



CHEM3202

Advanced Analysis and Measurement

Session 1, In person-scheduled-weekday, North Ryde 2022

School of Natural Sciences

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General Information

Unit convenor and teaching staff

Alf Garcia-Bennett

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Credit points

10

Prerequisites

CHEM2201 or CBMS200 or CBMS208

Corequisites

Co-badged status

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. The unit emphasises hands-on experience in analysing real life samples, using a wide range of techniques from a chemical, structural and physical perspective.

Important Academic Dates

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

Learning Outcomes

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

ULO1: Demonstrate an understanding of the concepts of molecular analysis and measurement in the molecular sciences.

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

ULO3: Communicate effectively within the conventions of the analytical molecular sciences discipline.

ULO4: Process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.

ULO5: Communicate analytical chemical knowledge by appropriately documenting the essential details of procedures undertaken, key observations, results and conclusions.

General Assessment Information

General Faculty Policy on assessment submission deadlines and late submissions:

Online quizzes, in-class activities, or scheduled tests and exam must be undertaken at the time indicated in the unit guide or iLearn page. Should these activities be missed due to illness or misadventure, students may apply for Special Consideration.

All other assessments must be submitted by 12:00 am on their due date. Should these assessments be missed due to illness or misadventure, students should apply for Special Consideration. Assessments not submitted by the due date will receive a mark of zero **unless** late submissions are specifically allowed as indicated in the unit guide or on iLearn.

If late submissions are permitted as indicated in the unit guide or on iLearn a consistent penalty will be applied for late submissions as follows:

A 12-hour grace period will be given after which the following deductions will be applied to the awarded assessment mark: 12 to 24 hours late = 10% deduction; for each day thereafter, an additional 10% per day or part thereof will be applied until five days beyond the due date. After this time, a mark of zero (0) will be given. For example, an assessment worth 20% is due 5 pm on 1 January. Student A submits the assessment at 1 pm, 3 January. The assessment received a mark of 15/20. A 20% deduction is then applied to the mark of 15, resulting in the loss of three (3) marks. Student A is then awarded a final mark of 12/20.

COVID Information and on-campus classes

On-campus teaching continues to be scheduled for Session 1, 2022. Masks are compulsory for all classes in indoor spaces and social distancing will be implemented wherever possible. Students will also be required to sanitise surfaces before and after use.

Students are requested to minimise the risk of spreading COVID to themselves and others in accordance with the university and NSW Health guidelines: <https://www.mq.edu.au/about/corona-virus-faqs> and <https://www.nsw.gov.au/covid-19/stay-safe>.

Any further requirements or changes to units in relation to COVID will be communicated to students via iLearn.

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignment 2	10%	No	
Assignment 1	10%	No	
Laboratory	30%	No	
Final Examination	50%	No	

Assignment 2

Assessment Type [1](#): Problem set

Indicative Time on Task [2](#): 15 hours

Due:

Weighting: **10%**

Qualitative and quantitative questions requiring processing and critically analysis.

On successful completion you will be able to:

- Demonstrate an understanding of the concepts of molecular analysis and measurement in the molecular sciences.
- Communicate effectively within the conventions of the analytical molecular sciences discipline.
- 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 [2](#): 15 hours

Due:

Weighting: **10%**

Qualitative and quantitative questions requiring processing and critically analysis.

On successful completion you will be able to:

- Demonstrate an understanding of the concepts of molecular analysis and measurement

in the molecular sciences.

- Communicate effectively within the conventions of the analytical molecular sciences discipline.
- Process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.

Laboratory

Assessment Type ¹: Lab report

Indicative Time on Task ²: 30 hours

Due:

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:

- Demonstrate an understanding of the concepts of molecular analysis and measurement in the molecular sciences.
- Demonstrate competency in the selection and use of important analytical techniques commonly used in industrial and academic research.
- Communicate effectively within the conventions of the analytical molecular sciences discipline.
- 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 ¹: Examination

Indicative Time on Task ²: 35 hours

Due:

Weighting: **50%**

Closed book examination.

On successful completion you will be able to:

- Demonstrate an understanding of the concepts of molecular analysis and measurement in the molecular sciences.
 - Communicate effectively within the conventions of the analytical molecular sciences discipline.
 - 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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¹ 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 [Writing Centre](#) for academic skills support.

