



ENEM20003 *Thermofluids Engineering Applications*

Term 2 - 2018

Profile information current as at 30/04/2024 03:16 am

All details in this unit profile for ENEM20003 have been officially approved by CQU University 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 will equip you with advanced knowledge and applications of the principles of thermodynamics, fluid mechanics and heat transfer to the design and analysis of complex thermofluid systems. You will apply your knowledge and understanding to evaluate the performance of air conditioning, cooling tower and other heat and energy transfer processes in various industrial plants. You will achieve the learning outcomes through an integration of advanced theoretical concepts and the application of modelling approaches, and experimental methods to solve industrial thermofluid problems. You will work both individually and collaboratively, to solve problems, and document and communicate your work clearly in a professional manner.

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 - 2018

- 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: 25%

2. **Written Assessment**

Weighting: 25%

3. **Laboratory/Practical**

Weighting: 20%

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

Weighting: 30%

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](#).

Unit Learning Outcomes

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

1. Apply the principles of thermodynamics, fluid mechanics and heat transfer to design complex thermofluid processes related to air-conditioning, heating, cooling and ventilation systems
2. Apply advanced knowledge and methodologies to critically evaluate the performance of complex mass, heat and energy transfer systems
3. Apply discipline-specific theories to critically analyse the operating characteristics of pumps and turbines
4. Model fluid dynamics problems using advanced numerical methods
5. Work collaboratively in a team, communicate professionally and develop high-quality technical documentation related to theoretical, experimental and computational modalities in the discipline.

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



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
1 - Written Assessment - 25%	•			•	
2 - Written Assessment - 25%		•	•		•
3 - Laboratory/Practical - 20%		•	•		•
4 - In-class Test(s) - 30%	•			•	

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
1 - Knowledge	◦	◦	◦	◦	
2 - Communication					◦
3 - Cognitive, technical and creative skills	◦	◦	◦	◦	
4 - Research		◦		◦	
5 - Self-management					◦
6 - Ethical and Professional Responsibility					◦
7 - Leadership					◦

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
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 - 25%	○			○	○			
2 - Written Assessment - 25%	○	○	○	○				
3 - Laboratory/Practical - 20%		○	○	○	○	○		
4 - In-class Test(s) - 30%	○							

Textbooks and Resources

Textbooks

There are no required textbooks.

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

Kalam Azad Unit Coordinator

a.k.azad@cqu.edu.au

Masud Khan Unit Coordinator

m.khan@cqu.edu.au

Schedule

Week 1 - 09 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Lecture: Overview of course and assessment

Stoecker: Ch 3 and 4
Eastop: Ch 15

Tutorial: Thermal comfort, Thermal principles, Psychrometry, Table & charts

Workshop: Introduction of Project 1

Week 2 - 16 Jul 2018

Module/Topic

Chapter

Events and Submissions/Topic

Lecture: Mass energy & heat transfer- cooling and dehumidification

Stoecker: Ch 3
Eastop: Ch 15

Tutorial: Thermal comfort, Psychrometry Table

Workshop: Project 1 hand over - aims, objectives and scopes

Week 3 - 23 Jul 2018

Module/Topic

Chapter

Events and Submissions/Topic

Lecture: Cooling tower - heat and mass transfer in the thermodynamic system, heat exchangers

Eastop: Ch 15
Stoecker: Ch 19

Tutorial: Mass, energy and heat transfer - cooling tower

Workshop: Analysis & design of heat exchanger

Week 4 - 30 Jul 2018

Module/Topic

Chapter

Events and Submissions/Topic

Lecture: Air conditioning - cooling & heating systems

Eastop: Ch 15
Stoecker: Ch 5

Tutorial: Air conditioning systems

Workshop: Enquiries & feedback on Project 1; Air conditioning- load calculation & system design

Week 5 - 06 Aug 2018

Module/Topic

Chapter

Events and Submissions/Topic

Lecture: Air conditioning systems

Eastop: Ch 15

Tutorial: Air conditioning systems

Workshop: Project 1 Presentation (Maintain formal dress code)

Air Conditioning Lab Report Due: Week 5 Friday (10 August 2018) 5:59 pm AEST

Vacation Week - 13 Aug 2018

Module/Topic

Chapter

Events and Submissions/Topic

Week 6 - 20 Aug 2018

Module/Topic

Chapter

Events and Submissions/Topic

Lecture: Refrigeration- types/systems, coefficient of performance

Eastop: Ch 14
Stoecker: Ch 10 and 17

Tutorial: Refrigerant systems

Workshop: Project 1 assistance and support

Project 1 Due: Week 6 Friday (24 Aug 2018) 5:59 pm AEST

Week 7 - 27 Aug 2018

Module/Topic

Chapter

Events and Submissions/Topic

Lecture: Fluid flow-steady & unsteady flows, compressible & incompressible flows.

