings (30% of total marks).

- Discussion and logical presentation of ideas and arguments by means of data analysis and synthesis (20% of total marks).

Referencing Style

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

Submission

Online Group

Learning Outcomes Assessed

- Analyse, explain and evaluate performance characteristics and determine load on air conditioning and refrigeration plants
- Analyse, explain and evaluate mass, energy and heat transfer processes in industrial plant and components, and industrial processes
- Describe types and characteristics fluid machinery and apply and explain the theory of energy transfer to its operation in engineering applications
- Explain and analyse complex flows and computational fluid dynamics methods in such flows.
- Apply discipline theories and methods to the problems of designing, implementing, operating and maintaining mechanical systems in industrial contexts
- Communicate professionally and provide evidence of personal reflection on, and critical assessment of, team contributions and professional development, and development of technical competence in thermofluid engineering

Graduate Attributes

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

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