

CHEM1010: Introductory Chemistry I

Callaghan and Ourimbah
Semester 1 - 2024



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description Often referred to as a 'Central Science', Chemistry is the study of chemicals and chemical processes that underpin physical and biological phenomena. Chemistry impacts and interacts with our lives on a daily basis, including the food we eat, the medicine we take, and the energy we use. CHEM1010 is the first of two foundation subjects in the key central scientific discipline of chemistry, providing core knowledge and skills, useful in science, engineering and life sciences. In CHEM1010, students will explore the primary concepts of chemistry, including basic atomic and molecular structure, the chemistry of carbon compounds, and principal physical concepts of the discipline.

Academic Progress Requirements Nil

Requisites This course has similarities to CHEM1110. If you have successfully completed CHEM1110 you cannot enrol in this course.

Assumed Knowledge Students who have completed HSC Chemistry within the last two years are encouraged to complete EPPREP941 Introduction to Undergraduate Chemistry (Advanced) before commencing CHEM1010. Students who have completed HSC Chemistry three or more years ago are advised to complete EPPREP940 Introduction to Undergraduate Chemistry before commencing CHEM1010. Students who have not completed HSC Chemistry are strongly advised to complete both EPPREP790 Foundation Chemistry and EPPREP940 Introduction to Undergraduate Chemistry before commencing CHEM1010. Further information about EPPREP790, EPPREP940, EPPREP941, and other NUPrep bridging and refresher courses can be found here: <https://www.newcastle.edu.au/study/pathways/nuprep/courses>

Contact Hours

Callaghan Laboratory *
Face to Face On Campus
3 hour(s) per week(s) for 7 week(s) starting Week 1

Lecture
Face to Face On Campus
36 hour(s) per term
For a summer or winter term the lectures may be compressed for the shorter term.

Workshop *
Face to Face On Campus
3 hour(s) per week(s) for 3 week(s) starting Week 2
When the course is offered over summer or winter term, the contact hours will be 18 hours of workshops for the full term delivered face to face.

COURSE OUTLINE

**Ourimbah
Laboratory ***

Face to Face On Campus
3 hour(s) per week(s) for 7 week(s) starting Week 1

Lecture

Face to Face On Campus
36 hour(s) per term
For a summer or winter term the lectures may be compressed for the shorter term.

Workshop *

Face to Face On Campus
3 hour(s) per week(s) for 3 week(s) starting Week 2
When the course is offered over summer or winter term, the contact hours will be 18 hours of workshops for the full term delivered face to face.

* This contact type has a compulsory requirement.

**Unit Weighting
Workload**

10
Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

CONTACTS

Course Coordinator

Callaghan
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SYLLABUS

Course Content

The course involves study of the following topics, illustrated where appropriate with relevant examples from applicable areas:

1. Introduction to Atomic and Molecular Concepts:
 - matter, atoms and elements
 - molecules and compounds
 - equations and stoichiometry
 - reactions - energy and enthalpy
2. Foundation Physical Concepts in Chemistry:
 - Gases
 - atomic structure
 - electron configurations of elements
 - bonding and structure
 - chemical equilibria
3. Introduction to Organic Chemistry:
 - orbitals and hybridisation
 - saturated compounds - alkanes and cycloalkanes
 - unsaturated compounds - alkenes and alkynes
 - Chirality
 - aromatic compounds – benzene
 - introduction to organic functional groups

Course Learning Outcomes

On successful completion of this course, students will be able to:

1. recognise and use chemical language, representations, structures and symbolism;
2. describe and apply basic chemistry concepts and extend to their chosen fields of study or programs.
3. recognise and identify isomers and organic functional groups, particularly hydrocarbons and their characteristic reactions;
4. apply the scientific method in the conduct and reporting of experiment results.
5. participate in and contribute to group problem solving.
6. Work safely and competently in a laboratory setting.

Course Materials

Lecture Materials:

- Made available in the course Canvas site.

