CHEM13080 *Analytical Science*
Term 2 - 2024

Profile information current as at 15/07/2025 06:12 am

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 electrodes. You will interpret analytical data; examine error analysis, data handling and manipulation; and understand quality assurance. During a compulsory residential school, you will apply analytical theory, use advanced analytical instrumentation and enhance your laboratory skills.

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
CHEM11043 Atoms, Molecules and Matter or CHEM11041 Chemistry for the Life Sciences
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).

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**
Weighting: 20%
2. **Written Assessment**
Weighting: 20%
3. **Practical and Written Assessment**
Weighting: 20%
4. **Online Test**
Weighting: 40%

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 SUTE feedback

Feedback

Rating the teaching team, in response to the question "How would you rate your teaching team for CHEM13080 - Analytical Sci.?", the majority of students selected the Exceptional rating.

Recommendation

This is pleasing feedback. We will continue our efforts to improve student learning and their experience in the next offering 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 of 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 applications.

Alignment of Learning Outcomes, Assessment and Graduate Attributes

— N/A Level • Introductory Level • Intermediate Level • Graduate Level ◦ Professional Level ◦ Advanced Level

Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes			
	1	2	3	4
1 - Presentation - 20%	•			•
2 - Written Assessment - 20%			•	
3 - Practical and Written Assessment - 20%		•	•	•
4 - Online Test - 40%	•		•	

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes			
	1	2	3	4
1 - Communication	•	•		•
2 - Problem Solving	•	•	•	

Graduate Attributes	Learning Outcomes			
	1	2	3	4
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 - 20%	•		•	•		•				
2 - Written Assessment - 20%	•	•	•	•		•				
3 - Practical and Written Assessment - 20%	•	•	•	•	•	•				
4 - Online Test - 40%		•	•							

Textbooks and Resources

Textbooks

CHEM13080

Prescribed

Quantitative Chemical Analysis
Edition: 10th (2020)
Authors: Daniel C. Harris; Charles A. Lucy
Macmillian
ISBN: 9781319274023
Binding: eBook

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)
- Zoom (both microphone and webcam capability)

Referencing Style

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

Teaching Contacts

Phil Kearns Unit Coordinator
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Amie Anastasi Unit Coordinator
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Schedule

Week 1 - 08 Jul 2024

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

Week 2 - 15 Jul 2024

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

Week 3 - 22 Jul 2024

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

Week 4 - 29 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic

Quality Assurance	5	**Assessment 1 - Research presentation - Review of new or novel analytical methods** Due: Week 4 Wednesday (31 July 2024) 11:59 pm AEST

Week 5 - 05 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Acid-base equilibria and EDTA titrations	10 and 12 (sections as directed in lectures)	**Assessment 2 - Data processing, calculations, and questions** Due: Week 5 Tuesday (6 Aug 2024) 11:59 pm AEST

Vacation Week - 12 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 19 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Electrochemical analysis	Lecture slides are standalone (see cpt 14-17 of text for further reference)	

Week 7 - 26 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Molecular and atomic spectroscopy	18 and 21 (sections as directed in lectures)	

Week 8 - 02 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Analytical separations - Part 1	23-25 (sections as directed in lectures)	

Week 9 - 09 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Analytical separations - Part 2	23-25 (sections as directed in lectures)	**Assessment 3 - Practical work & Scientific laboratory report** Due: Week 9 Wednesday (11 Sept 2024) 11:59 pm AEST

Week 10 - 16 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Mass spectrometry	22	

Week 11 - 23 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Automation, discrete and flow analysis	19-4 and other references as directed	

Week 12 - 30 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
		Assessment 4 - Online Test - End of Term Assessment Due: Week 12 Wednesday (2 Oct 2024) 11:59 pm AEST

Review/Exam Week - 07 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic

Exam Week - 14 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Assessment 1 - Research presentation - Review of new or novel analytical methods

Assessment Type
Presentation

Task Description
Representative sampling, sample preparation, method optimization, method validation and quality control are key components of Analytical Science. Additionally, analytical scientists are required to use a variety of sophisticated techniques and instrumentation to investigate and analyze, both known and unknown samples, with precision and accuracy.
In Assessment 1, you will conduct research to review at least three new and novel scientific methods published in credible scientific journals. In doing so, you will aim to better understand the main aspects of method development and validation. You will then present this information in the form of PowerPoint slides on which you will voice-over and record as a video for submission that **does not exceed 5 minutes** in length. Your submitted video must summarise your key findings, review the selected methods and demonstrate your understanding of the key analytical science principles.

Assessment Due Date
Week 4 Wednesday (31 July 2024) 11:59 pm AEST

To be submitted via Moodle

Return Date to Students
Week 8 Wednesday (4 Sept 2024)

Returned with feedback via Moodle

Weighting
20%

Minimum mark or grade
50% o

Assessment Criteria

- Relevance, reliability and depth of reviewed literature (including correct referencing) – 25%
- Demonstrated understanding of key analytical science concepts – 25%
- Slide content and layout – 25%
- Presentation delivery – 25%

Referencing Style

- Vancouver

Submission
Online

Submission Instructions
Presentation video should be submitted via Moodle as an .mp4 file.

