



# CBMS108

## Foundations of Chemical and Biomolecular Sciences 2

S1 External 2018

*Dept of Chemistry & Biomolecular Sciences*

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#### **Disclaimer**

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

## General Information

Unit convenor and teaching staff

Robert Willows

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Credit points

3

Prerequisites

CBMS107 or CBMS103 or HSC Chemistry Band 5

Corequisites

Co-badged status

Unit description

Molecular sciences is the basis for the development of new medicines, new materials, new ways of monitoring and improving our environment, and many other fields. This unit will focus on the properties and reactivity of matter and is an ideal unit for any student that wants to understand the atomic and molecular world within and around them. It will introduce chemical and physical properties of solids, liquids and gases, metals and solutions. It will examine specific reactions including precipitation, acid base chemistry and oxidation/reduction processes and will explore the energetics and rates of chemical change. It will also describe methods of detection and analysis of matter. Specific biological, environmental and new materials related to real world examples will be provided, with topics such as global warming, energy production and renewable fuels. This unit will provide an understanding and appreciation of the role of chemical and biomolecular sciences in our lives, now and in the future, including in helping to achieve a sustainable environment, understanding health and disease, and advancing new molecular technologies. Practical sessions and tutorials will reinforce learning throughout this unit.

## 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:

Explain the chemical and physical properties of solids, liquids and gases, metals and solutions.

Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.

Solve problems and process and interpret data related to the chemistry and biomolecular sciences concepts covered in this unit, and have an understanding of where to apply these concepts.

Undertake laboratory investigations requiring basic laboratory skills related to the reactions of matter and the energetics and rates of reaction, and their detection and analysis, and demonstrate an awareness of general laboratory safety procedures.

Record and analyse scientific data, as well as judge its reliability and significance and interpret and communicate conclusions, including using the basic elements of scientific report preparation.

Discuss the central role and impact of the chemical and biomolecular sciences concepts covered in this unit in our lives and its modern applications.

## **General Assessment Information**

**Attendance at all on campus session is compulsory:**

CBMS108/S1/Ext/Oncampus\_01

Sunday 25th March. 9:00am-6:00pm

CBMS108/S1/Ext/Oncampus\_02

Wednesday 18th April. 9:00am-6:00pm

CBMS108/S1/Ext/Oncampus\_03

Thursday 19th April 9:00am-6:00pm

CBMS108/S1/Ext/Oncampus\_04

Friday 20th April 9:00am-6:00pm

CBMS108/S1/Ext/Oncampus\_05

Sunday 3rd June. 9:00-6:00pm

- **If you are unable to attend an on campus session, exam, or hand in a form of assessment due to illness or misadventure, you must submit a Disruption to Studies notification at [ask.mq.edu.au](http://ask.mq.edu.au) no later than five (5) working days after the assessment task date or due date. You should also immediately contact the Unit Convenor, Professor Robert Willows ([robert.willows@mq.edu.au](mailto:robert.willows@mq.edu.au)).**

#### Final grade:

- Your final grade will be based on the mark from the aggregation of the individual assessments (in-class and online quizzes, mid-semester test, practical), but you must obtain a Pass grade or better (**40% or greater**) in the final examination to be awarded an overall Pass grade or better. That is, **you must meet this hurdle to be able to pass overall.**

## Online Quizzes

Due: Weighting: **15%**

There will be three on-line quizzes. You will find that these quizzes assist you in revising the course material as the course progresses. Further specific details on the quizzes will be provided at the CBMS108 iLearn site.

- Quiz 1 (on line)
- Quiz 2 (on line)
- Quiz 3 (in class) (Final on Campus session)

See General Assessment Information below for further information on the requirements for the CBMS108 assessment tasks.

This Assessment Task relates to the following Learning Outcomes:

- Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.
- Explain the chemical and physical properties of solids, liquids and gases, metals and solutions.
- Discuss the central role and impact of the chemical and biomolecular sciences concepts covered in this unit in our lives and its modern applications.

## PRACTICALS

Due: **every practical** Weighting: **20%**

The pre-practical exercises, performance in the practical, the practical report, and the post-practical exercises will be used to calculate the final practical mark. The assessment tasks start

off simple and build on skills and knowledge developed throughout the course.

Attendance: **If you are unable to attend a practical class, exam, or hand in a form of assessment due to illness or misadventure, you must submit a Disruption to Studies notification at [ask.mq.edu.au](http://ask.mq.edu.au) no later than five (5) working days after the assessment task date or due date. You should also immediately contact the Unit Convenor, Professor Robert Willows ([robert.willows@mq.edu.au](mailto:robert.willows@mq.edu.au)).**

This Assessment Task relates to the following Learning Outcomes:

- Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.
- Solve problems and process and interpret data related to the chemistry and biomolecular sciences concepts covered in this unit, and have an understanding of where to apply these concepts.
- Undertake laboratory investigations requiring basic laboratory skills related to the reactions of matter and the energetics and rates of reaction, and their detection and analysis, and demonstrate an awareness of general laboratory safety procedures.
- Record and analyse scientific data, as well as judge its reliability and significance and interpret and communicate conclusions, including using the basic elements of scientific report preparation.

