ENEM13014 *Thermodynamics*

Term 2 - 2019

Profile information current as at 16/05/2024 12:52 am

General Information

Overview

Students investigate of the flow of energy (heat) and work done in engineering processes, apply and explain key concepts and processes in thermodynamics and explain the procedures used to analyse the flow of energy and heat in liquids and gasses. Students use energy equations and the laws of thermodynamics to analyse and solve problems. They analyse the heat energy cycle for heat engines and heat pumps. They communicate effectively regarding technical aspects of thermodynamics, prepare technical and laboratory reports, clearly document technical procedures problem solutions, and evaluate uncertainties and the results of their work. Students develop a capacity to work, learn and communicate ethically and professionally, as individuals and in teams, to investigate and solve problems and present solutions. Distance education (FLEX) 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

Prerequisites: MATH11218 Applied Mathematics AND (ENEG11009 Fundamentals of Energy & Electricity OR PHYS11185 Engineering Physics B)
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 - 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).

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 Assessment**
Weighting: 20%
4. **Examination**
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 Unit evaluation

Feedback
Well laid-out Moodle site, easy to follow tutorials, help was always available, lecturer was friendly and nice guy, replied to emails quickly.

Recommendation
This standard will be maintained.

Feedback from Unit evaluation

Feedback
The exam should allow for an own equation sheet to be taken in or open book.

Recommendation
Will be discussed within the teaching team and be actioned as the team decide.

Feedback from Unit evaluation

Feedback
Tutorial assume knowledge on concepts without showing how things are calculated.

Recommendation
It's really a good feedback. More step-by-step calculation will be shown in coming years.

Feedback from Unit evaluation

Feedback
There should be more time between the assignments and a bit longer due date.

Recommendation
Review assessment due dates.

Feedback from Unit evaluation

Feedback
A lot of labs which created huge workload.

Recommendation
We had 4 labs, now there are only three labs. Further reduction of labs may not be possible as labs give the opportunity of learning hands-on.

Unit Learning Outcomes

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

1. Describe and explain key concepts and processes of thermodynamics.
2. Analyse flow and non-flow process using tables of properties for fluids, formulae and calculations and present working to explain the analysis.
3. Explain energy equations including the first law of thermodynamics and analyse and solve problems using these equations.
4. Explain the effects of entropy in engineering processes and the limitations that the second law of thermodynamics places on such processes.
5. Explain and analyse the heat energy cycle for a variety of heat engine and refrigeration cycles.
6. Communicate effectively using the terminology, symbols and diagrams of thermodynamics and professionally document calculations and problem solutions.
7. Prepare technical and laboratory reports with thorough evaluation of experimental uncertainties and results obtained.
8. Work, learn and communicate in an ethical, professional manner both individually and in teams, using information literacy skills to investigate problems and present solutions.

The Learning Outcomes for this unit are linked with Engineers Australia's **Stage 1 Competency Standard for Professional Engineers**.

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	8
1 - Written Assessment - 20%	●	●	●					
2 - Written Assessment - 20%				●	●	●		
3 - Practical Assessment - 20%					●	●	●	●
4 - Examination - 40%	●	●	●	●	●	●		

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes							
	1	2	3	4	5	6	7	8
1 - Communication	●	●	●	●	●	●	●	●
2 - Problem Solving	●	●	●	●	●	●	●	●
3 - Critical Thinking	●	●	●	●	●	●	●	●
4 - Information Literacy	●	●	●	●	●	●	●	●

Graduate Attributes	Learning Outcomes							
	1	2	3	4	5	6	7	8
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 Assessment - 20%	•	•	•	•						
4 - Examination - 40%	•	•	•					•		

Textbooks and Resources

Textbooks

ENEM13014

Prescribed

Fundamentals of Engineering Thermodynamics
8th edition (2014)
Authors: Moran, MJ., Shapiro, HN, Boettner, DD and Bailey, MB
John Wiley & Sons Ltd
New York , NY , USA
ISBN: 978-1-118-41293-0
Binding: Hardcover
ENEM13014

Prescribed

Thermodynamic and Transport Properties: SI Units
Edition: 5th or latest if any (1994)
Authors: Rogers, GFC and Mayhew, YR
Wiley Blackwell
Southern Gate , Chicester , UK
ISBN: 978-0-631-19703-4
Binding: Paperback

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

Mohammad Rasul Unit Coordinator
m.rasul@cqu.edu.au

Schedule

Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Fundamentals - Energy resources, thermodynamic concept,work,heat, 1st law of thermodynamics.	1 and 2 (excluding section 2.7)	Introduction, overview, and lecture and tutorial on chapter 2 (problems 1.27, 1.30, 2.2, 2.6, 2.7, 2.8 and 2.16).

Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Energy equations, non-flow and steady flow; properties of gases.	2 and 3 (excluding section 3.7)	Lecture on chapter 2 and 3, and tutorial on chapter 2 (problems 2.19, 2.26, 2.29, 2.59, 2.60 and 2.64).

Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Properties of vapours; non-flow process for gases.	3	Lecture on chapter 3 and tutorial on chapter 2 (problems 2.67, 2.72, 2.74, 2.80, 2.85 and 2.86). Assignment 1 question paper will be uploaded in the unit Moodle site by Friday of this week.

Week 4 - 05 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Non-flow process for vapours; steady flow processes for gases and vapours.	5	Lecture on chapter 5 and tutorial on chapter 3 (problems 3.10, 3.13, 3.14, 3.23, 3.24 and 3.71).

Week 5 - 12 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Second law of thermodynamics; Carnot cycle for gases and vapours, entropy.	5 and 6 (excluding sections 6.8 to 6.10)	Lecture on chapter 5 and 6, and tutorial on chapter 5 (problems 5.17, 5.43, 5.45, 5.65 and 5.68).

Vacation Week - 19 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
		This is a week for residential school for distance students. The specific schedule will be available in the unit moodle site about a month ago.

Week 6 - 26 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Rankine cycle for steam power plant. Written Assessment 1 on chapters 2,3,5 and 6 is due this week.	8 (excluding section 8.6)	Lecture on chapter 8 and tutorial on chapter 5 and 6 (problems 5.76, 5.81, 5.83, 6.3, 6.7 and 6.10). **Written Assessment (Assignment 1)** Due: Week 6 Friday (30 Aug 2019) 11:55 pm AEST

Week 7 - 02 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Air standard Otto cycle; constant volume process.	8 and 9 (excluding sections 9.12 to 9.14)	Lecture on chapter 8 and 9, and tutorial on chapter 8 (problems 8.7, 8.20, 8.22, 8.27, 8.29 and 8.30). Assignment 2 question paper will be uploaded in the unit Moodle site by Friday of this week.

Week 8 - 09 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Air standard diesel and dual combustion cycles	9	Lecture on chapter 9 and tutorial on chapter 8 (problems 8.35, 8.37, 8.40, 8.46 and 8.49).

Week 9 - 16 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Sterling and Ericson cycles.	9	Lecture and tutorial on chapter 9 (problems 9.1, 9.11, 9.20, 9.28 and 9.34).

Week 10 - 23 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic

Brayton cycle for gas turbines. Written Assessment 2 on chapters 8 and 9 is due this week.	9	Lecture and tutorial on chapter 9 (problems 9.50, 9.53, 9.54, 9.61 and 9.68). **Written Assessment (Assignment 2)** Due: Week 10 Friday (27 Sept 2019) 11:55 pm AEST
Week 11 - 30 Sep 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Reversed cycles - refrigeration.	10 (excluding section 10.7)	Lecture and tutorial on chapter 10 (problems 10.1, 10.10, 10.15, 10.29 and 10.34).
Week 12 - 07 Oct 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Revision	10	Review class
Review/Exam Week - 14 Oct 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**
Exam Week - 21 Oct 2019		
Module/Topic	**Chapter**	**Events and Submissions/Topic**

Assessment Tasks

1 Written Assessment (Assignment 1)

Assessment Type
Written Assessment

Task Description
This assessment task relates to the unit learning outcomes numbers 1- 3 and will cover study materials from chapters 2, 3, 5 and 6 of your textbook. The assignment questions will be available in unit Moodle site about three weeks prior to due date.

Assessment Due Date
Week 6 Friday (30 Aug 2019) 11:55 pm AEST
Late submission will not be accepted unless otherwise extension is requested in advance for valid reason(s) and approved by Lecturer.

Return Date to Students
Week 8 Friday (13 Sept 2019)
Feedback will be provided.

Weighting
20%

Minimum mark or grade
50%

Assessment Criteria
This assignment will be marked to a marking scheme as indicated in Assignment 1 question paper. Marks will be given for correct demonstration of appropriate understanding and processes used for solution, use of correct units, and neat and legible diagrams (both schematic and p-v or T-s diagrams, as appropriate). Late submission will draw a penalty at the rate of 5% per working day after the due date.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submission must be compiled as a single pdf file with file name as your last name_student ID_Assignment 1 and submitted through the unit moodle site. The first page of the assignment must show the following information: Name, Student Number, Year, Term, Unit Code and Assessment title.

Learning Outcomes Assessed

- Describe and explain key concepts and processes of thermodynamics.
- Analyse flow and non-flow process using tables of properties for fluids, formulae and calculations and present working to explain the analysis.
- Explain energy equations including the first law of thermodynamics and analyse and solve problems using these equations.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking

2 Written Assessment (Assignment 2)

Assessment Type
Written Assessment

Task Description
This assessment task relates to the unit learning outcomes numbers 4-6 and will cover study materials from chapters 8 and 9 of your textbook. The assignment questions will be available in unit Moodle site about three weeks prior to due date.

Assessment Due Date
Week 10 Friday (27 Sept 2019) 11:55 pm AEST
Late submission will not be accepted unless otherwise extension is requested in advance for valid reason(s) and approved by Lecturer.