Other Resources:

- WileyPlus Assignments. These assignments are optional and are provided by the lecturers.
- Molecular model kits. These are particularly useful when trying to understand the 3 dimensional structure of inorganic and organic molecules, especially when learning about stereochemistry. The "Molecular Model Set for General and Organic Chemistry" (Prentice Hall) is a good one and the "Kit 1A Organic, Organometallic, Inorganic Model Set" (Molecular Visions Kits), Darling Models (Stephen Darling) is also suitable. There are other options that are available online. You can also borrow from the First Year laboratory, and these will be supplied during the third workshop.

Recommended Text:

- "Chemistry", A. Blackman, S.E. Bottle, S. Schmid, M. Mocerino, U. Wille, J.E. Brady, F. Senese, W.H. Brown, T. Poon, J. Olmstead III, G.M. Williams, 4th (2018) and 5th (2022) editions, Wiley.

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Contact Hour Requirements:

- Workshop Attend 80% of sessions
- Laboratory Attend 80% of sessions

Course Assessment Requirements:

- Assessment 2 - Workshop and laboratory assessment: Pass requirement 50% - Must obtain 50% in this assessment item to pass the course.

SCHEDULE

Week	Week Begins	Topic	Learning Activity	Assessment Due
1	26 Feb	Block 1: Atomic theory and the periodic table	Lectures (3h), Lab induction	
2	4 Mar	Block 1: Units and chemical equations	Lectures (3h), Experiment 1a (3h)	
3	11 Mar	Block 1: Acid-base, redox & stoichiometry	Lectures (3h), Workshop 1 (3h)	
4	18 Mar	Block 1: Thermodynamics & Hess's law	Lectures (3h), Experiment 1b (3h)	Expt 1a report (Friday midnight)
5	25 Mar	Block 2: Gasses	Lectures (3h)	HW & EOB quizzes for block 1 (Friday midnight) Expt 1b report (Friday midnight)
6	1 Apr	Block 2: Atomic Structure	Lectures (1h), Experiment 2a (3h)	
7	8 Apr	Block 2: Atomic & Molecular structure	Lectures (3h), Workshop 2 (3h)	
Mid-Semester Recess				
Mid-Semester Recess				
8	29 Apr	Block 2: Molecular Structure & Equilibria	Lectures (3h), Experiment 2b (3h)	Expt 2a report (Friday midnight)
9	6 May	Block 2: Equilibria Block 3: Bonding in organic molecules & functional groups	Lectures (3h)	Expt 2b report (Friday midnight)
10	13 May	Block 3: Stereoisomerism	Lectures (3h), Experiment 3a (3h)	HW & EOB quizzes for block 2 (Monday midnight)
11	20 May	Block 3: Mechanism & reactivity	Lectures (3h), Workshop 3 (3h)	
12	27 May	Block 3: Mechanism & reactivity, Aromaticity	Lectures (3h), Experiment 3b (3h)	Expt 3a report (Friday midnight)
13	3 Jun	Block 3: Aromaticity	Lecture make-up for public holiday (1h) Make-up labs	HW & EOB quizzes for block 3 (Friday midnight) Expt 3b report (Friday midnight)
Examination Period				
Examination Period				

ASSESSMENTS

This course has 3 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Written exam covering lecture materials	Formal Examination period - as scheduled.	Individual	40%	1, 2, 3
2	Workshop and laboratory assessment*	A experiments are due 1 week after the workshop. B experiments are due 1 week after the experiment.	Individual	30%	1, 2, 3, 4, 5, 6
3	Online quizzes based on lecture	Homework quizzes (3 per block) open weekly and close at the same time as the end-of-block quiz 1 week after the end of each lecture block. Refer to detailed Schedule in the canvas site.	Individual	30%	1, 2, 3

* This assessment has a compulsory requirement.

Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Written exam covering lecture materials

Assessment Type

Formal Examination

Purpose

This is a summative assessment that covers materials covered in the lectures, laboratories and workshops.

