



CHEM13080 *Analytical Science*

Term 2 - 2018

Profile information current as at 28/04/2024 03:48 am

All details in this unit profile for CHEM13080 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 apply fundamental principles of analytical science and study analytical techniques, such as quantitative molecular spectrophotometry; atomic spectrometry; chromatographic methods; mass spectrometry, and the use of ion-selective and gas-sensing electrodes. You will interpret analytical data; examine error analysis, data handling and manipulation; and understand quality assurance. During a compulsory residential school you will use state-of-the-art analytical instrumentation and apply your learnt theoretical techniques and methods.

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: CHEM 11041 - Chemistry for the Life Sciences, knowledge of mathematics and formula manipulation are essential.

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

- Distance
- 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. **Presentation and Written Assessment**

Weighting: 25%

2. **Practical and Written Assessment**

Weighting: 10%

3. **Practical Assessment**

Weighting: 15%

4. **Examination**

Weighting: 50%

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 Have Your Say

Feedback

Study guide missing units for some equations

Recommendation

We will update the study guide with newer examples and also replace the missing equations.

Feedback from Have Your Say

Feedback

Assessment 3 needs additional page limits

Recommendation

We will update this page limit to include an additional page for the bonus task.

Feedback from Have Your Say

Feedback

Research Plan assessment could be clearer

Recommendation

We will update this assessment to include a tutorial video as well as the supporting text for students in the latest offering of analytical science.

Unit Learning Outcomes

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

1. Explain the theory and applications of contemporary techniques in analytical science.
2. Demonstrate practical laboratory skills in the use advanced analytical instrumentation to make reliable analytical measurements.
3. Demonstrate problem solving and analytical skills in the fundamentals of analytical science.
4. Research the developments and trends in analytical science for a diverse range of chemical and biomedical science applications.

Alignment of Learning Outcomes, Assessment and Graduate Attributes



Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes			
	1	2	3	4
1 - Presentation and Written Assessment - 25%	•			•
2 - Practical and Written Assessment - 10%		•	•	•
3 - Practical Assessment - 15%		•		

Assessment Tasks	Learning Outcomes			
	1	2	3	4
4 - Examination - 50%	•		•	

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 - Presentation and Written Assessment - 25%	•	•	•	•	•	•		•		
2 - Practical and Written Assessment - 10%	•	•	•	•	•	•		•		
3 - Practical Assessment - 15%	•	•	•	•		•		•		
4 - Examination - 50%	•	•	•	•						

Textbooks and Resources

Textbooks

CHEM13080

Prescribed

Exploring Chemical Analysis

Edition: 5th edn (2012)

WH Freeman and Co

New York , NY , USA

ISBN: 9781429275033

Binding: Paperback

Additional Textbook Information

[View textbooks at the CQUniversity Bookshop](#)

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Microsoft Excel
- PowerPoint
- Word processing

Referencing Style

All submissions for this unit must use the referencing style: [Vancouver](#)

For further information, see the Assessment Tasks.

Teaching Contacts

Catherine Jones Unit Coordinator

c.e.jones@cqu.edu.au

Schedule

Week 1 - 09 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to analytical science: measurements, concentration units and basic analytical tools	Textbook: 0-2 Study guide: 1-2	

Week 2 - 16 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Reliability of analytical data	Textbook: 3-5 Study guide: 3	

Week 3 - 23 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Sampling and sample preparation	Study guide: 4 Web resources	

Week 4 - 30 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Quality Assurance	Text book: 5 Study guide: 3 Web resources	

Week 5 - 06 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Chemical equilibria in analysis	Textbook: 8-10, 16 Study guide: 5	

Vacation Week - 13 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Week 6 - 20 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Molecular and atomic spectroscopy	Textbook: 18-20 Study guide: 6	Written component of Assessment 1 is due Research assignment - optimising analytical methods Due: Week 6 Monday (20 Aug 2018) 11:45 pm AEST

Week 7 - 27 Aug 2018

Module/Topic	Chapter	Events and Submissions/Topic
Electrochemical Analysis	Textbook: 14,15,17 Study guide: 7	

Week 8 - 03 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Analytical Separations	Textbook: 21-22 Study guide: 8	Residential School: 6-8 September 2018 Oral presentation for Assessment 1 due (to be given on the first day of Res. School)

Week 9 - 10 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Analytical Separations (continued)	Textbook: 21-22 Study guide: 8	

Week 10 - 17 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Mass spectrometry	Text book: 21 Study guide: 9 Web resources	Practical work and write-up Due: Week 10 Friday (21 Sept 2018) 11:45 pm AEST

Week 11 - 24 Sep 2018

Module/Topic	Chapter	Events and Submissions/Topic
Automation and flow analysis	Study guide: 10 Web resources	

Week 12 - 01 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
Revision	All resources	Treatment of analytical data using Excel Due: Week 12 Monday (1 Oct 2018) 11:45 pm AEST

Review/Exam Week - 08 Oct 2018

Module/Topic	Chapter	Events and Submissions/Topic
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Assessment Tasks

1 Research assignment - optimising analytical methods

Assessment Type

Presentation and Written Assessment

Task Description

Analytical scientists are required to use a variety of sophisticated instrumentation to investigate and analyse known and unknown samples with precision and accuracy. Method optimisation is often required to account for particular sample matrices or the specific reagents and equipment at hand - problem solving and adaptability are integral skills for analytical scientists to hold.

