CBMS101

Foundations of Chemistry

S2 External 2014

Chemistry and Biomolecular Sciences

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
Maree Nelson
maree.nelson@mq.edu.au
Contact via maree.nelson@mq.edu.au
F7B333
Monday-Thursday

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%	26 October 2014
In-class quizzes	15%	Various
Mid-semester test	15%	Sunday 28 Sept, 11am
Final Examination	55%	University Examination Period

Laboratory work

Due: **26 October 2014**
Weighting: **15%**

Laboratory work: The pre-lab exercises, performance in the laboratory and the laboratory report will be used to calculate the final laboratory mark. Each of the 6 laboratory reports are due on completion of the lab session with the last experiment, Experiment 6, due on Sunday 26 October.

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.

In-class quizzes

Due: **Various**
Weighting: **15%**

In-class quizzes: The best 4 quizzes (out of a possible 6) 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 each on-campus day (except when mid-semester test is held) at completion of lectures/tutorials a multiple choice quiz will be given on the topics discussed that day.

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: **Sunday 28 Sept, 11am**
Weighting: **15%**

Mid-semester Test: There will be a 45 minute test on Sunday 28 September, in the 11am lecture. This will cover all topics presented in lectures during the first 3 on-campus days (up to and including 'Gases'). 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.

There will be no make-up test for the mid-term test. Medical Certificates or official documents must be lodged with a special consideration form as soon as possible after the test online at https://ask.mq.edu.au/account/forms/display/enquiry/ if you are absent for the mid-term test. In this case, your final exam mark will be used for the missed mid-term 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;

Final Examination

Due: **University Examination Period**
Weighting: **55%**

Final Examination: 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.

Your marks/grades (on-line quizzes, mid-term exam, laboratory) will be placed on the **CBMS101X** ilearn web site. The **minimum requirement** to achieve a passing grade for CBMS101X is **satisfactory performance** in separately **both** the **final exam** and the **laboratory** component.

Final Examination Details: The examination timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in final form approximately four weeks before the commencement of the examinations. See www.timetables.mq.edu.au/exam. You are expected to present yourself for examination at the time and place designated by the University in the Examination Timetable. This could be any day after the final week of semester and up until the final day of the official examination period. It is Macquarie University policy to **not set early examinations** for individuals or groups of students. All students are expected to ensure that they are available until the end of the

teaching semester, that is, the final day of the official examination period.

The only exception to sitting an examination at the designated time is because of documented illness or unavoidable disruption. Absence from the final exam will result in a grade of F except in the case of a genuine medical emergency or misadventure as defined by the University (see below). In these circumstances you may wish to consider applying for Special Consideration. The special consideration process is available at https://ask.mq.edu.au/account/forms/display/enquiry/

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;

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.

The on-campus sessions will be 16-17 August, 26-28 September, and 25-26 October. For each day, lectures and tutorials will run from 9am-1pm and practical classes from 1.30pm-4.30pm. Practical classes will be held in E7B308 (First Year Chemistry Laboratory).

All on-campus sessions except 25 October: lectures and tutorials will be held in E6A133; 25 October in E7B264.

Please come straight to the class for commencement at 9am.You will NOT be required to sign-on at the Centre for Open Education.

On-campus sessions are compulsory. Repeat students may request practical exemption, but it is up to the discretion of the unit coordinator as to whether exemption is granted. **Non-attendance of the on-campus session is only allowed due to medical or other extenuating circumstances, of which details must be formally lodged** (see non-attendance and special

request details later).

It is very important to prepare well and **in advance** for the on-campus sessions including the first one. Purchase your text book as early as possible and begin working through each set chapter. Complete the set tutorial questions for each chapter and then **come prepared with questions** to the on-campus sessions. Lecture slides and lecture audio from the internal first semester unit are available on the CBMS101 website. It is advisable to bring the printed lecture slides for the relevant sections to the on-campus sessions (refer to the program later in these notes). Many of them will be used in the external lectures but not all.