Description

Short answer and multiple-choice questions split equally across the 3 lecture blocks.

Weighting

40%

Length

2 hours + reading time

Due Date

Formal Examination period - as scheduled.

Submission Method

Formal Exam

Assessment Criteria

Questions will require short written answers - single words or formulae to several lines of written explanation and calculation. The standard required for full marks is limited to the level of understanding as expressed in the lecture notes and the textbook, viz. 'Chemistry', Blackman et al., and not higher.

Part marks will be awarded according to the level of completeness, understanding and accuracy of a response. While inaccurate or non-applicable responses will not attract specific demerits, unless it is explicitly stated to that effect in the question, they will be regarded as relevant to assessment of the student's understanding of the topic under test.

A portion of the final examination may be given in 'multiple choice' format. Students will be informed of the format of the final examination at least 1 week prior to the examination.

Return Method

Not Returned

Feedback Provided

No Feedback

Opportunity to Reattempt

Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Workshop and laboratory assessment

Assessment Type	Tutorial / Laboratory Exercises
Purpose	Teaching of laboratory skills, data analysis, and reinforcement of theory taught in lectures.
Description	Students will work in small groups (usually of 2-3) or individually depending on the experiment. Each experiment is assessed with a lab performance and engagement mark, and an online canvas quiz.
Weighting	30%
Compulsory Requirements	Pass requirement 50% - Must obtain 50% in this assessment item to pass the course.
Length	Canvas quizzes are ~10 questions / experiment
Due Date	A experiments are due 1 week after the workshop. B experiments are due 1 week after the experiment.
Submission Method	Online
Assessment Criteria	Assessment across the 6 experiments and 3 workshops is comprised of engagement (40%), lab performance (20%), and reports in the form of an online canvas quiz for each experiment (40%).
Return Method	Online
Feedback Provided	Online - At completion of each canvas quiz. Marks awarded per question
Opportunity to Reattempt	Students WILL be given the opportunity to reattempt this assessment.

Assessment 3 - Online quizzes based on lecture

Assessment Type	Quiz
Purpose	Formative assessment to reinforce concepts taught in lectures and to encourage consolidation of knowledge throughout the course.
Description	3 homework quizzes + end-of-lecture block quiz for each of the three lecture blocks. (9 homework quizzes summing to 10% + 3 end-of-lecture block quizzes summing to 20%).
Weighting	30%
Length	10 questions (for HW), or 20 questions (for EOB)
Due Date	Homework quizzes (3 per block) open weekly and close at the same time as the end-of-block quiz 1 week after the end of each lecture block. Refer to detailed Schedule in the canvas site.
Submission Method	Online
Assessment Criteria	Selection of the correct answer from the list provided. Refer to Lecture Notes for details on the course content covered for each quiz.
Return Method	Online
Feedback Provided	Online - After submission of the quiz. Correct / incorrect answers. Students can arrange to review their quiz result by appointment with the relevant lecturer or Course Coordinator.
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Attendance

Attendance/participation will be recorded in the following components:

- (Method of recording: Scanned student ID card into excel on entry)
- Workshop (Method of recording: Scanned student ID card into excel on entry)

WH&S Requirements

A mandatory laboratory induction will take place in the scheduled lab session of week 1

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Face to Face: Communication will be provided via face to face meetings or supervision.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

As a result of student feedback, the following changes have been made to this offering of the course:

- Laboratory classes have been reintroduced into CHEM1010 as of 2024 following extensive student consultation and the positive feedback received in CHEM1020.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the [Oral Examination \(viva\) Procedure](#). In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the [Student Conduct Rule](#).

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in

all locations. For the Student Academic Integrity Policy, refer to <https://policies.newcastle.edu.au/document/view-current.php?id=35>.

**Adverse
Circumstances**

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:

1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:

<https://policies.newcastle.edu.au/document/view-current.php?id=236>

**Important Policy
Information**

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures

at <https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures> that support a safe and respectful environment at the University.

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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