



CHEM1001

Foundations of Chemical and Biomolecular Sciences 1

Session 2, In person-scheduled-infrequent, North Ryde 2026

School of Natural Sciences

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	3
<u>General Assessment Information</u>	3
<u>Assessment Tasks</u>	6
<u>Delivery and Resources</u>	8
<u>Unit Schedule</u>	11
<u>Policies and Procedures</u>	13
<u>Changes from Previous Offering</u>	15

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

Unit convenor

Nial Wheate

nial.wheate@mq.edu.au

Contact via Email

4 Wallys Walk, Room 235

Anytime

Professor

Joanne Jamie

joanne.jamie@mq.edu.au

Contact via 02 9850 8283

4WW 231

Make Appointment

Credit points

10

Prerequisites

Corequisites

Co-badged status

Unit description

Foundations of Chemical and Biomolecular Sciences 1 introduces students to the principles and practical aspects of molecular sciences, from simple chemicals to life's biomolecules. No prior chemistry or biology knowledge is assumed, making it ideal for anyone keen to understand the atomic and molecular world. The unit covers the language of chemistry, starting with atoms, molecules, elements, and compounds, and uses inorganic, organic, and biomolecular examples to explain their structures, functions, and reactions. It builds on this to predict the reactivity and behaviour of compounds, focusing on acids, bases, and organic biomolecules. Contemporary applications will show the role of chemical and biomolecular sciences in sustainable environments, health, disease, and molecular technologies. Practical sessions and workshops reinforce learning.

Learning in this unit enhances student understanding of global challenges identified by the United Nations Sustainable Development Goals ([UNSDGs](#)) Good Health and Well Being; Clean Water and Sanitation; Climate Action; Industry, Innovation and Infrastructure

Important Academic Dates

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

Learning Outcomes

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

- ULO1:** Use the language and principles of chemical science to explore the composition and properties of matter and discuss how molecular sciences are important in our lives.
- ULO2:** Name and write (or describe) the chemical structures for representative inorganic and organic compounds, including peptides, carbohydrates and nucleic acids.
- ULO3:** Analyse the chemical structure of chemical compounds to predict their function, reactivity and physical properties.
- ULO4:** Calculate the physical quantities that characterize chemical composition, including solids and solutions, as well as chemical reactions.
- ULO5:** Demonstrate laboratory skills used for the preparation, separation and analysis of chemical compounds, including an understanding of general laboratory safety procedures.
- ULO6:** Record and analyse scientific data, as well as communicate conclusions using the basic elements of scientific report preparation.

General Assessment Information

To successfully pass this unit, you will need to achieve a minimum total unit mark of 50%.

Practical Chemistry and Data Interpretation (40%)

There are four practicals (laboratories) to be completed, all with equal weighting in determining the practical competency mark (4 x 10%)

The laboratory assessment comprises:

- **pre-lab exercises: no marks but must be completed before the class, and**
- **Practical reports and preparation and conduct.**

Chemistry practical classes provide the following:

- **Hands-on Experience:** Practical classes provide essential hands-on experience that cannot be replicated through theoretical study. This practical exposure is crucial for understanding chemical concepts and techniques.
- **Skill Development:** These classes help you to develop critical laboratory skills, including accurate measurement, data analysis, bench skills, and the use of specialised

equipment. These skills are fundamental for any aspiring chemist and are best learned through direct practice.

- **Safety Training:** Practical work involves handling potentially hazardous materials and equipment. Mandatory practical classes ensure that you receive proper safety training, understand risk management, and can conduct experiments safely.
- **Application of Theory:** Practical classes bridge the gap between theory and practice. They allow you to apply theoretical knowledge in real-world scenarios, reinforcing your understanding and retention of the material.
- **Problem-Solving Abilities:** Practical experiments present unexpected challenges. By working through these problems, you enhance your critical thinking and problem-solving abilities, which are valuable skills in any career.
- **Collaboration and Communication:** Practical classes require teamwork and effective communication. These experiences help to prepare you for collaborative work environments and help you develop interpersonal skills.
- **Accreditation Requirements:** The Royal Australian Chemical Institute (RACI) mandates the offering of practical (laboratory) classes as part of chemistry programs. This ensures that the program meets professional standards and adequately prepares students for careers in chemistry.

