CBMS708
Chemical Analysis II
S1 Day 2015
Dept of Chemistry & Biomolecular Sciences

Contents

General Information ............................................. 2
Learning Outcomes ........................................... 2
Assessment Tasks ............................................. 3
Delivery and Resources ..................................... 4
Unit Schedule .................................................. 5
Policies and Procedures .................................... 7
Graduate Capabilities ....................................... 8
Changes since last offering ................................. 11
Technology Used .............................................. 11
General Information

Unit convenor and teaching staff
Lecturer
Christopher McRae
christopher.mcrae@mq.edu.au
Contact via christopher.mcrae@mq.edu.au
F7B 328
Students are encouraged to arrange a meeting via email.

Unit Convenor
Danny Wong
danny.wong@mq.edu.au
Contact via danny.wong@mq.edu.au
F7B 235

Credit points
4

Prerequisites
Admission to MRes

Corequisites

Co-badged status

Unit description
The chemical principles and practice of identifying and determining the composition are discussed. Topics covered include many analytical techniques commonly employed in both industrial and academic research laboratories. The unit emphasises hands-on experience in analysing real-life samples. A proportion of the unit develops skills in the use of modern library resources and electronic information retrieval. Using these skills, students will complete a short research project addressing a real-life analytical chemistry problem.

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

1. To acquire the principles of a range of advanced analytical techniques commonly used in industrial and academic research
2. To be able to make a selection of an appropriate analytical technique or a combination of techniques for the analysis of targeted samples, based on the chemistry involved

3. To interpret and draw sound conclusions from analytical chemical data obtained

4. To prepare written scientific documents at a satisfactory level

5. To deliver with confidence an oral presentation on a selected topic in analytical chemistry

**Assessment Tasks**

<table>
<thead>
<tr>
<th>Name</th>
<th>Weighting</th>
<th>Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments</td>
<td>10%</td>
<td>March 27; April 24; May 29</td>
</tr>
<tr>
<td>Laboratory Work</td>
<td>40%</td>
<td>Every two weeks + Week 12</td>
</tr>
<tr>
<td>Mid-Year 3-hour Examination</td>
<td>50%</td>
<td>June 2015</td>
</tr>
</tbody>
</table>

**Assignments**

Due: **March 27; April 24; May 29**

Weighting: **10%**

Numerical calculations and short answers.

This Assessment Task relates to the following Learning Outcomes:

- To acquire the principles of a range of advanced analytical techniques commonly used in industrial and academic research
- To be able to make a selection of an appropriate analytical technique or a combination of techniques for the analysis of targeted samples, based on the chemistry involved
- To interpret and draw sound conclusions from analytical chemical data obtained
- To prepare written scientific documents at a satisfactory level

**Laboratory Work**

Due: **Every two weeks + Week 12**

Weighting: **40%**

This component consists of 5 laboratory experiments and 1 project.

For each experiment, students are required to complete some Pre-laboratory work including Materials Safety Data Sheets and an oral assessment of 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.

Of the 40% for this component, 65% of the assessment will be weighted for laboratory work, and
35% weighted for a project. Each student is required to submit a report and also to deliver a verbal presentation for the project.

This Assessment Task relates to the following Learning Outcomes:

- To acquire the principles of a range of advanced analytical techniques commonly used in industrial and academic research
- To be able to make a selection of an appropriate analytical technique or a combination of techniques for the analysis of targeted samples, based on the chemistry involved
- To interpret and draw sound conclusions from analytical chemical data obtained
- To prepare written scientific documents at a satisfactory level
- To deliver with confidence an oral presentation on a selected topic in analytical chemistry

Mid-Year 3-hour Examination
Due: June 2015
Weighting: 50%
Closed book examination.