Return Date to Students
Week 12 Friday (11 Oct 2019)
Feedback will be provided

Weighting
20%

Minimum mark or grade
50%

Assessment Criteria
This assignment will be marked to a marking scheme as indicated in Assignment 2 question paper. Marks will be given for correct demonstration of appropriate understanding and processes used for solution, use of correct units, and neat and legible diagrams (both schematic and p-v or T-s diagrams, as appropriate). Late submission will draw a penalty at the rate of 5% per working day after the due date.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submission must be compiled as a single pdf file with file name as your last name_student ID_Assignment 2 and submitted through the unit moodle site. The first page of the assignment must show the following information: Name, Student Number, Year, Term, Unit Code and Assessment title.

Learning Outcomes Assessed

- Explain the effects of entropy in engineering processes and the limitations that the second law of thermodynamics places on such processes.
- Explain and analyse the heat energy cycle for a variety of heat engine and refrigeration cycles.
- Communicate effectively using the terminology, symbols and diagrams of thermodynamics and professionally document calculations and problem solutions.

Graduate Attributes

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

3 Practical Assessment (3 laboratory exercises)

Assessment Type
Practical Assessment

Task Description
This assessment task relates to learning outcomes numbers 5-8 of the unit.
Each student will be required to complete the following three laboratory exercises:

1. Performance analysis of solar energy collector (5 marks)
2. Performance analysis of Refrigeration cycle (7.5 marks)
3. Performance analysis of Rankine steam cycle (7.5 marks)

Laboratory schedule for both internal and distance students will be supplied separately.
Laboratory Report should have the following features and be arranged in the order given:

1. Title Page: Title, Author, University, School, Unit, Lecturer's name, Summary.
2. Summary: Summary should include a brief description of the introduction to the topic, objectives and scopes of experiment performed, and its methodology, results and discussion, and conclusions.
3. Table of Contents with page numbers.
4. Introduction.
5. Objectives.
6. Equipment details and diagram (simple and neat).
7. Experimental procedure.
8. Results: Graph or tables of results. Give graphs a figure number, and tables a table number.
9. Discussion: Where possible, compare results with theory and similar results found in the literature.
10. Conclusion.
11. Appendix I: Sample calculations and table of results if all results which cannot be presented graphically in the main text.
12. Appendix II: Raw data (typed)

At laboratory session, arrive early, be organised and ready to do the laboratory experiment.
Ensure to bring laboratory instruction sheet, notebook, ruler, pen and pencil and calculator.
Compulsory personal protection equipment (PPE) listed in your laboratory instruction sheet

Assessment Due Date

Laboratory schedule will be supplied separately. The report will be due within two weeks of performing laboratory practicals. The due date will be provided separately.

Return Date to Students

Two weeks after the submission of report.

Weighting
20%

Minimum mark or grade
50%

Assessment Criteria
The laboratory exercises are compulsory and will be up to 2 hours in duration. Submitted report without attending laboratory session (practical) will be marked as zero. Assessment will be done based on the professionalism in reporting and presentation, relevant and comprehensive content (as mentioned under laboratory above), clarity in results and discussion, sample calculation and referencing of source material as detailed below:

Professional presentation and formatting of the report. The report should address all key elements/steps undertaken to complete the laboratory sessions and report writing (i.e. sections on summary, introduction, theory, objectives, equipment and procedures, results and discussion, conclusions, and references)	10%

Properly written background and introduction with citations of literature/references using Harvard referencing style, related theory, equipment and actual procedures used (not direct copy from the lab sheet).	20%
Clarity and logical explanation of results and discussion including properly presented equations, graphs, tables, diagrams and/or drawings, etc. You should compare your results with similar experiments done elsewhere in the literature and/or your textbook.	60%
A clearly presented sample calculation and correctly referencing of source materials.	10%

It is expected that every member of a group will contribute to the conduct, preparation and write-up of the laboratory report. Late submission will draw a penalty at the rate of 5% every day after the due date and will be reflected in the final assessment.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submission must be compiled as a single pdf file with file name as your last name_student ID_Laboratory report and submitted through the Unit Website. The first page of the assignment must show the following information: Name, Student Number, Year, Term, Unit Code and Assessment title.

Learning Outcomes Assessed

- Explain and analyse the heat energy cycle for a variety of heat engine and refrigeration cycles.
- Communicate effectively using the terminology, symbols and diagrams of thermodynamics and professionally document calculations and problem solutions.
- Prepare technical and laboratory reports with thorough evaluation of experimental uncertainties and results obtained.
- Work, learn and communicate in an ethical, professional manner both individually and in teams, using information literacy skills to investigate problems and present solutions.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy

Examination

Outline
Complete an invigilated examination.

Date
During the examination period at a CQUniversity examination centre.

Weighting
40%

Length
180 minutes

Minimum mark or grade
50%

Exam Conditions
Restricted.

Materials
Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).
Calculator - all non-communicable calculators, including scientific, programmable and graphics calculators are authorised

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