Pre-lab questions must be completed with a minimum score of 90% at least 24 hours prior to your practical class. Failure to meet this requirement will result in denial of entry to the laboratory. These questions are designed to ensure you have adequately prepared for the laboratory class, including understanding the associated risks and safety issues, and becoming familiar with the apparatus and techniques to be used.

The pre-labs will be done online via iLearn quizzes and will be due **24 hours before the start of your class**, i.e. if you have a 9 am class the pre-lab will be due at 9 am **the day before** your class.

The **practical report** will be completed during the practical class and submitted to your demonstrator **before you leave that class**. Part of your practical report mark will be based on your:

- **Preparation:**
 - **Personal Protective Equipment (PPE):** Ensure you have all necessary PPE, including a lab coat, safety glasses, and enclosed shoes. This is crucial for your safety and the safety of others.
 - **Practical Notes:** Bring your Practical manual or notes, which include the experiment procedures and safety guidelines.
 - **Understanding Safety Protocols:** Familiarise yourself with the laboratory's

safety rules and emergency procedures. Know the location of safety equipment such as fire extinguishers, eye wash stations, and first aid kits.

- **Knowledge of the Experiment:** Review the experiment's background, objectives, and procedures. Understand the theory behind the experiment and the steps you will be performing.
 - **Materials and Equipment:** Ensure you have all the necessary materials and equipment for the experiment. Check that all equipment is in working order and that you know how to use it properly.
 - **Time Management:** Plan your time effectively to ensure you can complete the experiment within the allotted class period. This includes setting up, conducting the experiment, and cleaning up.
 - **Mental Preparedness:** Approach the lab with a focused and attentive mindset. Be ready to engage actively with the experiment and follow instructions carefully.
- **Safety Conduct:** Demonstrating the ability to conduct yourself in a safe manner.
 - **Ethical Conduct:** Demonstrating the ability to conduct yourself ethically.
 - **Engagement:** Showing a high level of engagement with the activities.

If you miss a practical class, you are **NOT** entitled to automatic rescheduling or a make-up class. Such an opportunity may be offered, if possible, provided sufficient warning is given. Justification for rescheduling or make-up (Special Consideration requests) must be lodged. If possible, you may be provided the opportunity to attend another practical class in the same block of prac classes.

Principles of Chemistry and Biomolecular Sciences (10%)

The Principles of Chemistry and Biomolecular Sciences Problem Set will contribute 10% to your overall mark. It is an **invigilated, in-class problem set** worth 10% of the overall unit mark.

It is scheduled for the Mid-Session Break in same week as Practical 2. It will be held at 3 pm, Monday 21 September.

The task is a **50-minute, closed-book, observed (invigilated) assessment** that includes calculation and application of theory questions. The task is built around an **applied, scenario-based problem** drawing together content from Weeks 1–8 of the unit. The example provided uses a real-world environmental chemistry scenario, and tests your ability to apply chemical principles to a continuous, contextualised problem.

Final Examination (50%)

The final examination will be two (2) hours, with 10 minutes of reading time, consisting of multiple-choice and free-text questions. The final examination questions will be drawn from all components of the unit (lectures, practicals, workshops, and assignments) and are designed to address your understanding of all the concepts presented within this unit.

Supplementary exams:

If you are not able to attend the final exam, and a Special Consideration application has been approved by the university, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. When you apply for special consideration for the final exam, you are confirming that you will be available to sit the supplementary exam. Please note that pre-existing commitments will not be accepted as grounds for a further special consideration application for the supplementary exam. Please ensure that you are familiar with the policy prior to submitting an application.

Gradebook:

Your marks will be displayed via **Gradebook** on iLearn. It is your responsibility to regularly verify that the records displayed at iLearn (Tools>Grades) are correct.

Special Considerations:

The [Special Consideration Policy](#) aims to support students who have been impacted by short-term circumstances or events that are serious, unavoidable and significantly disruptive, and which may affect their performance in assessment. If you experience circumstances or events that affect your ability to complete the assessments in this unit on time, please inform the convenor and submit a Special Consideration request through <https://connect.mq.edu.au/>.