## Mid-term Exam

Due: Friday 20th April (Fourth on campus session) Weighting: **15%**

There will be a 50 minute test during the fourth on-campus session (unless approved special conditions are obtained via Wellbeing) and will cover lectures up to and including buffers and solubility. This is designed to give you specific feedback on your understanding of the topics up to this stage to assist you in your further study of the unit. You should have listened to the first 19 lectures and completed the first 7 tutorial question sets before this date.

See General Assessment Information below for further information on the requirements for the CBMS108 assessment tasks.

This Assessment Task relates to the following Learning Outcomes:

- Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.
- Explain the chemical and physical properties of solids, liquids and gases, metals and solutions.
- Discuss the central role and impact of the chemical and biomolecular sciences concepts

covered in this unit in our lives and its modern applications.

## Final Examination

Due: **University Examination Period** Weighting: **50%**

The final exam will be 3 hours in length with 10 minutes reading time. It is designed to address specific understanding of all the topics presented within the course and to show that the knowledge obtained can be applied to new problems.

The final exam is a hurdle assessment and you will need to get  $\geq 40\%$  in the final exam to meet the hurdle. In the event that you make **a serious first attempt at the final exam**, you will be provided with an opportunity to sit a new final exam to meet the hurdle. The faculty define a serious attempt as a mark of 10% below the hurdle which in this instance is a mark between 30-40%. **You will NOT be given a second attempt to pass the exam if you get below 30% in your first attempt.**

**Final Examination Details:** The examination timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in final form approximately four weeks before the commencement of the examinations. You are expected to present yourself for examination at the time and place designated by the University in the Examination Timetable. This could be any day after the final week of semester and up until the final day of the official examination period. It is Macquarie University policy to **not set early examinations** for individuals or groups of students. All students are expected to ensure that they are available until the end of the teaching semester, that is, the final day of the official examination period. **NOTE: If you apply for a supplementary examination, you must make yourself available for 2 weeks after the formal examination period. If you are not available at that time, there is no guarantee an additional examination time will be offered. Specific examination dates and times will be determined at a later date.**

The only exception to sitting an examination at the designated time is because of documented illness or unavoidable disruption. Absence from the final exam will result in a grade of F except in the case of a genuine medical emergency or misadventure as defined by the University (see below). In these circumstances you should apply for a Supplementary Exam at [ask.mq.edu.au](http://ask.mq.edu.au).

See General Assessment Information below for further information on the requirements for the CBMS108 assessment tasks.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#"><u>Mid Semester Test</u></a>	15%	No	4th on campus session
<a href="#"><u>Online Quizzes</u></a>	15%	No	Week 5, 7 and 3rd of June
<a href="#"><u>Practical Assessment</u></a>	20%	Yes	At end of each lab

Name	Weighting	Hurdle	Due
<a href="#">Final Examination</a>	50%	Yes	During exam time in June

## Mid Semester Test

Due: **4th on campus session**

Weighting: **15%**

Mid Semester Test

On successful completion you will be able to:

- Explain the chemical and physical properties of solids, liquids and gases, metals and solutions.
- Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.
- Solve problems and process and interpret data related to the chemistry and biomolecular sciences concepts covered in this unit, and have an understanding of where to apply these concepts.

## Online Quizzes

Due: **Week 5, 7 and 3rd of June**

Weighting: **15%**

Online quizzes.

On successful completion you will be able to:

- Explain the chemical and physical properties of solids, liquids and gases, metals and solutions.
- Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.
- Discuss the central role and impact of the chemical and biomolecular sciences concepts covered in this unit in our lives and its modern applications.

## Practical Assessment

Due: **At end of each lab**

Weighting: **20%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

Pre-lab task and in-lab reports based on templates. Submitted by students in class at the end of each practical session.

Active participation in the practicals is a hurdle and will be assessed as satisfactory or unsatisfactory at the end of each class. You must have satisfactory participation in 4 of the 5 practicals to pass.

On successful completion you will be able to:

- Explain the chemical and physical properties of solids, liquids and gases, metals and solutions.
- Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.
- Solve problems and process and interpret data related to the chemistry and biomolecular sciences concepts covered in this unit, and have an understanding of where to apply these concepts.
- Undertake laboratory investigations requiring basic laboratory skills related to the reactions of matter and the energetics and rates of reaction, and their detection and analysis, and demonstrate an awareness of general laboratory safety procedures.
- Record and analyse scientific data, as well as judge its reliability and significance and interpret and communicate conclusions, including using the basic elements of scientific report preparation.

## Final Examination

Due: **During exam time in June**

Weighting: **50%**

**This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)**

Final Examination

On successful completion you will be able to:

- Explain the chemical and physical properties of solids, liquids and gases, metals and solutions.
- Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.
- Discuss the central role and impact of the chemical and biomolecular sciences concepts

covered in this unit in our lives and its modern applications.