² 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

Delivery and Resources

This unit requires 150 hours of work over the semester (formal contact hours and self study time). This is an average of 10 hours of work per week over each of the 15 weeks of semester. For students with weaker chemistry backgrounds, more time per week will likely be needed to perform satisfactorily in this unit.

Formal contact hours for Analytical Chemistry and Measurement consist of 2 hours of lectures and a 1-hour interactive tutorial (SGTA) per week, along with 5 x 4-hour laboratory classes throughout semester. Students are expected to participate in all lectures, tutorials and laboratory classes. Active participation by students in all these activities will be essential for success in the unit.

Lectures

The unit will cover 2 hours of lecture material each week. This will consist of interactive (live) online lectures.

Some lecture material will be available on the unit ILearn site, while other material will be provided during the lecture classes.

You should use these lectures as a starting point and supplement their content with material from the text book, the scientific literature and from other online sources. Much of the unit content builds on content covered in previous weeks, so it will be essential to keep up to date with the lecture material throughout the semester. There are no Mid-semester test but you will be give

two PROBLEM SETS each worth 10% to do, one in the middle of the semester and one towards the end of the semester.... This test will cover all course material up to and including the week that the Problem set is given.

Interactive Tutorials (SGTAs)

A 1-hour face to face or interactive tutorial (SGTA) will be held each week. This is your opportunity to interact directly with the teaching staff, to ask lots of pertinent questions and to identify any weaknesses or clarify misconceptions you may have. Learning is an active process, and as such, you must engage with the material. This means reading the textbook (and beyond) before and after lectures, attempting the assignment questions and discussing the concepts with your classmates and lecturers. Do not be afraid to ask questions – everyone benefits from a robust and open discussion of the topics. Five short quizzes (each worth 1% of the unit total) will also be run throughout semester. The quizzes may include any material that has been covered in the unit up to that point, so you are expected to keep up to date with lectures and to revise course material each week. The quizzes are designed to help you to learn continuously and to identify what you understand and the areas that you need to spend more time on, with minimal assessment penalty.

Laboratory Classes

Laboratory classes will be conducted in small teams and require a highly collaborative and investigative approach.. This laboratory work is designed to give real-world experience in research by involving you in the design of the experiments, using literature procedures as a guide, and troubleshooting to identify the best experimental conditions. **The classes will emphasize the importance of teamwork and being well prepared and efficient.** You will need to be fully aware of safety procedures, proper recording and reporting of raw data and interpretation of results. This will require an analytical and inquisitive approach. The first (dry) laboratory class starts in Week 1, where you will meet your fellow team members, plan your synthetic routes and complete risk assessments. There will then be 5 wet labs sessions run in two streams (Group A and Group B) on alternating weeks, starting in Weeks 2/3. The final (dry) laboratory class in Week 13 will bring all the team back together to discuss their results and to finalise the laboratory reports. To maximise the amount of wet lab time available to complete the experiments, you will need to be highly organised and to have prepared thoroughly BEFORE entering the laboratory. If you are not able to "hit the ground running" each laboratory class, you will almost certainly run out of time by the end of semester.

Unit Schedule

The schedule of 13 lectures is divided into 5 Modules:

Module 1 Error Analysis, Calibration and Regulations

Module 2 Spectroscopy

Module 3 Electrochemistry

Module 4 Scattering and Analytical Microscopy

Module 5 Gravimetric Analysis and Chemometrics

A detailed lecture schedule will be communicated to students via iLearn.

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](#)
- [Assessment Procedure](#)
- [Complaints Resolution 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 or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

At Macquarie, we believe [academic integrity](#) – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free [online writing and maths support](#), [academic skills development](#) and [wellbeing consultations](#).

Student Support

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

The Writing Centre

The Writing Centre provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Workshops](#)
- [Chat with a WriteWISE peer writing leader](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the 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 Services and Support

Macquarie University offers a range of [Student Support Services](#) including:

- [IT Support](#)
- [Accessibility and disability support](#) with study
- Mental health [support](#)
- [Safety support](#) to respond to bullying, harassment, sexual harassment and sexual assault
- [Social support including information about finances, tenancy and legal issues](#)

Student Enquiries

Got a question? Ask us via [AskMQ](#), or contact [Service Connect](#).

IT Help

For help with University computer systems and technology, visit 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.