



# CHEM13083 *Physical Chemistry*

## Term 1 - 2022

Profile information current as at 05/05/2024 04:14 am

All details in this unit profile for CHEM13083 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

In this unit you will develop advanced understanding of the core areas of physical chemistry, based around the themes of systems, states and processes. You will study mixtures and phases, spectroscopy, molecular motion and ionic conductance. This unit will extend your theoretical knowledge to complex mixtures encountered in environmental studies and vibrational spectroscopy, which is rapidly emerging as a core analytical tool for screening and quantification of species in a myriad of disciplines.

### 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

Prerequisite: CHEM19085 OR CHEM12077 OR CHEM12079 OR CHEM12080

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

### Offerings For Term 1 - 2022

- 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: 20%

#### 2. **Report**

Weighting: 50%

#### 3. **Online Test**

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. Evaluate the properties of mixtures
2. Predict the types of molecular motion in fluids and mixtures
3. Design and conduct practical assessments of molar conductance and conductivity
4. Assess the kinetics and determine the mass transfer process of various chemical reactions.

## 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
1 - Written Assessment - 20%		•		•
2 - Report - 50%	•	•	•	•
3 - Online Test - 30%	•	•		•

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes			
	1	2	3	4
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 - Written Assessment - 20%	•		•	•						
2 - Report - 50%	•	•	•		•					

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
<b>3 - Online Test - 30%</b>										

## Textbooks and Resources

### Textbooks

CHEM13083

#### Prescribed

**Physical Chemistry: Thermodynamics, Statistical Thermodynamics, and Kinetics, Global Edition**

Authors: Thomas Engel and Philip Reid

Pearson

Binding: Hardcover

#### Additional Textbook Information

All weekly lectures and tutorials are sourced from this textbook, so the student will be required to have access to it at all times. Both electronic and hard copies will suffice.

[View textbooks at the CQUniversity Bookshop](#)

### IT Resources

**You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- EndNote Bibliographical application
- MS Office

## Referencing Style

All submissions for this unit must use the referencing style: [Vancouver](#)  
For further information, see the Assessment Tasks.

## Teaching Contacts

**Shaneel Chandra** Unit Coordinator

[s.chandra@cqu.edu.au](mailto:s.chandra@cqu.edu.au)

## Schedule

### Week 1 - 07 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Fundamental Concepts of Thermodynamics	1	

### Week 2 - 14 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Heat, Work, Internal Energy, and the First Law of Thermodynamics	2	

**Week 3 - 21 Mar 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Internal Energy, Enthalpy and Thermochemistry	3, 4	

**Week 4 - 28 Mar 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Phase Diagrams and the Relative Stability of Solids, Liquids and Gases	8	<b>Written Assessment</b> Due: Week 4 Friday (1 Apr 2022) 11:45 pm AEST

**Week 5 - 04 Apr 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Electrochemical Cells and Batteries	11	

**Vacation Week - 11 Apr 2022**

Module/Topic	Chapter	Events and Submissions/Topic
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**Week 6 - 18 Apr 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Transport Phenomena	17	

**Week 7 - 25 Apr 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Elementary Chemical Kinetics	18	

**Week 8 - 02 May 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Complex Reaction Mechanisms	19	Residential School (5-6 May)

**Week 9 - 09 May 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Ideal and Real Solutions	9	

**Week 10 - 16 May 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Ideal and Real Solutions	9	<b>Practical and Written Assessment</b> Due: Week 10 Friday (20 May 2022) 11:45 pm AEST

**Week 11 - 23 May 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Electrolyte Solutions	10	

**Week 12 - 30 May 2022**

Module/Topic	Chapter	Events and Submissions/Topic
Revision		

**Review/Exam Week - 06 Jun 2022**

Module/Topic	Chapter	Events and Submissions/Topic
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**Exam Week - 13 Jun 2022**

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

# 1 Written Assessment

## Assessment Type

Written Assessment

## Task Description

For this Assessment Task, you will write a scientific review paper on a topic that will be allocated to you. The topic will be one of relevance to both the scientific and non-scientific communities. However, you will be writing as a scientist to try and explain the topic to a non-technical audience. The review must be word-processed, with appropriate layout and use of headings/sub-headings. Tables and figures to illustrate specific aspects may be included with titles and acknowledgement where necessary. In addition, the word count should not exceed 2000 (excluding references).