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 applications.

Graduate Attributes

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

2 Assessment 2 - Data processing, calculations, and questions

Assessment Type
Written Assessment

Task Description
Analytical laboratories produce large amounts of measurement data. The ability to correctly process, interpret, and assess this data is a vital skill for scientists.
Assessment 2 has been designed to enhance your problem solving, data interpretation, and data presentation skills. You will complete a series of data processing, calculation, and short answer questions, to interpret real datasets generated from analytical instruments that you will later operate during your Residential School. Working through Assessment 2 will familiarize you with some of the measurement techniques you will use during the Residential School. It will also prepare you for data generation, processing, and interpretation aspects of standard analytical laboratory work.
Additional details and instructions will be provided via the CHEM13080 Moodle site.

Assessment Due Date
Week 5 Tuesday (6 Aug 2024) 11:59 pm AEST

Please supply your response as a Word file with your name and student number in the title.

Return Date to Students
Week 7 Tuesday (27 Aug 2024)

Returned with feedback via Moodle

Weighting
20%

Minimum mark or grade
50%

Assessment Criteria

- Data interpretation 25%
- Data processing and presentation 25%
- Correct calculations 25%
- Correctly addressing questions 20%
- Correct use of referencing to answer questions 5%

Referencing Style

- Vancouver

Submission
Online

Submission Instructions
The assessment should be submitted via Moodle.

Learning Outcomes Assessed

- Demonstrate problem solving and analytical skills in the fundamentals of analytical science

Graduate Attributes

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

3 Assessment 3 - Practical work & Scientific laboratory report

Assessment Type
Practical and Written Assessment

Task Description
Working in a laboratory requires you to understand scientific theory and be able to correctly execute and troubleshoot techniques to obtain useful, valid data. Additionally, laboratory work requires you to have good planning and organisational skills, often to work as part of a team of analysts, to produce high quality results.
During the laboratory component of the compulsory residential school, you will enhance your proficiency in sample and standard preparation; chemical concentration calculations; instrument operation; method validation and overall

technical competency as an analytical scientist.
In Assessment 3, you will work in pairs or groups 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,write a full scientific report for one of the completed practicals. The report should clearly demonstrate your understanding of the analysis and any steps you took to increase data quality or troubleshoot unexpected results.
Additional details and instructions will be provided via the CHEM13080 Moodle site.

Assessment Due Date
Week 9 Wednesday (11 Sept 2024) 11:59 pm AEST

To be submitted via Moodle.

Return Date to Students
Week 11 Wednesday (25 Sept 2024)

Via Moodle with feedback

Weighting
20%

Minimum mark or grade
50%

Assessment Criteria

- Planning, effort and teamwork during residential school – 20%
- Demonstrated understanding of methodology and accurate sample and standard preparation; evidenced by correctly calculated results and/or description of procedural error - 30%
- Sound interpretation of data and discussion of results – 30%
- Correct formatting and presentation of report – 10 %
- Correct referencing and evidence of research to support conclusions – 10%

Referencing Style

- Vancouver

Submission
Online

Submission Instructions
The assessment should be submitted via Moodle.

Learning Outcomes Assessed

- Demonstrate practical laboratory skills in the use of 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 applications.

Graduate Attributes

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

4 Assessment 4 - Online Test - End of Term Assessment

Assessment Type
Online Test

Task Description
Assessment 4 - Online test - End of Term Assessment, will be comprised of short answer, problem solving and critical thinking questions that address the learning outcomes of this unit.
The assessment will be conducted online, through the Moodle Quiz facility, and will be timed.
You will have 2 hours to complete the assessment during the allocated period of 24 hours which end as stated in

the **Due Date Information** below.
A scientific calculator and Periodic Table may be required for some questions.
Please ensure you have a good, stable internet connection during the assessment period.
Additional details and instructions will be provided via the CHEM13080 Moodle site.

Assessment Due Date
Week 12 Wednesday (2 Oct 2024) 11:59 pm AEST

You will have 2 hours from when you open the quiz to complete the assessment.

Return Date to Students
Review/Exam Week Wednesday (9 Oct 2024)

Available via Moodle

Weighting
40%

Minimum mark or grade
50%

Assessment Criteria
Marks will be awarded for correctly addressing:

- Analytical methodology and data questions 30%
- Problem solving questions 40%
- Instrumentation questions 30%

Referencing Style

- Vancouver

Submission
Online

Submission Instructions
The online test will be conducted via the Moodle Quiz facility.

Learning Outcomes Assessed

- Explain the theory and applications of contemporary techniques in analytical science
- Demonstrate problem solving and analytical skills in the fundamentals of analytical science

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