



CBMS308

Advanced Analysis

S1 Day 2019

Dept of Molecular Sciences

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General Information

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Credit points

3

Prerequisites

(CBMS208 or CBMS200) and (CBMS204 or CBMS207 or CBMS203)

Corequisites

Co-badged status

Unit description

This unit covers advanced aspects of chemical analysis, building on the foundations laid in CBMS200. 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; analysis by mass spectrometry. The unit emphasises hands-on experience in analysing real life samples, using many of these techniques. Each student also devotes a proportion of the session to gain relevant work experience in off-campus laboratories in chemical industry and research organisations, such as CSIRO.

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:

To describe the scope of analytical chemistry, following the foundations laid in CBMS200.

To display competency in the use of important analytical techniques commonly used in industrial and academic research.

To analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.

To analyse and critique experimental data and present them in oral format.

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

To work effectively in off-campus laboratories.

To build teamwork with other members of the unit by working together in a laboratory environment.

Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Assignment 1</u>	4%	No	01/04/2019

Name	Weighting	Hurdle	Due
<u>Assignment 2</u>	3%	No	06/05/2019
<u>Assignment 3</u>	3%	No	27/05/2019
<u>Laboratory reports</u>	40%	No	Week 4 - Week 13
<u>Final Examinations</u>	50%	No	June 2019

Assignment 1

Due: **01/04/2019**

Weighting: **4%**

Assignment 1.

On successful completion you will be able to:

- To describe the scope of analytical chemistry, following the foundations laid in CBMS200.
- To display competency in the use of important analytical techniques commonly used in industrial and academic research.
- To process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.

Assignment 2

Due: **06/05/2019**

Weighting: **3%**

Assignment 2

On successful completion you will be able to:

- To describe the scope of analytical chemistry, following the foundations laid in CBMS200.
- To display competency in the use of important analytical techniques commonly used in industrial and academic research.
- To process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.

Assignment 3

Due: **27/05/2019**

Weighting: **3%**

Assignment 3

On successful completion you will be able to:

- To describe the scope of analytical chemistry, following the foundations laid in CBMS200.
- To display competency in the use of important analytical techniques commonly used in industrial and academic research.
- To process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.

Laboratory reports

Due: **Week 4 - Week 13**

Weighting: **40%**

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 decide on either completing a written report or performing an oral assessment on the laboratory work. Students must complete a total of 3 written reports and 2 oral assessments.

On successful completion you will be able to:

- To describe the scope of analytical chemistry, following the foundations laid in CBMS200.
- To display competency in the use of important analytical techniques commonly used in industrial and academic research.
- To analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
- To analyse and critique experimental data and present them in oral format.
- To work effectively in off-campus laboratories.
- To build teamwork with other members of the unit by working together in a laboratory environment.

Final Examinations

Due: **June 2019**

Weighting: **50%**

Closed book examination.

On successful completion you will be able to:

- To describe the scope of analytical chemistry, following the foundations laid in CBMS200.
- To display competency in the use of important analytical techniques commonly used in industrial and academic research.
- To process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.

Delivery and Resources

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

Prescribed text:

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

Recommended references (all available in University Library)

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

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).

Unit Schedule

Suggested Schedule

Date	Time	Activity
February 25	9:00 - 10:30	Outline of Unit
		Calibration Methods
	11:00 - 12:30	Electroanalytical Chemistry
March 4	4:00 - 6:00	Scientific Report Writing
	9:00 - 10:30	Electroanalytical Chemistry
	11:00 - 12:30	Electroanalytical Chemistry
	1:30 - 5:30	Laboratory Session

March 11	9:00 - 10:30	Electroanalytical Chemistry
	11:00 - 12:30	Electroanalytical Chemistry
	1:30 - 5:30	Laboratory Session
March 18	9:00 - 10:30	Flow Injection Analysis
	11:00 - 12:30	Flow Injection Analysis
	1:30 - 5:30	Laboratory Session
March 25	9:00 - 10:30	Flow Injection Analysis
	11:00 - 12:30	Spectroscopic Techniques
	1:30 - 5:30	Laboratory Session
April 1	9:00 - 10:30	Spectroscopic Techniques
	11:00 - 12:30	Spectroscopic Techniques
	1:30 - 5:30	Laboratory Session
April 8	9:00 - 10:30	Spectroscopic Techniques
	11:00 - 12:30	Spectroscopic Techniques
	1:30 - 5:30	Laboratory Session
May 27	9:00 - 10:30	Spectroscopic Techniques
	11:00 - 12:30	Spectroscopic Techniques
	1:30 - 5:30	Laboratory Session
June 3	9:00 - 10:30	Sensing Technologies
	11:00 - 12:30	Sensing Technologies
	1:30 - 5:30	Presentation of project work (CBMS825)

April 29, May 6, May 13 and May 20: Off-campus Laboratory Visits

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). 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](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

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

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/study/getting-started/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

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) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student Services and 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.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

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.

Graduate Capabilities

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- To describe the scope of analytical chemistry, following the foundations laid in CBMS200.
- To display competency in the use of important analytical techniques commonly used in industrial and academic research.
- To analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
- To analyse and critique experimental data and present them in oral format.
- To process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.
- To build teamwork with other members of the unit by working together in a laboratory environment.

Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3

- Laboratory reports
- Final Examinations

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcomes

- To describe the scope of analytical chemistry, following the foundations laid in CBMS200.
- To analyse and critique experimental data and present them in oral format.
- To process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.
- To work effectively in off-campus laboratories.
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Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- To describe the scope of analytical chemistry, following the foundations laid in CBMS200.
- To display competency in the use of important analytical techniques commonly used in industrial and academic research.
- To analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
- To analyse and critique experimental data and present them in oral format.
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Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- To describe the scope of analytical chemistry, following the foundations laid in CBMS200.
- To display competency in the use of important analytical techniques commonly used in industrial and academic research.
- To analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
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life samples.

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Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- To describe the scope of analytical chemistry, following the foundations laid in CBMS200.
- To display competency in the use of important analytical techniques commonly used in industrial and academic research.
- To analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
- To analyse and critique experimental data and present them in oral format.
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Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to

read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- To analyse and critique experimental data and present them in oral format.
- To process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.
- To work effectively in off-campus laboratories.
- To build teamwork with other members of the unit by working together in a laboratory environment.

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Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- To analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
- To analyse and critique experimental data and present them in oral format.
- To process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.
- To work effectively in off-campus laboratories.
- To build teamwork with other members of the unit by working together in a laboratory environment.

Assessment tasks

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- Assignment 2
- Assignment 3
- Laboratory reports

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcomes

- To display competency in the use of important analytical techniques commonly used in industrial and academic research.
- To analyse and interpret experimental data and present them in a structured report using appropriate scientific referencing.
- To analyse and critique experimental data and present them in oral format.
- To process and analyse chemical experimental data to draw scientifically sound conclusions, particularly the significance and validity of analytical results involving real-life samples.
- To work effectively in off-campus laboratories.
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Assessment tasks

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- Assignment 2
- Assignment 3
- Laboratory reports