



# ENAM12005 *Thermal Energy Plant*

## Term 2 - 2024

Profile information current as at 29/07/2024 05:55 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 plants using basic principles of thermodynamics. You will use standard thermodynamics tables to solve fundamental problems relating to flow and non-flow processes. You will apply thermodynamics and energy equations to analyse the performance of thermal energy plants such as heat engines and refrigeration cycles. You are required to communicate effectively regarding technical aspects of thermodynamics, prepare technical and laboratory reports, clearly document technical procedures and 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.

#### 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 - 2024

- 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. **Online Quiz(zes)**

Weighting: 40%

#### 2. **Written Assessment**

Weighting: 35%

#### 3. **Laboratory/Practical**

Weighting: 25%

### 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 Res school discussion

**Feedback**

The labs for this unit were very interesting and provided an understanding of how the different concepts are applied in the real world.

**Recommendation**

This practice should be continued.

#### Feedback from SUTE/Res school discussion

**Feedback**

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

**Recommendation**

This practice should be continued.

## 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



### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes				
	1	2	3	4	5
1 - Online Quiz(zes) - 40%	•	•	•		
2 - Written Assessment - 35%	•	•	•		•
3 - Laboratory/Practical - 25%				•	•

### 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					

## Textbooks and Resources

### Textbooks

ENAM12005

#### Prescribed

##### **Thermodynamics: Advanced Applications**

Edition: 1 (1996)

Authors: Kinsky, Roger

McGraw Hill

North Sydney , NSW , Australia

ISBN: 978-007-0665-91-0

ENAM12005

#### Prescribed

##### **Thermodynamics and Fluid Mechanics: An Introduction**

Edition: 1 (1995)

Authors: Kinsky, Roger

McGraw Hill

North Sydney , NSW , Australia

ISBN: ISBN: 978-1-119-24898-9

#### Additional Textbook Information

No

[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

## Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Ramadas Narayanan** Unit Coordinator

[r.narayanan@cqu.edu.au](mailto:r.narayanan@cqu.edu.au)

## Schedule

### Week 1 - 08 Jul 2024

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

### Week 2 - 15 Jul 2024

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 - 22 Jul 2024**

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

**Week 4 - 29 Jul 2024**

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 - 05 Aug 2024**

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

**Vacation Week - 12 Aug 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Vacation		

**Week 6 - 19 Aug 2024**

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 - 26 Aug 2024**

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 - 02 Sep 2024**

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

**Week 9 - 09 Sep 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Refrigeration and heat pumps	Thermodynamics : Advanced Applications. Chapter 4	Zoom Tutorial

**Week 10 - 16 Sep 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Residential school at ROK	Lab experiments	Residential School at ROK- Lab experiments

**Week 11 - 23 Sep 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Heat transfer	Thermodynamics : Advanced Applications. Chapter 1	Zoom Tutorial  <b>On-campus Activity- Practical assessments</b> Due: Week 11 Wednesday (25 Sept 2024) 11:45 pm AEST

**Week 12 - 30 Sep 2024**

Module/Topic	Chapter	Events and Submissions/Topic
Revision	All chapters previously stated	Zoom Tutorial  <b>Assignment</b> Due: Week 12 Friday (4 Oct 2024) 11:45 pm AEST

## Review/Exam Week - 07 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
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## Exam Week - 14 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
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## Assessment Tasks

### 1 Weekly Online Quizzes

#### Assessment Type

Online Quiz(zes)

#### Task Description

These weekly quizzes assess the contents of each week. There will be 8 quizzes starting from week 2 and extending up to week 9. All quizzes together will have a 40% 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 it within the open period.

#### Number of Quizzes

8

#### Frequency of Quizzes

Weekly

#### 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

40%

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

#### Submission

Online

#### Learning Outcomes Assessed

- Apply fluid properties to solve problems relating to flow and non-flow processes
- 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

### 2 Assignment

#### Assessment Type

Written Assessment

#### Task Description

The assignment is based on content from week 1 until week 11 inclusive. Questions will be released in Moodle early in the term

#### Assessment Due Date

Week 12 Friday (4 Oct 2024) 11:45 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 \(author-date\)](#)

**Submission**

Online

**Learning Outcomes Assessed**

- Apply fluid properties to solve problems relating to flow and non-flow processes
- 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
- Solve problems by following established procedures and communicating effectively in a team.

### 3 On-campus Activity- Practical assessments

**Assessment Type**

Laboratory/Practical

**Task Description**

Attend the residential school lab sessions and complete the relevant reports. Details of the residential school activities will be available in Moodle.

**Assessment Due Date**

Week 11 Wednesday (25 Sept 2024) 11:45 pm AEST

**Return Date to Students**

Review/Exam Week Wednesday (9 Oct 2024)

2 weeks after the submission

**Weighting**

25%

**Minimum mark or grade**

50%

**Assessment Criteria**

Students will be assessed on attendance, participation, test results, experimental activities and lab report.

**Referencing Style**

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

**Submission**

Online

**Learning Outcomes Assessed**

- Prepare technical and laboratory reports with evidence of thorough evaluation of experimental uncertainties and results obtained
- Solve problems by following established procedures and communicating effectively in a team.



## 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