



# CHEM6231

## Advanced Analysis

Session 1, Weekday attendance, North Ryde 2021

*Department of Molecular Sciences*

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#### **Notice**

As part of [Phase 3 of our return to campus plan](#), most units will now run tutorials, seminars and other small group activities on campus, and most will keep an online version available to those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face activities for your unit, please go to [timetable viewer](#). To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

## General Information

### Unit convenor and teaching staff

Convener, Lecturer

Alf Garcia-Bennett

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Contact via 02 9850 8285

4 Wally's Walk, Level 3, Room 327

Tuesday and Thursday 15:00-17:00

Lecturer

Yuling Wang

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Lecturer

Ian Jamie

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Credit points

10

Prerequisites

Admission to GradDipBiotech or GradCertLabAQMgt or GradDipLabAQMgt or MBiotech or MBioBus or MLabAQMgt or MRadiopharmSc or MSc or MScInnovationChemBiomolecularSc

Corequisites

Co-badged status

CHEM 3202

### Unit description

This unit covers advanced aspects of chemical analysis, building on the foundations laid in Analysis and Measurement. Modern chemical principles and practice of identifying substances and of determining their composition are discussed. Topics include many analytical techniques commonly employed in both industrial and academic research laboratories. Examples of applications to environmental and biological samples include: analysis of heavy metals by atomic absorption spectroscopy; inductively coupled plasma atomic emission spectroscopy; electrochemical detection of biochemicals and environmental pollutants. The unit emphasises hands-on experience in analysing real life samples, using many of these techniques.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://students.mq.edu.au/important-dates>

## Learning Outcomes

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

**ULO1:** Describe the scope of analytical chemistry.

**ULO2:** Demonstrate competency in the use of important analytical techniques commonly used in industrial and academic research.

**ULO3:** Analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.

**ULO4:** Analyse and critique experimental data and present them in oral format.

**ULO5:** Process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.

**ULO6:** Communicate analytical chemical knowledge by appropriately documenting the essential details of procedures undertaken, key observations, results and conclusions.

## General Assessment Information

In order to complete this unit satisfactorily students must:

- (a) attend and participate satisfactorily in **ALL** laboratory sessions;
- (b) submit satisfactory efforts at two (2) assignments;
- (c) perform satisfactorily in a final examination of three hours duration.

## Assessment Tasks

| Name                              | Weighting | Hurdle | Due   |
|-----------------------------------|-----------|--------|---|
| <a href="#">Laboratory Report</a> | 30%       | No     | 1 week after completion of Laboratory Session |
| <a href="#">Assignment 1</a>      | 10%       | No     | Monday 18th April, Week 17                    |
| <a href="#">Assignment 2</a>      | 10%       | No     | Friday 18th May, Week 22                      |
| <a href="#">Final Examination</a> | 50%       | No     | Week 14-15                                    |

### Laboratory Report

Assessment Type **1**: Lab report

Indicative Time on Task **2**: 30 hours

Due: **1 week after completion of Laboratory Session**

Weighting: **30%**

For each experiment, students are required to complete some Pre-laboratory work including Materials Safety Data Sheets and the general understanding of aim and procedure of the experiment. Following the completion of a laboratory session, students will then complete a written report.

On successful completion you will be able to:

- Describe the scope of analytical chemistry.
- Demonstrate competency in the use of important analytical techniques commonly used in industrial and academic research.
- Analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
- Analyse and critique experimental data and present them in oral format.
- Process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.
- Communicate analytical chemical knowledge by appropriately documenting the essential details of procedures undertaken, key observations, results and conclusions.

### Assignment 1

Assessment Type **1**: Problem set

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **Monday 18th April, Week 17**

Weighting: **10%**

Qualitative and quantitative questions requiring processing and critically analysis.

On successful completion you will be able to:

- Analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
- Analyse and critique experimental data and present them in oral format.
- Process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.
- Communicate analytical chemical knowledge by appropriately documenting the essential details of procedures undertaken, key observations, results and conclusions.

## Assignment 2

Assessment Type <sup>1</sup>: Problem set

Indicative Time on Task <sup>2</sup>: 15 hours

Due: **Friday 18th May, Week 22**

Weighting: **10%**

Numerical questions requiring students to process and critically analyse the supplied quantitative data; short-answer (fewer than 5 lines) questions.

On successful completion you will be able to:

- Analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
- Analyse and critique experimental data and present them in oral format.
- Process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.
- Communicate analytical chemical knowledge by appropriately documenting the essential details of procedures undertaken, key observations, results and conclusions.

## Final Examination

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 35 hours

Due: **Week 14-15**

Weighting: **50%**

Closed book examination.

On successful completion you will be able to:

- Describe the scope of analytical chemistry.
- Analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
- Analyse and critique experimental data and present them in oral format.
- Process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.
- Communicate analytical chemical knowledge by appropriately documenting the essential details of procedures undertaken, key observations, results and conclusions.

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<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Learning Skills Unit](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

## Delivery and Resources

Lecture notes, laboratory notes, tutorial videos and assignments can all be downloaded from iLearn.

Prescribed text: D.C.Harris, Quantitative Chemical Analysis, 9th Edition, W.H.Freeman and Company (2016).

Recommended references (all available in University Library):

D.A.Skoog, D.M.West, F.J.Holler, S.R.Crouch, Fundamentals of Analytical Chemistry, 9th Edition, Brooks/Cole, Thomson Learning, Inc (2014).

D.S.Hage, J.D.Carr, Analytical Chemistry and Quantitative Analysis, International Edition, Prentice Hall (2011).

D.A.Skoog, F.J.Holler and S.R.Crouch, Principles of Instrumental Analysis, 6th Edition, Saunders College Publishing (2007).

D. Sheehan, Physical Biochemistry: Principles and Applications, 2nd Edition, John Wiley & Sons Ltd (2009)

## Unit Schedule

| Week | Topic   | Lecturer |
|------|---|----------|
| 1    | Introduction to Analytical Chemistry and Measurement  | AGB, YW  |
| 2    | Statistical Methods in Analytical Chemistry           | YW       |
| 3    | Calibration and Metrology, Regulations and Standards. | AGB      |
| 4    | Advanced Spectroscopy                                 | AR       |
| 5    | Mass Spectroscopy                                     | AGB      |
| 6    | Atomic Adsorption                                     | IJ       |
| 7    | Electrochemistry 1                                    | AEGB     |
| 8    | Electrochemistry 2                                    | AEGB     |
| 9    | Scattering 1  | AEGB     |
| 10   | Scattering 2  | AEGB     |
| 11   | Analytical Microscopy                                 | AEGB     |
| 12   | Gravimetric Analysis and Chemometrics                 | AEGB     |
| 13   | Revision Lectures                                     | AEGB     |

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)

- [Special Consideration Policy](#)

Students seeking more policy resources can visit [Student Policies \(https://students.mq.edu.au/support/study/policies\)](https://students.mq.edu.au/support/study/policies). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

To find other policies relating to Teaching and Learning, visit [Policy Central \(https://policies.mq.edu.au\)](https://policies.mq.edu.au) and use the [search tool](#).

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## Student Enquiry Service

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## Equity Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide



appropriate help with any issues that arise during their studies.

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.