



# CBMS101

## Foundations of Chemistry

S1 Day 2016

*Dept of Chemistry & Biomolecular Sciences*

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#### Disclaimer

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## General Information

Unit convenor and teaching staff

Unit Convenor

Dr Damian Moran

[damian.moran@mq.edu.au](mailto:damian.moran@mq.edu.au)

Contact via [damian.moran@mq.edu.au](mailto:damian.moran@mq.edu.au)

F7B 329

Wed and Fri; other times by appointment

Lecturer

A/Prof Joanne Jamie

[joanne.jamie@mq.edu.au](mailto:joanne.jamie@mq.edu.au)

Contact via [joanne.jamie@mq.edu.au](mailto:joanne.jamie@mq.edu.au)

F7B 231

Mon - Fri

Associate Lecturer

Raha Moossavi Jazari

[raha.moossavi@mq.edu.au](mailto:raha.moossavi@mq.edu.au)

Contact via [raha.moossavi@mq.edu.au](mailto:raha.moossavi@mq.edu.au)

F7B 329

Mon and Tues

Credit points

3

Prerequisites

Corequisites

Co-badged status

### Unit description

This unit provides an introduction to the principles and practical aspects of chemistry. The unit does not assume prior knowledge of chemistry and can prepare students for entry to CBMS102 and CBMS103. Additionally it is intended as a one semester general purpose unit for non-science and science majors, including non-chemistry majors. The central focus of the unit is to make chemistry understandable and interesting and to teach some problem-solving skills that are useful in other studies and in the world beyond university, particularly in the workforce. The unit introduces atoms and molecules; elements and compounds; physical and chemical properties; the periodic table; mass and energy aspects of chemical reactions; and many other chemical concepts such as equilibrium at a basic level. Carbon compounds and biomolecules are to be introduced. Chemical principles are related to the real lives of students and our world, with topics such as global warming, air pollution, acid rain, energy production and renewable fuels.

## 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:

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- be able to write the chemical formulae of simple chemical compounds and balance basic chemical equations;
- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;
- have acquired basic laboratory skills and be familiar with general laboratory safety issues;
- have acquired some interpersonal skills through teamwork and communication during laboratory sessions and tutorials.

## Assessment Tasks

| Name              | Weighting | Due                           |
|-------------------|-----------|-------------------------------|
| Laboratory work   | 15%       | 3 hr Fortnightly              |
| Online Quizzes    | 15%       | Fortnightly                   |
| Mid Semester Test | 15%       | Week 6                        |
| Final Examination | 55%       | University Examination Period |

### Laboratory work

Due: **3 hr Fortnightly**

Weighting: **15%**

Laboratory work: There are 6 x 3hr laboratory sessions. The pre-lab exercises, performance in the laboratory and the laboratory report will be used to calculate the final laboratory mark. You are required to participate in all 6 laboratory sessions, submitting a Disruption to Studies notification if any are missed.

**Attendance:** Students unable to attend a laboratory class, exam, or hand in a form of assessment due to illness or misadventure, must submit a Disruption to Studies notification at [ask.mq.edu.au](http://ask.mq.edu.au) as soon as possible, as well as contacting Dr Damian Moran (unit convenor). If an absence is **anticipated** (perhaps for mandatory religious or University associated sporting event) you must inform the unit convenor **in advance** that this will be the case and make alternative arrangements. It is your responsibility to undertake this. Notification after the event of an anticipated absence will not be looked upon favourably. For a justified absence students will receive the average mark from the sessions they did attend. For any unjustified absences students will receive a zero mark.

On successful completion you will be able to:

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- be able to write the chemical formulae of simple chemical compounds and balance basic chemical equations;
- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;

- have acquired basic laboratory skills and be familiar with general laboratory safety issues;
- have acquired some interpersonal skills through teamwork and communication during laboratory sessions and tutorials.

## Online Quizzes

Due: **Fortnightly**

Weighting: **15%**

Online quizzes: Six (6) quizzes will be used for the final assessment. The quizzes are an important learning and testing tool that encourage students to work at a steady pace and keep up with the lectures topics.