It is highly recommended that you study continuously throughout the semester – in fact it is essential if you hope to achieve a good grade. At the end of these notes is a suggested study schedule to help you timetable and optimise your study for CBMS101X.

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

Required and Recommended Texts and/or Materials

The prescribed texts are:

Introductory Chemistry by Nivaldo Tro, 4th Edition, Pearson New International Edition published byPearson Education and Prentice Hall, 2014.

You are expected to have a copy of the text book (earlier editions are acceptable also). The brief lecture summaries and the lecture overheads discussed below are of little value without the text.

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.

Unit Notes:

Laboratory Notes for CBMS101

These are available from the University Co-op. Bookshop, or can be printed from the CBMS101 website. It is not possible to meet the requirements of the unit without a copy of these notes.

CBMS101 2014 Lecture Powerpoint Slides from First Semester

These can be printed from iLearn World Wide Web page using any web browser such as Mozilla, Netscape, Internet Explorer or Safari. The URL is: https://ilearn.mq.edu.au

Login and then click on CBMS101: Foundations of Chemistry 2014 S2.

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

Essential Skills for Science and Technology by Zeegers P., Deller-Evans K., Egege S., and Klinger C., Oxford University Press 2008.

Maths for Chemistry, A Chemist's Toolkit of Calculations by Monk P., Oxford University Press 2006

Technology Used and Required

UNIT WEB PAGE - ILEARN

iLearn is the name for Macquarie University's new 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://www.mq.edu.au/iLearn/studentinfo.htm or more information.

Much vital CBMS101 material and information is available via iLearn. The CBMS101 website will be used for the posting of important announcements. The web may also be used to check on your marks as the unit proceeds. Copies of many of the overheads to be presented in lectures are also available via the web as well as laboratory notes, unit outline, past exams and tests etc.

If you have off-campus internet access, simply start your web browser such as Firefox, Internet Explorer or Safari and proceed as below. You may also use the computers in the University Library. Once the browser program is running, type in the iLearn URL: https://ilearn.mq.edu.au

Teaching and Learning Strategy

Syllabus

The syllabus for CBMS101X detailing topics to be covered and textbook sections to be studied is set out on separate sheets near the end of this document. Consult this syllabus frequently to be sure that you have covered all the required material. Please ensure that you bring the correct experimental notes to each laboratory session.

Unit Requirements

The unit requirements are 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. If less than 5 of the 6 experiments are completed, regardless of reason, it will not be possible to pass the unit.

· Attempt at least 4 of the 6 in-class quizzes.

· Attempt the mid-semester test on Sunday 28 September 2014.

· Sit, and demonstrate satisfactory competency in, a final examination of three hours duration.

Students unable to attend an on-campus session due to illness or misadventure (defined in the 'Student Information' section of the University Undergraduate Studies Handbook) should provide the University with documentation including a Disruption to Studies form with Professional Authority form as soon as possible after any such absence. If you miss more than one laboratory session through illness or misadventure, you should request withdrawal without penalty. If you miss any laboratory session without adequate evidence of illness or misadventure, you may be withdrawn from the unit.

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:

· continuously work before on-campus sessions through reading of recommended material, attempting all set problems and preparing for the laboratory classes

· **attend all on-campus sessions**

· 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

· perform satisfactorily in the final exam.

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.

Lectures

Lectures are a very brief presentation of the syllabus with concentration on the more difficult aspects of the unit. Copies of many of the overhead powerpoint slides to be presented in lectures will be available on the CBMS101X iLearn web pages. These are the slides from the first semester internal offering of the unit so there are many more slides there than will be seen in the external lectures. They will be in PDF format so you can view them only if your computer has a Version 4 or later Adobe Acrobat Reader (can be downloaded from the CBMS101X home page). It would be advantageous for you 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 on the Web.