## Delivery and Resources

### Lectures

Lectures have been provided as Echo Recordings. Lecture topics are generally structured with lecture content and theory covered in 2 lectures following by a third lecture with worked examples of problems based on the theory, to strengthen and increase understanding of the concepts. Most lecture material will be available on the unit web site. You should download the lecture material and spend most of the time listening to the lecturer rather than transcribing. Students historically fall behind and perform poorly if they do not listen to the lectures consistently throughout the semester. Learning is an active process, and as such, you must engage with the material. Downloading and reading the lecture notes and relevant sections of the textbook (and beyond) before and after lectures is strongly recommended. Additional on-line quizzes will also be provided. The quizzes and mid session test are designed to allow you to continuously learn and to identify what you understand and the areas that you need to spend more time on, with minimal assessment penalty.

### Tutorials

Tutorials will be run to assist your understanding of the course material. Attempting the questions before the tutorial class to identify what you need assistance on is highly recommended. The tutor will often ask for students to assist in answering the questions throughout the class. Attendance records will be kept. While tutorials do not contribute formally to your mark, anonymous teaching evaluations from past students have identified tutorials as a valuable learning tool.

### Laboratory classes

Practical classes are designed to develop basic laboratory skills, general safety practices and critical and analytical thought. Pre-practical questions are designed to make sure you are ready for the practical work and have grasped the relevant theory and safety practices necessary. In-lab and post-lab work are designed to allow you to appropriately record your experimental observations and your calculations in a detailed and accurate manner and assess your understanding of the theory behind the experiments conducted and to use this understanding to solve related problems. The practicals are scaffolded such that the expectations of pre-practical, in-practical and post-practical reports increase throughout the course as understanding of the concepts and skill in how to record the data and interpret results develops.

## 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 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](http://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/>

## 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](#)

## 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](http://ask.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/](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

### Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

#### Learning outcome

- Undertake laboratory investigations requiring basic laboratory skills related to the reactions of matter and the energetics and rates of reaction, and their detection and analysis, and demonstrate an awareness of general laboratory safety procedures.

#### Assessment tasks

- Online Quizzes
- Final Examination

### 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 outcome

- Record and analyse scientific data, as well as judge its reliability and significance and interpret and communicate conclusions, including using the basic elements of scientific report preparation.

## Assessment task

- Practical Assessment

## 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

- Explain the chemical and physical properties of solids, liquids and gases, metals and solutions.
- Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.
- Solve problems and process and interpret data related to the chemistry and biomolecular sciences concepts covered in this unit, and have an understanding of where to apply these concepts.
- Undertake laboratory investigations requiring basic laboratory skills related to the reactions of matter and the energetics and rates of reaction, and their detection and analysis, and demonstrate an awareness of general laboratory safety procedures.
- Record and analyse scientific data, as well as judge its reliability and significance and interpret and communicate conclusions, including using the basic elements of scientific report preparation.
- Discuss the central role and impact of the chemical and biomolecular sciences concepts covered in this unit in our lives and its modern applications.

## Assessment tasks

- Mid Semester Test
- Online Quizzes
- Final Examination

## 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**

- Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.
- Solve problems and process and interpret data related to the chemistry and biomolecular sciences concepts covered in this unit, and have an understanding of where to apply these concepts.
- Record and analyse scientific data, as well as judge its reliability and significance and interpret and communicate conclusions, including using the basic elements of scientific report preparation.

## **Assessment tasks**

- Online Quizzes
- Practical Assessment
- Final Examination

## **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**

- Solve problems and process and interpret data related to the chemistry and biomolecular sciences concepts covered in this unit, and have an understanding of where to apply these concepts.
- Undertake laboratory investigations requiring basic laboratory skills related to the reactions of matter and the energetics and rates of reaction, and their detection and analysis, and demonstrate an awareness of general laboratory safety procedures.
- Record and analyse scientific data, as well as judge its reliability and significance and interpret and communicate conclusions, including using the basic elements of scientific

report preparation.

## Assessment tasks

- Mid Semester Test
- Online Quizzes
- Practical Assessment
- Final Examination

## 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

- Explain the chemical and physical properties of solids, liquids and gases, metals and solutions.
- Describe and predict reactions of matter including precipitation, acid base chemistry and oxidation/reduction processes and the energetics and rates of chemical change, and explain methods of detection and analysis of matter.
- Record and analyse scientific data, as well as judge its reliability and significance and interpret and communicate conclusions, including using the basic elements of scientific report preparation.
- Discuss the central role and impact of the chemical and biomolecular sciences concepts covered in this unit in our lives and its modern applications.

## Assessment tasks

- Mid Semester Test
- Practical Assessment

## 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 outcome

- Discuss the central role and impact of the chemical and biomolecular sciences concepts covered in this unit in our lives and its modern applications.

### 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:

### Assessment task

- Practical Assessment

### Changes since First Published

Date	Description
18/02/2018	Added in the compulsory participation hurdle as part of the practicals required by FSE.