Munson: Ch 3, 4 and 5

Tutorial: Fluid Flows problems

Workshop: Introduction of Project 2.

Cooling Tower Lab Report Due: Week 7 Friday (31 August 2018) 5:59 pm AEST

Week 8 - 03 Sep 2018

Module/Topic

Chapter

Events and Submissions/Topic

Lecture: Pumps - fluid flows, flow in pipes;
Munson: Ch 8

Tutorial: Pipe flows, flow losses;
Workshop: Discussion & feedback on project 2

Centrifugal Pump Lab Report Due:
Week 8 Friday (07 September 2018)
5:59 pm AEST

Week 9 - 10 Sep 2018

Module/Topic **Chapter**

Lecture: Fluid machinery- analysis, performance, characteristics of pumps.
Munson: Ch 12

Events and Submissions/Topic

Tutorial: Fluid machineries & characteristics.
Workshop: Team discussion & feedback on project 2.

Pelton Turbine Lab Report Due:
Week 9 Friday (07 September 2018)
5:59 pm AEST

Lab report Due: Week 9 Friday (14 Sept 2018) 5:59 pm AEST

Week 10 - 17 Sep 2018

Module/Topic **Chapter**

Lecture: Turbines - energy transfer calculations for pelton
Munson: Ch 12
Other References

Events and Submissions/Topic

Tutorial: Pumps and turbines calculations
Workshop: Project 2 completion; numerical analysis, problem & solution

Week 11 - 24 Sep 2018

Module/Topic **Chapter**

Lecture: Computational Fluid Dynamics (CFD)-Basic equations and modelling
Munson: Section A
Other References

Events and Submissions/Topic

Tutorial: Navier-Stokes equations
Workshop: Project 2 Presentation (Maintain formal dress code)

Week 12 - 01 Oct 2018

Module/Topic **Chapter**

Lecture: Unit material review

Events and Submissions/Topic

Tutorial: Review
Workshop: Project 2 assistance and support

Project 2 Due: Week 12 Friday (5 Oct 2018) 5:59 pm AEST

Review/Exam Week - 08 Oct 2018

Module/Topic **Chapter**

Review Period

Events and Submissions/Topic

Suggested date and time will be confirmed and notified.

Class test Due: Review/Exam Week Thursday (11 Oct 2018) 5:00 pm AEST

Term Specific Information

Teaching Team

Melbourne campus

Professor Masud Khan (m.khan@cqu.edu.au)

Dr Kalam Azad (a.k.azad@cqu.edu.au)

Rockhampton campus

Name:

Perth campus

Name:

Assessment Tasks

1 Project 1

Assessment Type

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 to the unit website (Moodle).

Assessment Due Date

Week 6 Friday (24 Aug 2018) 5:59 pm AEST

Project 1 report submission

Return Date to Students

Week 8 Friday (7 Sept 2018)

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

Weighting

25%

Minimum mark or grade

50%

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 using the equation below and based on their contribution and performance. Team members will need to submit Team Charter (Declaration of individual student contributions) and SPA (Self and Peer Assessment) report. 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, declaration of contribution and SPA templates will be provided on Moodle.

Individual student marks = Total project 1 marks achieved by the team out of 25 x (Individual share / Equal team share)

For 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)

Please note: Students are advised to meet the submission due date to avoid the delay penalty (5% mark per day can be deducted from the team achieved marks for delay submission). The assessment item will not be accepted if submission delayed more than five business days after the due date of submission. Generally, extension request will not be granted because it is a team submission, not individual submission. However, it could be considered for special

circumstances based on the evidence (i.e. medical certificate from GP or hospital medical certificate) of serious medical condition of members of the team.