If you have difficulty attending and participating in an assessment task, please contact the Unit Convenor immediately (in ADVANCE if possible) as there may be alternatives available to make up a missed task.

Late Assessment Submission

Late assessments are not accepted in this unit unless a [Special Consideration](#) has been submitted and approved.

Assessment Tasks

Name	Weighting	Hurdle	Due	Groupwork/Individual	Short Extension	AI Approach
Final Examination	50%	No	Examination Period	Individual	No	Observed
Practical Chemistry and Data Interpretation	40%	No	Week 10	Individual	No	Observed
Principles of Chemistry and Biomolecular Sciences	10%	No	21/09/2026	Individual	No	Observed

Final Examination

Assessment Type ¹: Examination

Indicative Time on Task ²: 20 hours

Due: **Examination Period**

Weighting: **50%**

Groupwork/Individual: Individual

Short extension ³: No

AI Approach: Observed

The final exam will be designed to address specific understanding of all topics presented within the course and to show that the knowledge obtained can be applied to new problems.

On successful completion you will be able to:

- Use the language and principles of chemical science to explore the composition and properties of matter and discuss how molecular sciences are important in our lives.
- Name and write (or describe) the chemical structures for representative inorganic and organic compounds, including peptides, carbohydrates and nucleic acids.
- Analyse the chemical structure of chemical compounds to predict their function, reactivity and physical properties.
- Calculate the physical quantities that characterize chemical composition, including solids and solutions, as well as chemical reactions.

Practical Chemistry and Data Interpretation

Assessment Type ¹: Experiential task

Indicative Time on Task ²: 16 hours

Due: **Week 10**

Weighting: **40%**

Groupwork/Individual: Individual

Short extension ³: No

AI Approach: Observed

A collection of evidence of the development of practical skills and data analysis competency.

On successful completion you will be able to:

- Use the language and principles of chemical science to explore the composition and properties of matter and discuss how molecular sciences are important in our lives.
- Name and write (or describe) the chemical structures for representative inorganic and organic compounds, including peptides, carbohydrates and nucleic acids.
- Analyse the chemical structure of chemical compounds to predict their function, reactivity and physical properties.
- Calculate the physical quantities that characterize chemical composition, including solids and solutions, as well as chemical reactions.

- Demonstrate laboratory skills used for the preparation, separation and analysis of chemical compounds, including an understanding of general laboratory safety procedures.
- Record and analyse scientific data, as well as communicate conclusions using the basic elements of scientific report preparation.

Principles of Chemistry and Biomolecular Sciences

Assessment Type ¹: Experiential task

Indicative Time on Task ²: 10 hours

Due: **21/09/2026**

Weighting: **10%**

Groupwork/Individual: Individual

Short extension ³: No

AI Approach: Observed

Assessment of the understanding of the Principles of Chemistry and Biomolecular Sciences

On successful completion you will be able to:

- Use the language and principles of chemical science to explore the composition and properties of matter and discuss how molecular sciences are important in our lives.
- Name and write (or describe) the chemical structures for representative inorganic and organic compounds, including peptides, carbohydrates and nucleic acids.
- Analyse the chemical structure of chemical compounds to predict their function, reactivity and physical properties.
- Calculate the physical quantities that characterize chemical composition, including solids and solutions, as well as chemical reactions.

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- [Academic Success](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation.

³ An automatic short extension is available for some assessments. Apply through the [Service Connect Portal](#).

Delivery and Resources

Communication

During the semester, the CHEM1001 iLearn site will be used to communicate important information to you. In addition, emails will be sent to your student email account. Please check your messages frequently.

Please feel free to communicate directly with your unit convenor using the contact details provided on the iLearn. Questions about the unit content and administration that may be of general interest will be best posted in the Student Q&A on the iLearn site so that everybody can see the answer.

Classes

- **Lectures.** There are no in-person lectures for this unit. Lecture notes will be available from the iLearn site and video recordings of the lectures given in Session 1 will be available via the Echo360 facility. You are expected to read the lecture notes and watch the videos on a weekly schedule.

The lectures are for emphasising certain points from the notes and to provide some examples of solving questions pertaining to the topics.

