ENEM14014 *Capstone Thermofluid Engineering*
Term 1 - 2017

Profile information current as at 02/05/2024 06:30 am

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.

Corrections

Unit Profile Correction added on 24-02-17

Residential School for all students enrolled in FLEX mode is in **Week 7 (Wednesday to Friday)**

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 - 2017

- Bundaberg
- Distance
- Gladstone
- Mackay
- Melbourne
- 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. **Presentation and Written Assessment**
Weighting: 25%
2. **Presentation and Written Assessment**
Weighting: 20%
3. **Practical and Written Assessment**
Weighting: 20%
4. **In-class Test(s)**
Weighting: 35%

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 Course Evaluation Feedback

Feedback

Feedback on some assessment items (Project#2, Class Test#2 and Lab reports) was late because their submission date was close to one another in Week 12 which creates a spike in load for the lecturer to mark and provide timely feedback.

Recommendation

The number of assessment items and their submission time will be reviewed along with a review of the grading assessment criteria.

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

— 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 - 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

Fluid Mechanics
7th Edition (2013)
Authors: Munson, Okiishi, Huebsch and Rothmayer
John Wiley & Sons
Singapore , Singapore
ISBN: 978-1-118-318676
Binding: Hardcover
ENEM14014

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
ENEM14014

Supplementary

Applied Thermodynamics for Engineering Technologists
5th Edition (1993)
Authors: Eastop/McConkey
Pearson
England
ISBN: 9780582091931
Binding: Hardcover
ENEM14014

Supplementary

Elementary Fluid Mechanics
7th Edition (1996)
Authors: Street, Watters and Vennard
John Wiley & Sons
USA
ISBN: 978-0-471-01310-5
Binding: Hardcover

Additional Textbook Information
Students may have purchased the Munson text in a previous course

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

Masud Khan Unit Coordinator
m.khan@cqu.edu.au

Schedule

Week 1 - 06 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Overview of course and assessment Workshop: Thermal comfort, Thermal principles, Psychrometry, Table & charts	Stoecker: Ch 3 and 4 Eastop: Ch 15	

Week 2 - 13 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Mass energy & heat transfer- cooling and dehumidification Workshop: Project 1 hand over; Tutorial: Thermal comfort, Psychrometry Table	Stoecker: Ch 3 Eastop: Ch 15	

Week 3 - 20 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Mass energy & heat transfer- cooling tower, heat exchangers Workshop: Analysis & design of heat exchangers; Tutorial: Mass energy and heat transfer	Eastop: Ch 15 Stoecker: Ch 19	

Week 4 - 27 Mar 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Air conditioning- cooling & heating systems Workshop: Enquiries & feedback on Project 1; Air conditioning- load calculation & system design; Tutorial: Air conditioning systems	Eastop: Ch 15 Stoecker: Ch 5	

Week 5 - 03 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Air conditioning systems Workshop: Project 1 presentation & discussion; Tutorial: Air conditioning systems	Eastop: Ch 15	

Vacation Week - 10 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 17 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Refrigeration- types/systems, coefficient of performance Workshop: Refrigeration- types/load calculations, refrigerant & their properties, Project 1 completion; Tutorial: Refrigerant systems	Eastop: Ch 14 Stoecker: Ch 10 and 17	**Project # 1** Due: Week 6 Friday (21 Apr 2017) 11:45 pm AEST

Week 7 - 24 Apr 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Fluid flow-steady & unsteady flows, compressible & incompressible flows; Workshop: Project 2 hand over; Tutorial: Fluid Flows	Munson: Ch 3, 4 and 5	Residential school for all students enrolled in FLEX mode (Monday to Wednesday)

Week 8 - 01 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Fluid flows-flow in pipes Workshop: Discussion & feedback on project 2; Tutorial: Pipe flows, flow losses	Munson: Ch 8	

Week 9 - 08 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Fluid machinery- analysis, performance, characteristics Workshop: Team discussion & feedback on project 2; Tutorial: Fluid machineries & characteristics	Munson: Ch 12	

Week 10 - 15 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Pumps & turbines, energy transfer calculations Workshop: Project 2 presentation & discussion; Tutorial: Class test	Munson: Ch 12 Other References	Class Test

Week 11 - 22 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Computational Fluid Dynamics (CFD)-Basic equations & Navier-Stokes equation Workshop: Project 2 completion; numerical analysis, problem & solution; Tutorial: Navier-Stokes equations	Munson: Section A Other References	**Laboratory Test and Report** Due: Week 11 Monday (22 May 2017) 11:45 pm AEST

Week 12 - 29 May 2017

Module/Topic	Chapter	Events and Submissions/Topic
Lecture: Course review Workshop: Review/Feedback; Tutorial: Review		**Project # 2** Due: Week 12 Monday (29 May 2017) 11:45 pm AEST

Review/Exam Week - 05 Jun 2017

Module/Topic	Chapter	Events and Submissions/Topic
Review Period		

Exam Week - 12 Jun 2017

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

Laboratory sessions for the on-campus students will be scheduled locally

Assessment Tasks

1 Project # 1

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 course website (Moodle).

Assessment Due Date
Week 6 Friday (21 Apr 2017) 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 x (30/33.3) = 32.4 (out of 40)
S2 = 36 x (33/33.3) = 35.6 (out of 40)
S3 = 36 x (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

2 Project # 2

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.

Assessment Due Date
Week 12 Monday (29 May 2017) 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 x (30/33.3) = 32.4 (out of 40)
S2 = 36 x (33/33.3) = 35.6 (out of 40)
S3 = 36 x (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

3 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 Faculty 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
Week 11 Monday (22 May 2017) 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

4 Class Test

Assessment Type
In-class Test(s)

Task Description
This assessment covers weekly topics from Week 1 to Week 10. 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

Week 10: Date and time will be 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

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