



# CBMS108

## Foundations of Chemical and Biomolecular Sciences 2

S2 Day 2019

*Dept of Molecular Sciences*

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#### Disclaimer

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## General Information

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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

Participation in tutorials, quizzes, mid-term exam, practicals:

- **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 request for special consideration** no later than five (5) working days after the assessment task date or due date. Information for Special consideration can be found here: <https://students.mq.edu.au/study/my-study-program/special-consideration>
- **You should also immediately contact the Unit Convenor, Professor Robert Willows (robert.willows@mq.edu.au).**
- You may only attend the practical classes for which you are enrolled, as shown in your eStudent timetable.

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). 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 achieve 40% or better in the final exam to pass overall. If your final exam mark is between 30-40% you will get a second attempt at the exam but ONLY if you can pass the unit with a grade of 40%**

in the exam. The **SECOND** attempt is to demonstrate that you have obtained a minimum level of understanding to pass the unit and is not to improve your overall grade from the **FIRST** attempt.

## Online Quizzes

Due: Weekly online quizzes from **Weeks 2-12** Weighting: **15%**

There will be 10 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.

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:

- 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.
- 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.

## 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](mailto: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: **Week 7** Weighting: **15%**

There will be a 50 minute test in Week 7 in the lecture room (unless approved special conditions are obtained via Wellbeing) and will cover lectures up to the end of chemical kinetics. 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.

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.
- 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.

## 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 in the week following the regular exam 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).

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Mid Semester Test</u>	15%	No	Week 7 during lecture 3
<u>Online Quizzes</u>	15%	No	Weeks 2-12
<u>Practical Assessment</u>	20%	Yes	At end of each lab
<u>Final Examination</u>	50%	Yes	Examination period
<u>Participation</u>	0%	Yes	On campus sessions

### Mid Semester Test

Due: **Week 7 during lecture 3**

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: **Weeks 2-12**

Weighting: **15%**

Online quizzes.

10 online quizzes each worth 1.5%. Scheduled on-line between weeks 2-12 of semester.

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)**

Reports based on templates submitted by students in class at the end of each practical session.

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.
- 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: **Examination period**

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.
- 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.

## Participation

Due: **On campus sessions**

Weighting: **0%**

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

You must participate in minimum of 8 tutorial classes and 4 of 5 practical classes. This is a hurdle requirement.



On successful completion you will be able to:

- 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.

## Delivery and Resources

### Required Textbook:

Top Hat General Chemistry AUS Edition: Franklin Ow et al: ISBN: 978-1-77330-520-2

Register at <https://app.tophat.com/register/student/> for the text book and access to the Tutorial Questions, Revision Questions and Homework problems.

Join code: See iLearn for details

Note that the textbook includes Tutorial questions, Revision Questions and Homework problems.

Access is free when you are within the University Library Zone. Access outside this zone requires a paid subscription. It is highly advisable to purchase a subscription unless you plan to attend university each week to access the text in the free zone. The online quizzes and homework/tutorial questions are conducted through this resource.

### Lectures

Lectures will be presented formally, although quizzes and general questions may be asked in class and can include demonstrations. Lectures will also include working through examples of problems, to strengthen and increase understanding of the concepts. Most lecture material will be available on the unit web site, while other material will be provided in the lecture class. You are expected to download the lecture material and bring it into the lecture class so you can spend most of the time listening to the lecturer rather than transcribing. Do not assume these notes or recordings/video capture are a suitable substitute to attending the lectures. Students historically fall behind and perform poorly if they do not attend the lecture classes and often further material is provided in the lecture class, so a student that does not attend the class will not be as well prepared as they would otherwise be. Learning is an active process, and as such, you must engage with the material. This means downloading and reading the lecture notes and relevant sections of the textbook (and beyond) before and after lectures is strongly

recommended. The mid session test will be run in the lecture class and will include multiple choice and short answer questions. Additional weekly 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. Participation records will be kept and logged. Anonymous teaching evaluations from past students have identified tutorials as a valuable learning tool and participation is thus a hurdle requirement for passing the unit.

## 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.

## Unit Schedule

Weekly Topics in CBMS108	Topic name	Outline/Concepts
1	Matter & Change	Definitions; elements (metal, non-metal, metalloid); chemical change (H, S, G); stoichiometry & mass conservation
2	Modern Atomic Theory	Periodic atomic properties, electronic configurations, quantization of energy, quantum mechanical model of the atom, atomic orbitals
3	Chemical Bonding and Intermolecular Forces (Phase diagrams)	Molecular orbital model, types (ionic, covalent, metallic), resonance, polarity and electronegativity, structure (VSEPR), bond order, bond length, bond energy, Types of interactions (ion-dipole, dipole-dipole, dispersion, H-bonding), solids (atomic, molecular, ionic, metallic, network covalent), Lewis diagrams.
4	Transition Metal Complexes	Physical properties, ligands and chelates, coordination chemistry, colour and magnetism, Crystal-field theory
5	Gas Laws & Kinetic Theory	Pressure, the gas laws, the ideal gas equation, partial pressures, Kinetic-Molecular Theory, Real Gases
6	Chemical Kinetics	Factors affecting reaction rates, reaction rates, an introduction to rate laws, determining the form of the rate law, Temperature + Collisions = Rate

7	Chemical Equilibria	Equilibrium constant $K_{eq}$ and kinetics. Relationship to concentrations. Le Châtelier's Principle, applications
8	Acid-Base Equilibria	Brønsted-Lowry model, pH, strong & weak acid/base examples, $K_a$ & $K_b$ , naming polyatomic ions
9	Buffers & Solubility	Henderson-Hasselbalch, titrations and pH curves, solubility equilibria, $K_{sp}$ , precipitation
10	Oxidation & Reduction	Definition, oxidation states, balancing redox reactions in acid/base, the activity series, Galvanic cells, Cell Potentials (Nernst Eq.), batteries and fuel cells (flow batteries)
11	Thermochemistry	The Nature of Energy, enthalpy, heats of reaction, Hess's Law, spontaneous processes, Entropy, standard entropy changes of chemical reactions
12	Introductory Spectroscopy	Basics: Interaction of light with matter. Light, UV, IR, Electromagnetic interactions. NMR, MS

## 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](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>).

## 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](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 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](mailto: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/](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 tasks**

- Practical Assessment
- Participation

## **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:

### **Assessment task**

- Participation

## **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.

### Assessment task

- Participation



## 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