On successful completion you will be able to:

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- be able to write the chemical formulae of simple chemical compounds and balance basic chemical equations;
- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;

## Mid Semester Test

Due: **Week 6**

Weighting: **15%**

There will be a 45 minute test in Week 6, in the lecture (and possibly in the chemistry laboratories). This will cover all topics presented in lectures during weeks 1-5, inclusive. Questions will be a mixture of multiple choice and short answer and you will be required to have pen or pencil and a calculator at the test. The test is designed to give you specific feedback on your understanding of the topics up to this stage.

**If you are absent for the mid-term test, a Disruption to Studies notification must be lodged at [ask.mq.edu.au](https://ask.mq.edu.au) as soon as possible after the exam.** If a make-up test is granted as a result of the Disruption to Studies process the examination will be scheduled during the mid-session holidays (11 - 22 April).

On successful completion you will be able to:

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- be able to write the chemical formulae of simple chemical compounds and balance basic chemical equations;

## Final Examination

Due: **University Examination Period**

Weighting: **55%**

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 acquired can be applied to new problems. You **MUST** perform satisfactorily in the final exam to pass CBMS101. The exam will contain a mixture of multiple choice and short answer questions both of which may involve problem solving.

Assessment will be based primarily on the total score aggregated as above, but, in addition, **a satisfactory level of achievement in the final exam and the completion of, and satisfactory performance in the laboratory sessions is required in order to pass the unit.**

The University Examination period in First Half Year 2016 is from 14 June to 1 July.

You are expected to present yourself for examination at the time and place designated in the University Examination Timetable. The 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. See <https://iexams.mq.edu.au/timetable>

The only exception to sitting an examination at the designated time is through documented illness or unavoidable disruption. In these circumstances you must contact [ask.mq.edu.au](mailto:ask.mq.edu.au) as soon as possible and submit a Disruption to Studies notification.

If a Supplementary Examination is granted as a result of the Disruption to Studies process the examination will be scheduled after the conclusion of the official examination period. The offer of a supplementary examination is at the discretion of the academic staff and you should not assume that it will be offered to you. Supplementary exams are **not make-up exams** i.e., a poor result in the final examination is not reason to request a supplementary exam.

You are advised that it is Macquarie University policy **not to 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.

Your marks or grades (online quizzes, mid-semester test, laboratory) will be made available at the CBMS101 iLearn space progressively. **Your final SNG will be based primarily on the aggregate mark, but the minimum requirement to achieve a passing grade is satisfactory performance in each of the final exam and the laboratory components.**

On successful completion you will be able to:

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- be able to write the chemical formulae of simple chemical compounds and balance basic chemical equations;

## Delivery and Resources

### Classes

CBMS101 is a 3 credit-point half-year unit and will require an average of 9 hours work per week (including face to face time) with some students requiring more time.

Students are expected to attend two weekly lectures (Wednesday 10 am and Friday 10 am), a 1-hour tutorial each week and a 3-hour laboratory session every second week (E7B 308, entry off north balcony) plus 4.5 hours per week of private study.

Some students will probably need to spend significantly more time than this. New material and new concepts are introduced in fast succession. **Thus, in order to successfully complete this unit, students will need to work hard, consistently and continuously throughout the semester.**

**Lectures commence in week 1, tutorials in week 2.** Lectures and tutorials start at five minutes past the hour and finish at five minutes before the hour.

***In Week 2 laboratory classes will commence for half of the student group and the remaining half will commence in Week 3.*** It is important for you to check the CBMS101 iLearn site to see which laboratory demonstrator you have been scheduled. Students will spend a total of 18 hours (six 3-hour sessions) in the laboratory during the semester.

The timetable for classes can be found at the University website: <http://www.timetables.mq.edu.au/>

## Required and Recommended Texts and/or Materials

- The prescribed text is ***Introductory Chemistry*** by Nivaldo Tro, 5th Edition (Global Edition) published by Pearson Education Ltd, 2015. You are expected to have a copy of the text book. The brief lecture summaries and the lecture overheads discussed below are of little value without the text. Please remember that copies of the textbook, including earlier editions, are available at the Library.
- **CBMS101 2016 Lecture Powerpoint Slides** are available in PDF format at the CBMS101 iLearn site.

