



ENAM12005 Thermal Energy Plant

Term 2 - 2021

Profile information current as at 05/05/2024 07:02 pm

All details in this unit profile for ENAM12005 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 introduces the analysis of thermal energy plant using basic principles of thermodynamics. You will use standard thermodynamics tables and solve fundamental problems relating to flow and non-flow processes. You will apply thermodynamics and energy equations to analyse fundamental energy plant problems plus heat engine and refrigeration cycles. You are required to 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 your work. You are required to develop a capacity to work and communicate ethically and professionally, as individuals and in teams, to investigate and solve problems and present solutions. In this unit, you must complete compulsory practical activities. Refer to the Engineering Undergraduate Course Moodle site for proposed dates.

Details

Career Level: *Undergraduate*

Unit Level: *Level 2*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

Prerequisites: ENEG11009 and MATH11160

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 - 2021

- Mixed Mode

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: 35%

2. **Written Assessment**

Weighting: 35%

3. **On-campus Activity**

Weighting: 25%

4. **Presentation**

Weighting: 5%

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

The short Zoom sessions were very effective as they were straight to the point covering all the necessary information for that week. It allowed more time to work through the textbook and assignments.

Recommendation

This practice will be continued.

Feedback from Unit Evaluation

Feedback

The weekly quizzes provided a good way to support the week's study and self-check progress and understanding.

Recommendation

This practice will be continued.

Feedback from Unit evaluation

Feedback

The unit was well structured and provided the necessary knowledge to complete the assessment items.

Recommendation

This practice will be continued. Ways to improve the unit further will be explored.

Unit Learning Outcomes

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

1. Apply fluid properties to solve problems relating to flow and non-flow processes
2. Apply the first law of thermodynamics, second law of thermodynamics and other energy equations to basic problems in thermodynamics
3. Analyse typical heat engine cycles and refrigeration cycles
4. Prepare technical and laboratory reports with evidence of thorough evaluation of experimental uncertainties and results obtained
5. Solve problems by following established procedures and communicating effectively in a team.

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

Intermediate 1.1 Descriptive formula-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the practice area. (LO: 1I 2I 3I 4I) 1.2 Procedural-level understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the practice area. (LO: 1I 2I 3I 4I 5I) 1.3 In-depth practical knowledge and skills within specialist sub-disciplines of the practice area. (LO: 1I 2I 3I 4I 5I) 1.4 Discernment of engineering developments within the practice area. (LO: 1I 2I 3I 4I) 1.5 Knowledge of engineering design practice and contextual factors impacting the practice area. (LO: 1I 2I 3I 4I) 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the area of practice. (LO: 1I 2I 3I 4I 5I) 2.1 Application of established technical and practical methods to the solution of well-defined engineering problems. (LO: 1I 2I 3I 4I 5I) 2.2 Application of technical and practical techniques, tools and resources to well-defined engineering problems. (LO: 1I 2I 3I 4I) 2.3 Application of systematic design processes to well-defined engineering problems. (LO: 1I 3I) 2.4 Application of systematic project management processes. (LO: 2N 3N 4I) 3.2 Effective oral and written communication in professional and lay domains. (LO: 4I 5I) 3.6 Effective team membership and team leadership. (LO: 4I 5N)

Note: LO refers to the Learning Outcome number(s) which link to the competency and the levels: N – Introductory, I – Intermediate and A – Advanced. Refer to the Engineering Undergraduate Course Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping information <https://moodle.cqu.edu.au/course/view.php?id=1511>

Alignment of Learning Outcomes, Assessment and Graduate Attributes

 N/A Level	 Introductory Level	 Intermediate Level	 Graduate Level	 Professional Level	 Advanced Level
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Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
1 - Online Quiz(zes) - 35%	•	•	•		
2 - Written Assessment - 35%	•	•	•		•
3 - Laboratory/Practical - 25%				•	•
4 - Presentation - 5%				•	•

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes				
	1	2	3	4	5
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 - Online Quiz(zes) - 35%	•	•								

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
2 - Written Assessment - 35%	•	•	•	•		•				
3 - Laboratory/Practical - 25%	•	•	•	•	•	•				
4 - Presentation - 5%	•			•		•				

Textbooks and Resources

Textbooks

ENAM12005

Prescribed

Thermodynamics: Advanced Applications

Edition: 1997 (1997)

Authors: Kinsky, Roger

McGraw-Hill, North Ryde, NSW Sydney.