- **Workshops.** Workshops commence in **Week 2**. Workshops will be held via Zoom meetings. During the Workshops, you will work through problems (the Workshop Question Set).
- **Practicals.** Practical 1 (Exp 1) will be held on the weekend of 29/30-August. Practical 2 (Exp2) will be held on Tuesday/Wednesday 22/23-September. Practical 3 (Exp 3) will be held on Thursday/Friday 24/25-September. Practical 4 (Exp 4) will be held in the weekend of 24/25-October. In the practicals, you will be able to put into practice the theory you have seen in the lectures and workshops, and develop your laboratory skills.

The practical classes for CHEM1001 are run in 14SCO 308. There is a virtual tour available on the CHEM1001 iLearn site that will show you where the laboratories are, and what they look like inside.

It is very important that you understand that you will not be allowed to attend the laboratory if you do not have a laboratory coat ("lab coat"), safety glasses and enclosed, sturdy footwear (e.g. Ugg boots are *not* acceptable).

Disposable gloves will be supplied to you.

It is also important that you understand that the doors to the laboratory will be **closed 20 minutes after the start of the class**. Entry to the class will not be permitted after this time.

You are required to undertake prelaboratory exercises (prelabs) before coming to the session, to help you prepare for the lab. At the lab, you will be assessed on preparedness, general behaviour, ethical behaviour, and competence, as well as the quality of your results. You are to submit a report ("lab report") that summarises the outcomes of your investigation.

Teaching and Learning Strategy

CHEM1001 is a 10 credit-point, half-year unit and will require, on average, 10 hours of study per week (contact hours plus self-study time).

CHEM1001 is designed to introduce you to the principles of the molecular sciences, including developing an understanding of the practical skills required to undertake simple chemistry experiments efficiently and safely. The lecture materials, workshops and practical classes complement each other, and have been developed to increase your understanding of the topics so that you can achieve the learning outcomes.

The expectation is that you will:

- Watch all lecture videos and read through the lecture notes.
- Actively engage in the workshop classes and attempt the exercises.
- Demonstrate competence in all practical classes.
- Spend an average of no less than 3 hours per week of private study in addition to class contact.

If you prepare, study and attend all components of the unit and work consistently and continuously throughout the session, you will be able to develop a strong understanding of the general, inorganic and organic chemistry presented, and perform well in this unit. Students who fail to do this and try to cram just before the exam will not do well in this unit.

- **Lectures.** You are expected to read through and take notes on the lecture materials provided on the iLearn site. Based on observations of student behaviour and performance, engaging with the lecture notes and videos is crucial to avoid falling behind and performing poorly. Learning is an active process, so you must engage with the material. It is strongly recommended to review lecture notes and relevant textbook sections (and beyond) both before and after lectures.
- **Workshop classes.** Are run to assist your understanding of the course material. Experience has demonstrated that there is a strong correlation between engagement with all activities, including the workshop classes, and success in this unit.
- **Practical classes.** Are designed to develop basic laboratory skills, safety practices, and critical and analytical reasoning skills. Pre-practical (prelabs) questions are designed to ensure that you are ready for the practical work and understand the safety considerations of each experiment. The practicals are designed to teach you to appropriately record your experimental observations and to present your calculations in a detailed manner.

Textbook:

- Weeks 1-6: [OpenStax Chemistry 2e](#), by Flowers et al. This is an open-access, FREE, textbook.

- Weeks 7-13: [OpenStax Organic Chemistry - A Tenth Edition](#), by McMurry. This is an open-access, FREE, textbook

Other Recommended Texts:

- **Strongly Recommended: Pushing Electrons: a Guide for Students of Organic Chemistry** by Daniel P. Weeks, Fourth Edition, 2014, Brooks/Cole, Cengage Learning. (<https://au.cengage.com/c/isbn/9781133951889/>)
- **Introductory Chemistry by David W. Ball** (free) Download or view at no cost from <https://open.umn.edu/opentextbooks/textbooks/22>
- **CLUE: Chemistry, Life, the Universe and Everything** by Melanie M. Cooper and Michael W. Klymkowsky (free) Download or view at no cost at <https://open.umn.edu/opentextbooks/textbooks/clue-chemistry-life-the-universe-and-everything>
- **Introductory Chemistry** by Nivaldo J. Tro, Fifth Edition (Pearson New International Edition), 2015, Pearson Education

Other general and organic chemistry textbooks may also be useful.