- **Laboratory Notes for CBMS101** are available in PDF format at the CBMS101 iLearn site. It is not possible to meet the requirements of the unit without a copy of these notes.
- **A laboratory coat** must be worn for each laboratory session along with shoes which fully enclose feet. Students **will not be permitted** to work in the laboratory wearing inappropriate footwear.

Additional Resources for those seeking more (available in the Library and/or Co-op Bookshop):

- *Aylward and Findlay's SI Chemical Data* by A. G. Blackman 7th Ed. John Wiley and Sons, Australia 2014.
- *Essential Skills for Science and Technology* by Zeegers P., Deller-Evans K., Egege S., and Klinger C., Oxford University Press 2011.
- *Maths for Chemistry, A Chemist's Toolkit of Calculations* by P. Monk and L. J. Munro, 2nd Ed. Oxford University Press 2010.

## Technologies Used and Required

### UNIT WEB PAGE - ILEARN

**iLearn** is the name for Macquarie University's Learning Management System (LMS). The iLearn online learning environment enables learning, teaching, communication and collaboration. It is used to make lecture notes, laboratory notes, discussion forums, digital lecture recordings and other learning resources available to students online. See <http://help.ilearn.mq.edu.au/> for more information.

Much vital CBMS101 material and information is available via iLearn. The CBMS101 iLearn site will be used for the posting of important announcements, as well as providing access to lecture notes, laboratory notes, the unit outline, past exams, etc. iLearn may also be used to check on your marks as the unit proceeds.

Your iLearn Username is your Macquarie Student ID Number, which is an 8-digit number found on your Campus Card. The password is your myMQ Student Portal password. This will be the original MQID password (2 random characters followed by your date of birth in ddmmyy format) that was sent to you on enrolment, unless you have already changed your password in the myMQ Student Portal. If you have any problems with iLearn log a ticket with OneHelp at <http://mq.edu.au/onehelp/>.

More information about OneHelp can be found at <http://informatics.mq.edu.au/help/>

## Teaching and Learning Strategy

### Lectures

As indicated above, copies of many of the overhead Powerpoint slides to be presented in



lectures will be available at the CBMS101 iLearn site in PDF format. **You are expected to download the lecture slides** and bring them to your lectures so you can spend most of the lecture time listening to the presenter and less on transcribing notes.

But be warned! You may be tempted to believe that reading the slides can substitute for attendance at the lectures. Many slides make little sense without the accompanying discussion. Moreover, not all slides used in lectures are necessarily included in the material that is placed at the CBMS101 iLearn site.

Wednesday and Friday lectures will be recorded and will be available on the CBMS101 iLearn site after each lecture but should only be used as an additional resource as they are not a substitute for actually being present at the lectures.

**Do not assume that having the powerpoint slides and listening to iLectures are a suitable substitute for attending lectures.**

## Tutorials

**Tutorial work in CBMS101 involves regular weekly interactive tutorial classes (which all students are strongly advised to attend).**

To prepare for tutorials you must attempt as many as possible of the textbook questions listed on the tutorial sheets to be provided and on the unit website. As a general rule, the topics included are those covered in lectures immediately before the tutorial. During each tutorial class you should ask questions about any problem that caused you difficulties, but in the absence of questions, your tutor will ask the class to work through the examples listed on the tutorial sheets. **You will get much more benefit from the tutorials if you have prepared in advance.**

## Laboratory Work

Details of the laboratory work are contained in the notes available at the CBMS101 iLearn site. You will be scheduled to complete a total of six experiments by attending laboratory classes in either even weeks (weeks 2, 4, 6, 8, 10 and 12) or odd weeks (weeks 3, 5, 7, 9, 11 and 13).

**For safety reasons you will not be permitted to participate in laboratory sessions unless you are wearing a lab coat and sturdy shoes which cover your feet.** The Laboratory Notes must be read and some simple preparatory exercises completed **before** you attend the laboratory session.