This Assessment Task relates to the following Learning Outcomes:

- To acquire the principles of a range of advanced analytical techniques commonly used in industrial and academic research
- To be able to make a selection of an appropriate analytical technique or a combination of techniques for the analysis of targeted samples, based on the chemistry involved
- To interpret and draw sound conclusions from analytical chemical data obtained

Delivery and Resources

Prescribed text

Recommended references
# Unit Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>February 23</td>
<td>9:00 – 10:30</td>
<td>Outline of Unit</td>
</tr>
<tr>
<td></td>
<td>11:00 – 1:00</td>
<td>Calibration Methods</td>
</tr>
<tr>
<td></td>
<td>2:00 – 4:00</td>
<td>Voltammetry</td>
</tr>
<tr>
<td></td>
<td>4:00 – 6:00</td>
<td>Scientific Report Writing</td>
</tr>
<tr>
<td>March 2</td>
<td>9:00 – 1:00</td>
<td>Laboratory Session</td>
</tr>
<tr>
<td></td>
<td>2:00 – 3:30</td>
<td>Voltammetry</td>
</tr>
<tr>
<td></td>
<td>4:00 – 5:30</td>
<td>Voltammetry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tutorial Set 1 on Voltammetry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assignment 1 due at 6 pm, April 2, 2015</td>
</tr>
<tr>
<td>March 9</td>
<td>9:00 – 1:00</td>
<td>Laboratory Session</td>
</tr>
<tr>
<td></td>
<td>2:00 – 3:30</td>
<td>Voltammetry</td>
</tr>
<tr>
<td></td>
<td>4:00 – 5:30</td>
<td>Voltammetry</td>
</tr>
<tr>
<td>March 16</td>
<td>9:00 – 1:00</td>
<td>Laboratory Session</td>
</tr>
<tr>
<td></td>
<td>2:00 – 3:30</td>
<td>Atomic Absorption Spectroscopy</td>
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<tr>
<td></td>
<td>4:00 – 5:30</td>
<td>Atomic Absorption Spectroscopy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tutorial Set 2 on Atomic Absorption Spectroscopy</td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Activity</td>
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<td>-----------</td>
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</tr>
<tr>
<td>March 23</td>
<td>9:00 – 1:00</td>
<td>Laboratory Session</td>
</tr>
<tr>
<td></td>
<td>2:00 – 3:30</td>
<td>Electrophoresis</td>
</tr>
<tr>
<td></td>
<td>4:00 – 5:30</td>
<td>Electrophoresis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tutorial Set 3 on Electrophoresis</td>
</tr>
<tr>
<td>March 30</td>
<td>9:00 – 1:00</td>
<td>Laboratory Session</td>
</tr>
<tr>
<td></td>
<td>2:00 – 3:30</td>
<td>Mass Spectroscopy</td>
</tr>
<tr>
<td></td>
<td>4:00 – 5:30</td>
<td>Mass Spectroscopy</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Assignment 2 due at 6 pm, April 24, 2015</strong></td>
</tr>
<tr>
<td>April 20</td>
<td>9:00 – 1:00</td>
<td>Laboratory Session</td>
</tr>
<tr>
<td></td>
<td>2:00 – 3:30</td>
<td>Mass Spectroscopy</td>
</tr>
<tr>
<td></td>
<td>4:00 – 5:30</td>
<td>Chromatography</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tutorial Set 4 on Mass Spectroscopy</td>
</tr>
<tr>
<td>April 27</td>
<td>9:00 – 1:00</td>
<td>Laboratory Session</td>
</tr>
<tr>
<td></td>
<td>2:00 – 3:30</td>
<td>Chromatography</td>
</tr>
<tr>
<td></td>
<td>4:00 – 5:30</td>
<td>Chromatography</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tutorial Set 4 on Chromatography</td>
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<tr>
<td></td>
<td></td>
<td><strong>Assignment 3 due at 6 pm, May 22, 2015</strong></td>
</tr>
<tr>
<td>June 1</td>
<td>9:00 – 10:30</td>
<td>Immunoassays</td>
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<tr>
<td></td>
<td>11:00 – 12:30</td>
<td>Immunoassays</td>
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</tbody>
</table>
Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:


In addition, a number of other policies can be found in the Learning and Teaching Category of 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/support/student_conduct/](https://students.mq.edu.au/support/student_conduct/)

Results

Results shown in iLearn, 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.