Taped lectures from the internal first semester offering will be available on the CBMS101X iLearn website and should be used as an *additional* resource.

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

Tutorials

Tutorials in CBMS101X will take place after the morning lectures and before the lunch break.

To prepare for tutorials you must attempt as many as possible of the textbook questions listed on the tutorial sheets attached. As a general rule, the topics included are those covered in lectures. During each tutorial session 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 only benefit from the tutorials if you have prepared in advance.

Laboratory Work

Details of the laboratory work are contained in the notes available from the University Bookshop and available on the web. You will be scheduled to complete a total of six experiments. Students repeating CBMS101 may be given an exemption from the practical component. They need to meet with Mrs Nelson to discuss this possibility. Students attempting CBMS101 for the third time **must** complete the practical work again.

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. The pre-lab exercises must be completed and given to your demonstrator immediately after you arrive at the laboratory at 1.30pm. You will not be permitted to begin the practical until you have submitted your completed pre-lab to your demonstrator. 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. Good preparation is essential to understand and benefit from the lab work.

Your marked laboratory report will be returned to you by post as quickly as possible. While comments may be provided for your guidance, your grade (for the lab report) will reflect the quality of your answers.

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

In-class Quizzes

Six quizzes will be given, one at the end of each morning lecture/tutorial session, to encourage

students to work at a steady pace throughout the 13 weeks of semester.

The best four quiz results will be used for assessment.

Changes to CBMS101X

There have been no significant changes.

Unit Schedule

TIMETABLE FOR RESIDENTIAL DAYS

In the **weeks prior to each on-campus session** you should read the corresponding chapters in the text book and attempt the set tutorial problems from the end of the chapter in the textbook (also available on the web). A study plan is provided at the end of this document to assist you. A selection of the set tutorial problems below will be discussed in the on-campus sessions. Additionally, if in your preparation you find that there are areas that you need further help on, you should provide the details to the lecturer in charge of the relevant on-campus session (preferably BEFORE the on-campus session) by email so the lecturer can also address these issues with the class (if you are having difficulties it is probable that other students will also have similar difficulties).

On-Campus Session 1 Day 1 (16th August)

9-10.30 am (E6A133)

Lecture: chapters 1, 2 and 3 (excluding 3.8-3.12), 4 and 5.

Tutorial Problems: sets 1, 2 (see attached sheet with 'Tutorial Schedule').

10.30-10.45 am (balcony E7B level 3)

Morning tea

10.45 am-1 pm (E6A133)

Lecture: chapter 7: chemical reactions.

Tutorial Problems: set 3 (see attached sheet with 'Tutorial Schedule').

1-1.30 pm

Lunch break

1.30-4.30 pm (E7B 308 entry off balcony level 3)

Laboratory: Experiment 1, Physical and Chemical Changes. Have **pre-lab for Experiment 1 (E1)** ready for submission at 1.30pm to your demonstrator.

On-Campus Session 1 Day 2 (17th August)

9-10.30 am (E6A133)

Lecture: chapter 13 1-5, Solutions; chapter 6, Chemical Composition.

Tutorial problems: set 4.

10.30-10.45 am (balcony E7B level 3)

Morning tea

10.45 am-1 pm (E6A133)

Lecture: chapter 8, Reaction Stoichiometry; chapter 13.6-13.8, Molarity and Solution Stoichiometry

Tutorial problems: set 5.

1-1.30 pm

Lunch break

1.30-4.30 pm (E7B 308 entry off balcony level 3)

Laboratory: Experiment 2, Separations and Purifications; Precipitation Reactions.

Have pre-lab for E2 ready for submission at 1.30 pm to your demonstrator.

On-Campus Session 2 Day 1 (26 September)

9-10.30 am (E6A133)

Lecture: chapter 9, Atoms, Orbitals and Electron Configuration.

Tutorial Problems: set 6.