**Good preparation is essential if you are to understand and benefit from lab work.** So the pre-lab exercises must be submitted **by 9 am the day prior to your laboratory class** at the Faculty of Science and Engineering Student Services Centre (Building C7A (MUSE), Level 2). You will not be permitted to begin the practical until you have submitted your completed pre-lab.

*The laboratory work must be completed in the 3-hour practical time allotted and the report handed in at the end of the practical session.* Your marked laboratory report will be returned to you by your demonstrator at your next laboratory session. While comments may be provided for

your guidance, your grade (for the lab report) will reflect both the quality of your answers and your practical skills in the laboratory.

**Plagiarism is not accepted and no marks will be awarded to any student involved in plagiarising.**

### Online Quizzes

Six online quizzes will be given at the CBMS101 iLearn site with the intention to encourage students to work at a steady pace throughout the semester. Each quiz will be open for completion for 1 week. All attempts, including incorrect and correct answers are stored on the web site for each student and can be accessed by the lecturer.

## Unit Schedule

| Week | Lecture 1<br>Wednesday 10 am                 | Lecture 2<br>Friday 10 am                        | QUIZ (due Sun<br>midnight) | Practical class<br>(E7B Level 3)                                     |
|------|--|--|----------------------------|--|
| 1    | Welcome Chemical Foundations                 | Matter Chemical and Physical Changes             |                            |  |
| 2    | Atoms and Elements                           | Molecules and Compounds                          |                            | E1 Physical and Chemical Changes (Stream A)                          |
| 3    | Chemical Reactions                           | Chemical Reactions                               | 1                          | E1 Physical and Chemical Changes (Stream B)                          |
| 4    | Solutions; Chemical Composition              | Quantities in Chemical Reactions - Stoichiometry |                            | E2 Separations and Purifications; Precipitation Reactions (Stream A) |
| 5    | Stoichiometry                                | Stoichiometry                                    | 2                          | E2 Separations and Purifications; Precipitation Reactions (Stream B) |
| 6    | Solution Stoichiometry; Acid/Base Titrations | Mid-semester Test                                |                            | E3 Stoichiometry (Stream A)  |
| 7    | Gases  | Gases  | 3                          | E3 Stoichiometry (Stream B)  |
| 8    | Atoms, Orbitals and Electronic Configuration | Chemical Bonding                                 |                            | E4 Acid/Base Stoichiometry (Stream A)                                |
| 9    | Intermolecular Forces                        | Energy   | 4                          | E4 Acid/Base Stoichiometry (Stream B)                                |
| 10   | Acids and Bases                              | Acids and Bases                                  |                            | E5 Calorimetry; Heats of Reactions (Stream A)                        |
| 11   | Chemical Equilibrium                         | Oxidation and Reduction                          | 5                          | E5 Calorimetry; Heats of Reactions (Stream B)                        |

|    |                   |                                       |   |   |
|----|-------------------|---------------------------------------|---|---|
| 12 | Organic Chemistry | Organic Chemistry                     |   | E6 Equilibrium; Redox Reactions; Models of Organic Molecules (Stream A) |
| 13 | Organic Chemistry | Organic Chemistry<br>Exam Preparation | 6 | E6 Equilibrium; Redox Reactions; Models of Organic Molecules (Stream B) |

## Policies and Procedures

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

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

**New Assessment Policy in effect from Session 2 2016** [http://mq.edu.au/policy/docs/assessment/policy\\_2016.html](http://mq.edu.au/policy/docs/assessment/policy_2016.html). For more information visit [http://students.mq.edu.au/events/2016/07/19/new\\_assessment\\_policy\\_in\\_place\\_from\\_session\\_2/](http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/)

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public [http://www.mq.edu.au/policy/docs/complaint\\_management/procedure.html](http://www.mq.edu.au/policy/docs/complaint_management/procedure.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

## Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](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

- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;

### Assessment tasks

- Laboratory work
- 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 outcomes

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;