Referencing Style

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

Submission

Online Group

Submission Instructions

Submission link will be provided on Moodle of this assessment item

Learning Outcomes Assessed

- Apply the principles of thermodynamics, fluid mechanics and heat transfer to design complex thermofluid processes related to air-conditioning, heating, cooling and ventilation systems
- Model fluid dynamics problems using advanced numerical methods

Graduate Attributes

- Knowledge
- Research
- Self-management

2 Project 2

Assessment Type

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 Friday (5 Oct 2018) 5:59 pm AEST

Project 2 technical report submission

Return Date to Students

Exam Week Friday (19 Oct 2018)

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

Weighting

25%

Minimum mark or grade

50%

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 using the equation below and based on their contribution and performance. Team members will need to submit Team Charter (Declaration of individual student contributions) and SPA (Self and Peer Assessment) report. 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, declaration of contribution and SPA templates will be provided on Moodle.

Individual student marks = Total project 2 marks achieved by the team out of 25 x (Individual share / Equal team share)

For 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)

Please note: Students are advised to meet the submission due date to avoid the delay penalty (5% mark per day can be deducted from the team achieved marks for delay submission). The assessment item will not be accepted if submission delayed more than five business days after the due date of submission. Generally, extension request will not

be granted because it is a team submission, not individual submission. However, it could be considered for special circumstances based on the evidence (i.e. medical certificate from GP or hospital medical certificate) of serious medical condition of members of the team.

Referencing Style

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

Submission

Online Group

Submission Instructions

Submission link will be provided on Moodle of this assessment item

Learning Outcomes Assessed

- Apply advanced knowledge and methodologies to critically evaluate the performance of complex mass, heat and energy transfer systems
- Apply discipline-specific theories to critically analyse the operating characteristics of pumps and turbines
- Work collaboratively in a team, communicate professionally and develop high-quality technical documentation related to theoretical, experimental and computational modalities in the discipline.

Graduate Attributes

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

3 Lab report

Assessment Type

Laboratory/Practical

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 Due Date

Week 9 Friday (14 Sept 2018) 5:59 pm AEST

Lab report submission

Return Date to Students

Week 11 Friday (28 Sept 2018)

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

Weighting

20%

Minimum mark or grade

50% (average but not individual)

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).

Assessment item details:

This is also a Team report submission and initially team submission will be assessed and a grade will be given for each team. Then individual grade will be determined using the equation below and based on their contribution and performance. Team members will need to submit Team Charter (Declaration of individual student contributions). 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 and declaration of contribution templates will be provided on Moodle.

Individual student marks = Total lab marks achieved by the team out of 20 x (Individual share / Equal team share) x lab attendance

For example: *Individual contributions of 3 students in Team A are given below. This Team A received 16 marks (out of 20) for their lab.*

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

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

S1 = 16 x (30/33.3) x 1 = 14.40 (out of 20)

S2 = 16 x (33/33.3) x 1 = 15.85 (out of 20)

S3 = 16 x (37/33.3) x 1 = 17.78 (out of 20)

Please note the key information:

1. Average 50% marks in all lab reports (but not individual) are the minimum requirement to pass in this assessment item.
2. The lab attendances are really important because it is a mandatory component and a multiplication factor (i.e. Present - 1, Absent - 0) for individual mark calculation as shown in the above equation will be used.
3. Please follow individual lab report due date as mentioned in the weekly schedule.
4. Students are advised to meet the submission due date to avoid the delay penalty (5% mark per day can be deducted from the team achieved marks for delay submission). The assessment item will not be accepted if submission delayed more than five business days after the due date of submission. Generally, extension request will not be granted because it is a team submission, not individual submission. However, it could be considered for special circumstances based on the evidence (i.e. medical certificate from GP or hospital medical certificate) of serious medical condition of members of the team.

Referencing Style

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

Submission

Online Group

Submission Instructions

All lab reports should be submitted before due date. Individual submission link will be provided on Moodle of this assessment item

Learning Outcomes Assessed

- Apply advanced knowledge and methodologies to critically evaluate the performance of complex mass, heat and energy transfer systems
- Apply discipline-specific theories to critically analyse the operating characteristics of pumps and turbines
- Work collaboratively in a team, communicate professionally and develop high-quality technical documentation related to theoretical, experimental and computational modalities in the discipline.

Graduate Attributes

- Communication
- Cognitive, technical and creative skills
- Research
- Self-management
- Ethical and Professional Responsibility

4 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 Thursday (11 Oct 2018) 5:00 pm AEST

Return Date to Students

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

Weighting

30%

Minimum mark or grade

50%

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

- Apply the principles of thermodynamics, fluid mechanics and heat transfer to design complex thermofluid processes related to air-conditioning, heating, cooling and ventilation systems
- Model fluid dynamics problems using advanced numerical methods

Graduate Attributes

- Knowledge

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