In Assessment Task 1 you will consult the scientific literature to find examples of published methods that utilised an analytical instrument (from the list provided on Moodle). You will research the method development, optimisation and validation that was required for the new or novel methods. You will prepare a written report detailing these findings and you will give an oral presentation (using PowerPoint) at the residential school that outlines the key approaches to method optimisation for your particular instrument. This will aid you and your peers leading into the residential school (where you will gain hands on experience with advanced instrumentation, including method optimisation).

A list of suitable instrumentation and any additional details of the written and oral presentation structures will be provided on Moodle.

Assessment Due Date

Week 6 Monday (20 Aug 2018) 11:45 pm AEST

Written report to be submitted through Moodle by the due date. Oral presentation due (and to be given) on the first day of the Residential School

Return Date to Students

Week 9 Monday (10 Sept 2018)

Feedback will be given via Moodle after both written and oral components have been completed

Weighting

25%

Minimum mark or grade

40% of the total marks allocated for the assessment task

Assessment Criteria**Written report:**

Presentation and organisation of material - 5%

Clarity of writing - 10%

Relevance, reliability and depth of reviewed literature - 15%

Detailed discussion of required content - 40%

Correct referencing style including in-text references - 10%

Oral presentation:

Content and presentation of slides - 10%

Delivery and responses to questions - 10%

Referencing Style

- [Vancouver](#)

Submission

Online

Learning Outcomes Assessed

- Explain the theory and applications of contemporary techniques in analytical science.
- Research the developments and trends in analytical science for a diverse range of chemical and biomedical science applications.

Graduate Attributes

- Communication

- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Ethical practice

2 Practical work and write-up

Assessment Type

Practical and Written Assessment

Task Description

In addition to understanding theory and techniques; working in a laboratory requires you to have good planning and organisational skills, and to be able to work efficiently as part of a team of analysts to produce high quality results. In Assessment 2 you will work in pairs or groups (depending on numbers) to prepare samples and standards; to carry out experiments; and utilise a variety of analytical instrumentation during the residential school. You will then answer a series of question relating to each of the experiments you have carried out, and you will write a full laboratory report for one practical (identified by the teaching staff at completion of the residential school). Marks for the practical component will be awarded for evidence of planning and team work.

Assessment Due Date

Week 10 Friday (21 Sept 2018) 11:45 pm AEST

Return Date to Students

Week 11 Friday (28 Sept 2018)

Feedback will be given via Moodle

Weighting

10%

Minimum mark or grade

40% of the total marks allocated for the assessment task

Assessment Criteria

Practical component:

Planning, effort and teamwork - 10%

Written component Part A - Discussion Questions:

Completion of questions - 10%

Written component Part B - Lab Report:

Clarity, completeness and presentation - 5%

Appropriate treatment of experimental data and correct calculations - 40%

Sound interpretation of data - 30%

Evidence of research and correct referencing - 5%

Referencing Style

- [Vancouver](#)

Submission

Online

Learning Outcomes Assessed

- Demonstrate practical laboratory skills in the use advanced analytical instrumentation to make reliable analytical measurements.
- Demonstrate problem solving and analytical skills in the fundamentals of analytical science.
- Research the developments and trends in analytical science for a diverse range of chemical and biomedical science applications.

Graduate Attributes

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

3 Treatment of analytical data using Excel

Assessment Type

Practical Assessment

Task Description

Data treatment and analysis are essential skills for all scientists. In Assessment 3 you will use and manipulate specific functionalities within Excel using real data obtained from previously conducted experiments. An instruction booklet, Excel templates and details of how to present your results as a report will be available on Moodle.

Assessment Due Date

Week 12 Monday (1 Oct 2018) 11:45 pm AEST

Return Date to Students

Review/Exam Week Monday (8 Oct 2018)

Weighting

15%

Minimum mark or grade

40% of the total marks allocated for the assessment task

Assessment Criteria

Clarity, completeness and presentation – 10%

Appropriate treatment of experimental data and correct calculations – 40%

Sound interpretation of data – 40%

Evidence of research and correct referencing – 10%

Referencing Style

- [Vancouver](#)

Submission

Online

Learning Outcomes Assessed

- Demonstrate practical laboratory skills in the use advanced analytical instrumentation to make reliable analytical measurements.

Graduate Attributes

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

Examination

Outline

Complete an invigilated examination.

Date

During the examination period at a CQUniversity examination centre.

Weighting

50%

Length

120 minutes

Minimum mark or grade

40

Exam Conditions

Closed Book.

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