North Ryde, NSW Sydney. , QLD , Australia

ISBN: 780074703120

Binding: Paperback

ENAM12005

Prescribed

Thermodynamics and Fluid Mechanics: An Introduction 1996

Edition: 1996 (1996)

Authors: Kinsky, Roger

McGraw-Hill, North Ryde, NSW Sydney.

North Ryde, NSW Sydney. , NSW , Australia

ISBN: 9780074702383

Binding: Paperback

Additional Textbook Information

If you prefer to study with a paper text, you can purchase one at the CQUni Bookshop here:

<http://bookshop.cqu.edu.au> (search on the Unit code).

[View textbooks at the CQUniversity Bookshop](#)

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Access to a computer with webcam, microphone and headphones/speakers for online tutorials
- Scanner

Referencing Style

All submissions for this unit must use the referencing styles below:

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

For further information, see the Assessment Tasks.

Teaching Contacts

Ramadas Narayanan Unit Coordinator
r.narayanan@cqu.edu.au

Schedule

Week 1 - 12 Jul 2021

Module/Topic	Chapter	Events and Submissions/Topic
Energy and Humanity	Thermodynamics and Fluid Mechanics : An Introduction. Chapter1	Zoom Tutorial

Week 2 - 19 Jul 2021

Module/Topic	Chapter	Events and Submissions/Topic
Basic concepts	Thermodynamics and Fluid Mechanics : An Introduction. Chapter 2	Zoom Tutorial Week 2 online quiz

Week 3 - 26 Jul 2021

Module/Topic	Chapter	Events and Submissions/Topic
Energy	Thermodynamics and Fluid Mechanics : An Introduction. Chapter 3	Zoom Tutorial Week 3 online quiz

Week 4 - 02 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
Closed and open systems	Thermodynamics and Fluid Mechanics : An Introduction. Chapter 4	Zoom Tutorial Week 4 online quiz

Week 5 - 09 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
Gases	Thermodynamics and Fluid Mechanics : An Introduction. Chapter 5	Zoom Tutorial Week 5 online quiz

Vacation Week - 16 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
Vacation		

Week 6 - 23 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
Heat engines	Thermodynamics and Fluid Mechanics : An Introduction. Chapter 6	Zoom Tutorial Week 6 online quiz

Week 7 - 30 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
Heat engine performance	Thermodynamics and Fluid Mechanics : An Introduction. Chapter 7	Zoom Tutorial Week 7 online quiz

Week 8 - 06 Sep 2021

Module/Topic	Chapter	Events and Submissions/Topic
Steam-water systems	Thermodynamics : Advanced Applications. Chapter 3	Zoom Tutorial Week 8 online quiz

Week 9 - 13 Sep 2021

Module/Topic	Chapter	Events and Submissions/Topic
Online Residential school	Lab experiments	

Week 10 - 20 Sep 2021

Module/Topic	Chapter	Events and Submissions/Topic
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Refrigeration and heat pumps	Thermodynamics : Advanced Applications. Chapter 4	Zoom Tutorial Lab reports Due: Week 10 Friday (24 Sept 2021) 5:00 pm AEST
Week 11 - 27 Sep 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Heat transfer	Thermodynamics : Advanced Applications. Chapter 1	Zoom Tutorial
Week 12 - 04 Oct 2021		
Module/Topic	Chapter	Events and Submissions/Topic
Revision	All chapters previously stated	Zoom Tutorial Assignment Due: Week 12 Friday (8 Oct 2021) 5:00 pm AEST
Review/Exam Week - 11 Oct 2021		
Module/Topic	Chapter	Events and Submissions/Topic
		Video Presentation Due: Review/Exam Week Monday (11 Oct 2021) 5:00 pm AEST
Exam Week - 18 Oct 2021		
Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Weekly Online quizzes

Assessment Type

Written Assessment

Task Description

These weekly quizzes assess contents from each week. There will be 7 quizzes starting from week 2 extending up to week 8. All quizzes together will have 35% weighting of the unit. The assessment task can be accessed from the unit Moodle site on a weekly basis. Each quiz will be open for a week and students need to attempt within the open period.

Assessment Due Date

Weekly due dates will be given in the Moodle

Return Date to Students

Students will be getting feedback immediately after the submission of the quizzes.

Weighting

35%

Minimum mark or grade

50%

Assessment Criteria

The correct answer will get full marks and the incorrect answer will be given zero marks.