### Assessment tasks

- Laboratory work
- Online Quizzes
- Mid Semester Test

## 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:

### Learning outcomes

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- be able to write the chemical formulae of simple chemical compounds and balance basic chemical equations;

- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;

## **Assessment tasks**

- Laboratory work
- Online Quizzes
- Mid Semester Test

## **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**

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- be able to write the chemical formulae of simple chemical compounds and balance basic chemical equations;
- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;
- have acquired basic laboratory skills and be familiar with general laboratory safety issues;

## **Assessment tasks**

- Laboratory work
- Online Quizzes
- Mid Semester Test

- 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

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;
- have acquired basic laboratory skills and be familiar with general laboratory safety issues;
- have acquired some interpersonal skills through teamwork and communication during laboratory sessions and tutorials.

### Assessment tasks

- Laboratory work
- Online Quizzes
- Mid Semester Test
- 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

- be able to write the chemical formulae of simple chemical compounds and balance basic chemical equations;
- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;
- have acquired basic laboratory skills and be familiar with general laboratory safety issues;
- have acquired some interpersonal skills through teamwork and communication during laboratory sessions and tutorials.

## Assessment tasks

- Laboratory work
- Online Quizzes
- Mid Semester Test
- 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

- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;
- have acquired some interpersonal skills through teamwork and communication during laboratory sessions and tutorials.

## Assessment tasks

- Laboratory work
- Online Quizzes
- Final Examination



## 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 outcomes

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of chemical data, and acquaintance of information technology to social and environmental awareness;
- have acquired basic laboratory skills and be familiar with general laboratory safety issues;

### Assessment task

- Laboratory work

## 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:

### Learning outcomes

- have achieved a fundamental understanding of general chemical principles applicable to chemistry and other science disciplines, particularly the role of chemistry in modern society relating to current issues such as energy production and everyday life experiences;
- have developed graduate capabilities ranging from chemistry specific skills, including the analytical capability in solving chemical problems, processing and interpretation of

chemical data, and acquaintance of information technology to social and environmental awareness;

- have acquired basic laboratory skills and be familiar with general laboratory safety issues;

## Assessment task

- Laboratory work

## Changes from Previous Offering

There are no substantial changes to the content. However, there is a new Unit Convenor in 2016.

## Disruption to Studies Notifications

The University is committed to equity and fairness in all aspects of its learning and teaching. In stating this commitment, the University recognises that there may be circumstances where a student is prevented by unavoidable disruption from performing in accordance with their ability. The University has a policy on special consideration request that may be found at [http://www.mq.edu.au/policy/docs/disruption\\_studies/procedure.html](http://www.mq.edu.au/policy/docs/disruption_studies/procedure.html). The University classifies a disruption as serious and unavoidable if it:

- could not have reasonably been anticipated, avoided or guarded against by the student; and
- was beyond the student's control; and
- caused substantial disruption to the student's capacity for effective study and/or completion of required work; and
- occurred during an event critical study period and was at least three (3) consecutive days duration, and / or
- prevented completion of a final examination.

This policy is instituted to support students who experience serious and unavoidable disruption such that they do not reach their usual demonstrated performance level. The disruption to studies notification must be completed and submitted online through [ask.mq.edu.au](http://ask.mq.edu.au) within five (5) working days of the commencement of the disruption. In the situation where a student requires a proxy to submit it on their behalf, this will be taken into account on submission of appropriate evidence as detailed below.

**Extensions:** Students unable to complete a form of assessment (e.g. online quizzes) on time due to illness or other extenuating circumstances must submit a Disruption to Studies notification at [ask.mq.edu.au](http://ask.mq.edu.au) AND contact Dr Damian Moran (unit convenor) to discuss possible extensions as soon as possible. Extensions will be granted based on merit and will be more favourably considered if consultation with the unit coordinator on the need for an extension occurred BEFORE the due date. Considering that each quiz is available for a one week period

an extended period of illness (or other misadventure) must be demonstrated (not just the day or so before a quiz is due).