Student Support

Macquarie University provides a range of support services for students. For details, visit [http://students.mq.edu.au/support/](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 improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser
Graduate Capabilities

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- To acquire the principles of a range of advanced analytical techniques commonly used in industrial and academic research
- To be able to make a selection of an appropriate analytical technique or a combination of techniques for the analysis of targeted samples, based on the chemistry involved
- To interpret and draw sound conclusions from analytical chemical data obtained
- To prepare written scientific documents at a satisfactory level
- To deliver with confidence an oral presentation on a selected topic in analytical chemistry

Assessment tasks

- Assignments
- Laboratory Work
- Mid-Year 3-hour Examination

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and
decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

**Learning outcomes**

- To acquire the principles of a range of advanced analytical techniques commonly used in industrial and academic research
- To be able to make a selection of an appropriate analytical technique or a combination of techniques for the analysis of targeted samples, based on the chemistry involved
- To interpret and draw sound conclusions from analytical chemical data obtained
- To prepare written scientific documents at a satisfactory level
- To deliver with confidence an oral presentation on a selected topic in analytical chemistry

**Assessment tasks**

- Assignments
- Laboratory Work
- Mid-Year 3-hour Examination

**PG - Discipline Knowledge and Skills**

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

**Learning outcomes**

- To acquire the principles of a range of advanced analytical techniques commonly used in industrial and academic research
- To be able to make a selection of an appropriate analytical technique or a combination of techniques for the analysis of targeted samples, based on the chemistry involved
- To interpret and draw sound conclusions from analytical chemical data obtained
- To prepare written scientific documents at a satisfactory level
- To deliver with confidence an oral presentation on a selected topic in analytical chemistry

**Assessment tasks**

- Assignments
- Laboratory Work
- Mid-Year 3-hour Examination

**PG - Critical, Analytical and Integrative Thinking**

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience,
of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

**Learning outcomes**

- To acquire the principles of a range of advanced analytical techniques commonly used in industrial and academic research
- To be able to make a selection of an appropriate analytical technique or a combination of techniques for the analysis of targeted samples, based on the chemistry involved
- To interpret and draw sound conclusions from analytical chemical data obtained
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**Assessment tasks**

- Assignments
- Laboratory Work
- Mid-Year 3-hour Examination

**PG - Effective Communication**

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

**Learning outcomes**

- To acquire the principles of a range of advanced analytical techniques commonly used in industrial and academic research
- To be able to make a selection of an appropriate analytical technique or a combination of techniques for the analysis of targeted samples, based on the chemistry involved
- To interpret and draw sound conclusions from analytical chemical data obtained
- To prepare written scientific documents at a satisfactory level
- To deliver with confidence an oral presentation on a selected topic in analytical chemistry

**Assessment tasks**

- Assignments
- Laboratory Work
PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues.

This graduate capability is supported by:

**Learning outcomes**

- To acquire the principles of a range of advanced analytical techniques commonly used in industrial and academic research
- To be able to make a selection of an appropriate analytical technique or a combination of techniques for the analysis of targeted samples, based on the chemistry involved
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**Assessment tasks**

- Assignments
- Laboratory Work
- Mid-Year 3-hour Examination

**Changes since last offering**

There are no changes made in CBMS825 since the last offering.

**Technology Used**

It is important that you have a scientific calculator as hand-held calculators will be used during laboratory sessions, for assignments, and in the final examination. Note that text retrieval calculators are not allowed in the final examination.

Use will be made of Excel and other data processing and display software. Computers carrying this software are available in the teaching laboratories. Items of interest, links to other on-line material will be placed on the unit website.

Computers for general use are provided by the University, but it would be advantageous to have your own computer and internet access.