Referencing Style

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

Submission

Online

Learning Outcomes Assessed

- Use tables of properties for fluids and explain and solve basic problems relating to flow and non-flow process.
- Apply the first law of thermodynamics, second law of thermodynamics and other energy equations to basic

- problems in thermodynamics.
- Analyse typical heat engine cycles and refrigeration cycles.
- Prepare technical and laboratory reports with evidence of thorough evaluation of experimental uncertainties and results obtained.
- Communicate professionally and provide evidence of personal reflection on, and critical assessment of, team contributions and professional development.
- Solve problems and record and communicate clearly and professionally the approach used to solve problems and the reasons for adopting such approaches to problems.

Graduate Attributes

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

2 Assignment

Assessment Type

Written Assessment

Task Description

Assignment is based on content from week 1 until week 11 inclusive.
Questions will be released in Moodle at the beginning of the term

Assessment Due Date

Week 12 Friday (8 Oct 2021) 5:00 pm AEST

Return Date to Students

2 weeks after the submission

Weighting

35%

Minimum mark or grade

50%

Assessment Criteria

It will be graded based on the presentation, the method of solution, appropriate explanation and completeness of the solution. A complete solution should include any assumptions made, relevant sketches, clear step by step solution and conclusion/judgement on the answer. Detailed criteria will be given in the assignment task sheet.

Referencing Style

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

Submission

Online

Learning Outcomes Assessed

- Use tables of properties for fluids and explain and solve basic problems relating to flow and non-flow process.
- Apply the first law of thermodynamics, second law of thermodynamics and other energy equations to basic problems in thermodynamics.
- Analyse typical heat engine cycles and refrigeration cycles.
- Prepare technical and laboratory reports with evidence of thorough evaluation of experimental uncertainties and results obtained.
- Communicate professionally and provide evidence of personal reflection on, and critical assessment of, team contributions and professional development.
- Solve problems and record and communicate clearly and professionally the approach used to solve problems and the reasons for adopting such approaches to problems.

Graduate Attributes

- Communication
- Problem Solving

- Critical Thinking
- Information Literacy
- Information Technology Competence
- Ethical practice

3 Lab reports

Assessment Type

On-campus Activity

Task Description

Attend the online lab session and complete a report. Details of the residential school activities will be available in Moodle.

Assessment Due Date

Week 10 Friday (24 Sept 2021) 5:00 pm AEST

Return Date to Students

Two weeks after the submission

Weighting

25%

Minimum mark or grade

50%

Assessment Criteria

Students will be assessed on attendance, participation, test results, presentation skills, experimental activities and reflections.

Referencing Style

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

Submission

Online

Learning Outcomes Assessed

- Use tables of properties for fluids and explain and solve basic problems relating to flow and non-flow process.
- Apply the first law of thermodynamics, second law of thermodynamics and other energy equations to basic problems in thermodynamics.
- Analyse typical heat engine cycles and refrigeration cycles.
- Prepare technical and laboratory reports with evidence of thorough evaluation of experimental uncertainties and results obtained.
- Communicate professionally and provide evidence of personal reflection on, and critical assessment of, team contributions and professional development.
- Solve problems and record and communicate clearly and professionally the approach used to solve 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

4 Video Presentation

Assessment Type

Presentation

Task Description

Prepare a video presentation on your learning in this unit. Length : Maximum 5 minutes.

Assessment Due Date

Review/Exam Week Monday (11 Oct 2021) 5:00 pm AEST

Return Date to Students

The assessment feedback will be given 2 weeks after the submission

Weighting

5%

Assessment Criteria

Student demonstrates understanding of the unit learning outcomes and reflects on their learning in the unit
Quality of presentation slides and video presentation. More information will be there in the moodle.

Referencing Style

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

Submission

Online

Learning Outcomes Assessed

- Use tables of properties for fluids and explain and solve basic problems relating to flow and non-flow process.
- Apply the first law of thermodynamics, second law of thermodynamics and other energy equations to basic problems in thermodynamics.
- Analyse typical heat engine cycles and refrigeration cycles.
- Prepare technical and laboratory reports with evidence of thorough evaluation of experimental uncertainties and results obtained.
- Communicate professionally and provide evidence of personal reflection on, and critical assessment of, team contributions and professional development.
- Solve problems and record and communicate clearly and professionally the approach used to solve problems and the reasons for adopting such approaches to problems.

Graduate Attributes

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