## Syllabus

### Syllabus

The syllabus for CBMS101 detailing topics to be covered and textbook sections to be studied is set out below. Consult this syllabus frequently to be sure that you have covered all the required material. A timetable of lecture topics and experiments is also in the unit outline. Please ensure that you bring the correct experimental notes to each laboratory session.

### Unit Requirements

The unit requirement is that you:

- Participate in **all** laboratory sessions, complete the pre-lab before the lab session and submit laboratory reports at the completion of each session
- Attempt **all** online quizzes
- Attempt the mid-semester test on **Wednesday 6 April 2016**
- Sit, and demonstrate satisfactory competency in, a final examination of three hours duration.

Students unable to attend a laboratory class due to illness or misadventure (as defined in the University Disruption to Studies policy) must submit a Disruption to Studies notification at [ask.mq.edu.au](http://ask.mq.edu.au) as soon as possible. In special circumstances it may be possible to attend an alternative laboratory class, but this must be arranged in advance with the unit coordinator. **If you miss more than one laboratory session through illness or misadventure, you should request withdrawal without penalty.**

### Unit Expectations

In addition to the formal requirements for the unit, there are other actions you should take to have a reasonable chance of success. They are the same things that you need to do in order to demonstrate that you have been performing satisfactorily up to the time of any request for special consideration.

The unit expectations are that you will:

- attend all lectures
- attend all tutorial classes and attempt the set exercises
- demonstrate reasonable competence in all laboratory preparation exercises and attend each lab class
- demonstrate reasonable competence in the laboratory with submission of report before

leaving the lab

- spend an average of no less than 4 hours per week private study in addition to class contact

***If you fail to meet the formal unit requirements, you may be withdrawn from the unit, but if you fail to meet these expectations, the probability of obtaining a passing grade will be greatly reduced.***

## Syllabus

### CBMS101 Foundations of Chemistry 2016

Textbook:

***Introductory Chemistry* by Nivaldo Tro, 5th Edition (Global Edition) published by Pearson Education Ltd, 2015**

|  |            |
|--|------------|
| <b>The Chemical World (Introductory lecture)</b>                             | <b>CH1</b> |
| <b>Measurement and Problem Solving (Introductory lecture)</b>                | <b>CH2</b> |
| <b>Matter (1 lecture)</b>  | <b>CH3</b> |
| Sections 3.1-3.7 presented in Week 1; sections 3.8-3.12 presented in Week 9. |            |
| <b>Atoms and Elements (1 lecture)</b>  | <b>CH4</b> |
| Atomic Theory  | 4.2        |
| The Nuclear Atom   | 4.3        |
| Properties of Protons, Neutrons and Electrons                                | 4.4        |
| Elements Defined by Number of Protons  | 4.5        |
| Periodic Law and Periodic Table  | 4.6        |
| Ions   | 4.7        |
| Isotopes   | 4.8        |
| Atomic Mass  | 4.9        |
| <b>Molecules and Compounds (1 lecture)</b>                                   | <b>CH5</b> |

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|-----------------------------------|----------|
| Constant Composition of Compounds | 5.2      |
| Chemical Formulae                 | 5.3, 5.5 |
| Elements and Compounds            | 5.4      |
| Naming Compounds                  | 5.6-5.10 |

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| <b>Chemical Composition (1 lecture)</b> | <b>CH6</b> |
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|--------------------------------|---------|
| Mass and Moles                 | 6.1-6.5 |
| Mass Percent Composition       | 6.6-6.7 |
| Calculating Empirical Formulae | 6.8     |
| Calculating Molecular Formulae | 6.9     |

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| <b>Chemical Reactions (2 lectures)</b> | <b>CH7</b> |
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|---------------------------------------|---------|
| Chemical Equations                    | 7.3-7.4 |
| Solubility                            | 7.5     |
| Precipitation Reactions               | 7.6-7.7 |
| Acid-Base and Gas Evolution Reactions | 7.8     |
| Oxidation-Reduction Reactions         | 7.9     |
| Classifying Chemical Reactions        | 7.10    |

