



CHEM13080 Analytical Science

Term 2 - 2019

Profile information current as at 24/04/2024 01:17 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 - 2019

- 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. **Presentation and Written Assessment**

Weighting: 25%

2. **Practical Assessment**

Weighting: 15%

3. **Practical and Written Assessment**

Weighting: 10%

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 Student evaluation; phone and face-to-face conversations

Feedback

Some students felt the weighting of the assessments did not reflect the amount of effort required.

Recommendation

We will review the assessment items and their weightings in the next review of the unit, as part of the Rejuvenation of Science.

Feedback from Student evaluation; face-to-face conversation

Feedback

Students were positive about the preparation and delivery of the residential school.

Recommendation

We will continue to enhance the residential school with each offering, with the overall aim being to increase student competency in analytical science.

Feedback from Student evaluation, face-to-face and phone conversation

Feedback

Students commented that the unit coordinator did a good job of teaching and answering forum questions completely. However, an inconsistency in the style of lecturers/ depth of later lecturers was mentioned.

Recommendation

We will continue to encourage the use of the Q&A forum for prompt responses to unit related content, and to give detailed assistance with problem solving as required. The later lectures were from 2017, we will update and re-record them ahead of the next offering.

Feedback from Student email and Moodle Q&A

Feedback

Some students requested further tutorial videos for Assessment 3 - Treatment of analytical data using Excel.

Recommendation

We will review the continued applicability of this long standing assessment, in the next review of the unit.

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%		•		
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

Quantitative Chemical Analysis

Edition: 9th edn (2017)

Authors: Daniel C. Harris

W.H Freeman

New York , NY , USA

ISBN: 9781464135385 (eBook) or 9781319154141 (Paperback)

Binding: Other

Additional Textbook Information

Paperback copies, e-copies will be equally useful.

Paper copies can be purchased from 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)
- Microsoft Office (Word, Excel and PowerPoint)

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

Catherine Jones Unit Coordinator

c.e.jones@cqu.edu.au

Schedule

Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to analytical science; Review of measurements, concentration units and basic analytical tools	0-2	

Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Reliability of analytical data	3-5 (sections as directed by lecturers)	

Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Sampling and sample preparation	28	

Week 4 - 05 Aug 2019		
Module/Topic	Chapter	Events and Submissions/Topic
Quality Assurance	5	
Week 5 - 12 Aug 2019		
Module/Topic	Chapter	Events and Submissions/Topic
Chemical equilibria in analysis	6-13 (sections as directed by lecturers)	Written component of Assessment 1 is due Written and oral research assignment - Optimising Analytical Methods Due: Week 5 Friday (16 Aug 2019) 11:45 pm AEST
Vacation Week - 19 Aug 2019		
Module/Topic	Chapter	Events and Submissions/Topic
Week 6 - 26 Aug 2019		
Module/Topic	Chapter	Events and Submissions/Topic
Molecular and atomic spectroscopy	18-21 (sections as directed by lecturers)	
Week 7 - 02 Sep 2019		
Module/Topic	Chapter	Events and Submissions/Topic
Electrochemical Analysis	14-17 (sections as directed by lecturers)	PowerPoint Slides for Assessment 1 Due: Week 7 Thurs (5 Sep. 2019) 5:00 pm AEST Oral component of Assessment 1 is due at Res. School Residential School: 6-8 Sep 2019
Week 8 - 09 Sep 2019		
Module/Topic	Chapter	Events and Submissions/Topic
Analytical Separations	23-26 (sections as directed by lecturers)	
Week 9 - 16 Sep 2019		
Module/Topic	Chapter	Events and Submissions/Topic
Analytical Separations (continued)	23-26 (sections as directed by lecturers)	Practical work - Calculations and Answers to Questions Due: Week 9 Friday (20 Sept 2019) 11:45 pm AEST
Week 10 - 23 Sep 2019		
Module/Topic	Chapter	Events and Submissions/Topic
Mass spectrometry	22	
Week 11 - 30 Sep 2019		
Module/Topic	Chapter	Events and Submissions/Topic
Automation and flow analysis	As directed by lecturers	Scientific Laboratory Report Due: Week 11 Monday (30 Sept 2019) 11:45 pm AEST
Week 12 - 07 Oct 2019		
Module/Topic	Chapter	Events and Submissions/Topic
Revision	All resources	
Review/Exam Week - 14 Oct 2019		
Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Written and oral 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, therefore, 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 one of the analytical instruments listed on your Moodle site. You will research the optimisation and validation that was required for the development of the new or novel methods. You will prepare a written report detailing these findings. Additionally, you will give an oral presentation (using PowerPoint) at the residential school that outlines the key approaches to method development/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 5 Friday (16 Aug 2019) 11:45 pm AEST

Written report to be submitted through Moodle by the due date. Oral presentation PowerPoint slides due: Week 7 Thursday (5 Sep. 2019) - to be presented at the Residential School (6-8 Sep. 2019)

Return Date to Students

Week 8 Monday (9 Sept 2019)

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:

Slide content - 5%

Slide layout - 5%

Presentation delivery - 5%

Response to audience questions - 5%

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 - Calculations and Answers to Questions

Assessment Type

Practical 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. During the residential school, for Assessment 2, you will work in pairs or groups (depending on numbers), to plan your work, to prepare samples and standards, to carry out experiments, and to utilise a variety of analytical instrumentation. You will then, individually, complete a series of data processing, calculations and questions, relating to each of the experiments you have carried out.

Assessment Due Date

Week 9 Friday (20 Sept 2019) 11:45 pm AEST

Return Date to Students

Week 11 Friday (4 Oct 2019)

Weighting

15%

Minimum mark or grade

40% of the total marks allocated for the assessment task

Assessment Criteria

Planning, effort and teamwork during residential school - 30%

Demonstrated understanding of methodology and accurate sample and standard preparation; evidenced by correctly calculated results and/or description of procedural error - 30%

Completion of questions from practical manual - 30%

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

3 Scientific Laboratory Report

Assessment Type

Practical and Written Assessment

Task Description

You will write a full scientific laboratory report for one practical completed at the residential school. The specific practical

will be identified by the teaching staff at completion of the residential school. Any additional details about the expected report layout will be provided via Moodle.

Assessment Due Date

Week 11 Monday (30 Sept 2019) 11:45 pm AEST

Return Date to Students

Week 12 Friday (11 Oct 2019)

Feedback will be given via Moodle

Weighting

10%

Minimum mark or grade

40% of the total marks allocated for the assessment task

Assessment Criteria

Clarity, completeness and presentation - 20%

Appropriate treatment of experimental data and correct calculations - 40%

Sound interpretation of data - 30%

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.
- 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

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