10.30-10.45 am (balcony E7B level 3)

Morning tea

10.45 am-1 pm (E6A133)

Lecture: chapter 11, Gases.

Tutorial Problems: chapter11 problems from set 7.

1-1.30 pm

Lunch break

1.30-4.30 pm (E7B 308 entry off balcony level 3)

Laboratory: Experiment 3, Stoichiometry. Have **pre-lab for Experiment 3 (E3)** ready for submission at 1.30 pm to your demonstrator.

On-Campus Session 2 Day 2 (27 September)

9-10.30 am (E6A133)

Lecture: chapter 10, Chemical Bonding.

Tutorial Problems: chapter 10 problems from set 7.

10.30-10.45 am (balcony E7B level 3)

Morning tea

10.45 am-1 pm (E6A133)

Lecture: chapter 12, Intermolecular Forces.

Tutorial Problems: set 8.

1-1.30 pm

Lunch break

1.30-4.30 pm (E7B 308 entry off balcony level 3)

Laboratory: Experiment 4, Acid-Base Stoichiometry. Have **pre-lab for Experiment 4 (E4)** ready for submission at 1.30 pm to your demonstrator.

On-Campus Session 2 Day 3 (28th September)

9-10.30 am (E6A133)

Lecture: Energy, chapter 3 3.8-3.12; chapter 8, 8.7; chapter 12, parts of 12.4, 12.5.

Tutorial Problems: set 9.

10.30-10.45 am (balcony E7B level 3)

Morning tea

10.45-12 pm (E6A 133)

Mid-semester Test (50 minutes) – Examination of material from first 4 on-campus days, up to and including chapter 11, Gases. There will be a short time before commencement of the test for questions and answers.

12 pm

End of second on-campus session.

On-Campus Session 3 Day 1 (25 October)

9-10.30 am (E7B264)

Lecture: chapters 14, Acids and Bases

Tutorial Problems: set 10, (see attached sheet with 'Tutorial Schedule').

10.30-10.45 am (balcony E7B level 3)

Morning tea

10.45 am -1 pm (E7B264)

Lecture: chapter 15: Chemical Equilibrium

Tutorial Problems: set 10 continued, (see attached sheet with 'Tutorial Schedule').

1-1.30 pm

Lunch break

1.30-4.30 pm (E7B 308 entry off balcony level 3)

Laboratory: Experiment 5, Calorimetry; Heats of Reaction. Have **pre-lab for Experiment 5 (E5)** ready for submission at 1.30 pm to your demonstrator.

On-Campus Session 3 Day 2 (26 October)

9-10.30 am (E6A133)

Lecture: chapters 16, Oxidation and Reduction

Tutorial Problems: set 11, (see attached sheet with 'Tutorial Schedule').

10.30-10.45 am (balcony E7B level 3)

Morning tea

10.45 am -1 pm (E6A133)

Lecture: chapter 18: Organic Chemistry

Tutorial Problems: set 12, (see attached sheet with 'Tutorial Schedule').

1-1.30 pm

Lunch break

1.30-4.30 pm (E7B 308 entry off balcony level 3)

Laboratory: Experiment 6, Equilibrium; Redox reactions; Models of organic Molecules. Have **pre-lab for Experiment 6 (E6)** ready for submission at 1.30 pm to your demonstrator.

To-Do Lists Before Residential Sessions

Before First On-Campus Session

(1) Carefully read the **whole of these** notes	
(2) Buy the textbook	
(3) Read Tro Chapters 1, 2, 3.1-3.7, 4, 5 and 7 and attempt as many practice and set problems as possible	
(4) Read Laboratory Introduction notes, E1 and E2	
(5) Complete pre-lab work for E1 - 2	
(6) Purchase a lab coat if you don't already have one	