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| <b>Quantities in Chemical Reactions (3 lectures)</b> | <b>CH8</b> |
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| Mole to Mole Conversions                            | 8.3     |
| Mass to Mass Conversions                            | 8.4     |
| Limiting Reactant, Percent Yield, Theoretical Yield | 8.5-8.6 |
| Enthalpy  | 8.7     |

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| <b>Electrons in Atoms and the Periodic Table (1 lecture)</b> | <b>CH9</b> |
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| Electromagnetic Radiation                      | 9.2-9.3 |
| Bohr Model                                     | 9.4     |
| Quantum-Mechanical Orbitals                    | 9.5-9.6 |
| Electron Configurations and the Periodic Table | 9.7-9.9 |

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| <b>Chemical Bonding (1 lecture)</b> | <b>CH10</b> |
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| Lewis Structures                   | 10.2-10.6 |
| Predicting the Shapes of Molecules | 10.7      |
| Electronegativity and Polarity     | 10.8      |

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| <b>Gases (1 lecture)</b> | <b>CH11</b> |
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|-----------------------------------|-----------|
| Kinetic Molecular Theory          | 11.2      |
| Pressure and its Measurement      | 11.3      |
| The Gas Laws                      | 11.4-11.6 |
| Avogadro's Law                    | 11.7      |
| Ideal Gas Equation                | 11.8      |
| Gas Mixtures and Partial Pressure | 11.9      |
| Gases in Chemical Reactions       | 11.10     |

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| <b>Liquids, Solids and Intermolecular Forces (1 lecture)</b> | <b>CH12</b> |
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|-----------------------------------|------|
| Solids and Liquids                | 12.2 |
| Surface Tension and Viscosity     | 12.3 |
| Evaporation and Condensation      | 12.4 |
| Melting, Freezing and Sublimation | 12.5 |
| Types of Intermolecular Forces    | 12.6 |
| Types of Crystalline Solids       | 12.7 |
| Water                             | 12.8 |

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|---|-----------------|
| <b>Solutions (1 lecture)</b>                | <b>CH13</b>     |
| Homogeneous Mixtures                        | 13.2-13.4       |
| Mass Percent                                | 13.5            |
| Molarity                                    | 13.6            |
| Dilution                                    | 13.7            |
| Stoichiometry                               | 13.8            |
| <br><b>Acids and Bases (2 lectures)</b>     | <br><b>CH14</b> |
| Definitions                                 | 14.2-14.4       |
| Reactions of Acids and Bases                | 14.5            |
| Titration                                   | 14.6            |
| Strong and Weak Acids and Bases             | 14.7            |
| Amphoteric Water                            | 14.8            |
| pH and pOH                                  | 14.9            |
| Buffers                                     | 14.10           |
| Acid Rain                                   | 5.9 (pg 182)    |
| <br><b>Chemical Equilibrium (1 lecture)</b> | <br><b>CH15</b> |
| Reaction Rate                               | 15.2            |
| Dynamic Equilibrium                         | 15.3            |
| Equilibrium Constant                        | 15.4-15.6       |
| Le Chatelier's Principle                    | 15.7-15.10      |
| Molar Solubility                            | 15.11           |
| Catalysts                                   | 15.12           |
| <br><b>Electrochemistry (2 lectures)</b>    | <br><b>CH16</b> |
| Definitions                                 | 16.2            |

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|---------------------------|------|
| Oxidation States          | 16.3 |
| Balancing Redox Equations | 16.4 |
| The Activity Series       | 16.5 |
| Batteries and Fuel Cells  | 16.6 |
| Electrolysis              | 16.7 |
| Corrosion                 | 16.8 |

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| <b>Organic Chemistry (3 lectures)</b> | <b>CH18</b> |
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|-------------------------------------|-----------|
| Carbon                              | 18.3      |
| Hydrocarbons                        | 18.4      |
| Alkanes                             | 18.5-18.7 |
| Alkenes and alkynes                 | 18.8      |
| Reactions                           | 18.9      |
| Functional Groups                   | 18.11     |
| Other Organic Families of Compounds |           |
| 18.12-18.17                         |           |