## Assessment Due Date

Week 4 Friday (1 Apr 2022) 11:45 pm AEST

To be submitted via Moodle

## Return Date to Students

Week 6 Friday (22 Apr 2022)

Returned with feedback via Moodle

## Weighting

20%

## Minimum mark or grade

50%

## Assessment Criteria

### Assessment Criteria

*Introduction and Background: 25%*

Excellent detail to highlight the present scenario.

Very convincing argument provided for undertaking the present study

*Literature: 20%*

Coherent, with excellent merge of literature

All material is sourced externally cited in the correct format

Literature cited is recent (< 5 years), credible, relevant

*Organization: 25%*

Well-presented

Well-positioned to reinforce the argument(s)

Correctly labelled

Well-organized such that patterns and themes immediately become obvious

*Analysis of the Literature: 20%*

Critical examination of literature is evident

Demonstration of new knowledge to produce coherent understanding of the topic

*Overall Presentation: 10%*

No typos, cohesive and very easy to follow arguments

## Referencing Style

- [Vancouver](#)

## Submission

Online

## Submission Instructions

To be submitted via Moodle

## Learning Outcomes Assessed

- Predict the types of molecular motion in fluids and mixtures
- Assess the kinetics and determine the mass transfer process of various chemical reactions.

## Graduate Attributes

- Communication
- Critical Thinking
- Information Literacy

## 2 Practical and Written Assessment

### Assessment Type

Report

### Task Description

The Assessment Task relates to the compulsory Residential School. At the Residential School, you may work in pairs or groups on experiments. For the Assessment Task, you will write up an individual scientific report of the experiments and activities undertaken during the Residential School.

### Assessment Due Date

Week 10 Friday (20 May 2022) 11:45 pm AEST

To be submitted via Moodle

### Return Date to Students

Week 12 Friday (3 June 2022)

Returned with feedback via Moodle

### Weighting

50%

### Minimum mark or grade

50%

### Assessment Criteria

#### Assessment Criteria

*Introduction and Background: 50%*

Very convincing justifications for the merits of the experiments.

*Literature: 20%*

Scientific literature, externally cited in the correct format to justify claims and explanations

Literature cited is recent (< 5 years), credible, relevant

*Organization: 30%*

Well-positioned to reinforce the argument(s)

Correctly labelled figures and tables

*Overall Presentation: 10%*

No typos, cohesive and very easy to follow arguments

Word limit - 2000

### Referencing Style

- [Vancouver](#)

### Submission

Online

### Submission Instructions

To be submitted via Moodle

### Learning Outcomes Assessed

- Evaluate the properties of mixtures
- Predict the types of molecular motion in fluids and mixtures
- Design and conduct practical assessments of molar conductance and conductivity
- Assess the kinetics and determine the mass transfer process of various chemical reactions.

### Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Team Work

## 3 Online Test

### Assessment Type

Online Test

**Task Description**

The Online Test will be an assortment of problem-solving and extended-answer questions. It will have a timed period in which it must be submitted. The specific details of the Assessment will be provided on Moodle.

**Assessment Due Date**

To be attempted in Moodle at a date to be specified.

**Return Date to Students**

Marked assessments will be returned via Moodle.

**Weighting**

30%

**Minimum mark or grade**

50%

**Assessment Criteria**

Due to the specific nature of questions in this activity, specific instructions and assessment criteria will be further explained in the Test itself.

**Referencing Style**

- [Vancouver](#)

**Submission**

Online

**Submission Instructions**

To be submitted by the due date and time.

**Learning Outcomes Assessed**

- Evaluate the properties of mixtures
- Predict the types of molecular motion in fluids and mixtures
- Assess the kinetics and determine the mass transfer process of various chemical reactions.

**Graduate Attributes**

- Problem Solving
- Critical Thinking



## 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