High school textbooks may be useful for those students who have not studied Chemistry before this unit:

- Chemistry in Focus - Year 12 by Debra Smith, Anne Disney, Anna Davis
- Excel Year 11 - Chemistry Study Guide by Geoffrey Thickett
- Excel Year 12 Chemistry Study Guide by Geoffrey Thickett
- Chemistry Essentials for Dummies by John T. Moore

Unit Schedule

The following schedule is indicative only and may change.

CHEM1001 S2 2026 Schedule

Week 1 (27-July-26)

1. Introductions, Administration (Practical classes, etc), Tools (Textbook, Mastering Chemistry)
2. Introduction to Chemistry – definitions: matter, states, reactions

Week 2 (3-August-26)

1. The Periodic Table - Structure of atoms, emphasis on electron number, electron arrangement (shells), trends periods and groups in the periodic table – atomic radius, ionic radius, electronegativity, ionisation energy, reactivity
2. Matter and change – definitions of chemistry, molecules/compounds, representations of chemistry: chemical equations, balancing equations, Naming binary and simple

polyatomic inorganic compounds.

Week 3 (10-August-26)

1. Quantification – significant figures, scientific notation. The mole and molar mass; conversions between amount (molecular) and amount (molar) and between amount and mass.
2. Quantification – concentration and dilutions

Week 4 (17-August-26)

1. Equilibria – K_{eq} , K_{sp} , K_a , K_b as examples of K_{eq} under specific contexts.
2. Acids and Bases – examples of equilibria. K_a , K_b , K_w ; pH etc.

Week 5 (24-August-26)

1. Weak Acids, Weak Bases
2. Buffers (Henderson-Hasselbalch Equation), Titrations

Weekend 29/30-August

Practical Class 1 (Exp 1)

Week 6 (31-August-26)

1. Electronegativity and polarisation, Lewis diagrams
2. Hybrid Orbitals, Molecular Shape

Week 7 (7-September-26)

1. Organic Chemistry: Functional Groups and Drawing Structures
2. Organic Compound Naming

Week 8 (14-September-26)

1. Conformations, Isomerism and Stereochemistry
2. Predicting Reactivity

22/25-September-26

Practical Class 2 and 3 (Exp 2 and Exp 3)

Principles of Chemistry and Biomolecular Sciences Problem Set

Week 9 (5-October-26)

1. Alkanes, Alkenes and Alkynes - Reactivities
2. Aromatic Compounds - Properties and Reactivities

Week 10 (12-October-26)

1. Alcohols - Reactivities
2. Aldehydes and Ketones - Reactivities

Week 11 (19-October-26)

1. Carboxylic Acids and Derivatives - Properties and Reactivities
2. Biomolecules Part 1 – Carbohydrates

Weekend 24/25-October-26

Practical Class 4 (Exp 4)

Week 12 (26-October-26)

1. Biomolecules Part 2 - Amines, Amino Acids, Peptides and Proteins
2. Biomolecules Part 3 - Nucleic acids

Week 13 (2-November-26)

1. Revision
2. Revision

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Assessment Procedure](#)
- [Complaints Resolution Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#)

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

To find other policies relating to Teaching and Learning, visit [Policy Central](https://policies.mq.edu.au) (<https://policies.mq.edu.au>) and use the [search tool](#).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: <https://students.mq.edu.au/admin/other-resources/student-conduct>

Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit connect.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Academic Integrity

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

Student Support

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

Academic Success

[Academic Success](#) provides resources to develop your English language proficiency, academic writing, and communication skills.

- [Ask a Study Coach](#)
- [Access StudyWISE](#)
- [Upload an assignment to Studiosity](#)
- [Complete the Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

Student Services and Support

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

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

- [Student Advocacy](#) provides independent advice on MQ policies, procedures, and processes

Student Enquiries

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

IT Help

For help with University computer systems and technology, visit <https://students.mq.edu.au/support/technology/service-desk>.

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.

Changes from Previous Offering

There are no substantial changes from the previous offering of this unit of study.

Unit information based on version 2026.04 of the [Handbook](#)