Before Second On-Campus Session

(1) Carefully read **these** notes again	
(2) Study Chapters 6, 8, 9.11, 10, 12 and parts of 13.	
(3) Attempt the allocated problems. Make notes on any difficulties you encounter for discussion during the on-campus workshops.	
(4) Read E3 and E4	
(5) Complete pre-lab work for E3 and E4. Look at relevant 'lecture' notes and Chapters 6, 7, 8 and 13 to assist	

(6) Download, print and attempt the past mid-term tests	

Before Third On-Campus Session

(1) Study Chapters 14, 15, 16 and 18 of the text book and attempt allocated problems	
(2) Make notes on any difficulties you encounter for discussion during the on-campus workshop	
(3) Read E5 and E6. Do pre-lab for both experiments.	
(4) Start revising all topics	

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

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy http://mq.edu.au/policy/docs/grading/policy.html

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

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy 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/

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) 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

IT Help

For help with University computer systems and technology, visit http://informatics.mq.edu.au/help/.

When using the University's IT, you must adhere to the Acceptable Use Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

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 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
- In-class quizzes
- Mid-semester test
- Final Examination

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;
- 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
- In-class quizzes
- Mid-semester test
- Final Examination

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

Assessment tasks

- Laboratory work
- In-class 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;

Assessment tasks

- Laboratory work
- In-class 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

- 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 tasks

- Laboratory work
- In-class 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 outcome

- have acquired some interpersonal skills through teamwork and communication during laboratory sessions and tutorials.

Assessment task

- Laboratory work

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 some interpersonal skills through teamwork and communication during laboratory sessions and tutorials.

Assessment tasks

- Laboratory work
- In-class quizzes

- Mid-semester test
- Final Examination

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;
- have acquired some interpersonal skills through teamwork and communication during laboratory sessions and tutorials.

Assessment tasks

- Laboratory work
- In-class quizzes
- Mid-semester test
- Final Examination

Special Consideration Requests

Special Consideration Requests including non-attendance and extensions

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 Disruption to Studies that may be found at http://students.mq.ed

u.au/student_admin/exams/disruption_to_studies/. The University recognises that at times an event or set of circumstances may occur that

- 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
- substantially interfered with the otherwise satisfactory fulfilment of a unit or program requirements AND
- was of at least three (3) consecutive days duration within a study period and/or prevented completion of a formal 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 form required to submit for a Disruption to Studies can be found online at http://students.mq.edu.au/student_admin/exams/disruption_to_studies/. Completed forms can be lodged online at the Science Centre, Level 1 E7A.

Non-Attendance for On-Campus Sessions: Students unable to attend part of an on-campus session or the final exam due to illness or other extenuating circumstances must fill in a Disruption to Studies form and provide formal documentary evidence as soon as possible AND contact Mrs Maree Nelson. Please note while missing one day of an on-campus session with appropriate formal documentation supplied is allowed, if the first on-campus session is missed completely then a withdrawal from the unit is required. Contact Mrs Nelson immediately if you miss two or more on-campus days due to illness or other extenuating circumstances. The intensive nature of the on-campus sessions and significant level of assessment during these sessions means that such non-attendance can significantly impact on progress.

For students who do have a valid reason for the non-attendance (*via* Disruption to Studies formally approved by the unit coordinator), if in-class quizzes or one laboratory class is missed, you will get an average mark of your other quizzes or laboratory reports. If more than one laboratory class is missed you must speak to Mrs Nelson to discuss alternative options. If the mid-term exam is missed, there will be no make up exam. **In this case, your final exam mark will be used for the missed mid-term mark (*i.e.* final exam mark will be out of 70%).** If the final exam is missed due to a valid reason a Supplementary Examination can be granted. If a Supplementary Examination is granted, 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 provided. Supplementary

Examinations are **not make-up exams**, *i.e.*, a poor result in the final examination is not reason to request a supplementary examination. **Please note that if you are sick at or in the days just prior to the scheduled exam time you should contact the unit coordinator as soon as possible to discuss the possibility of a supplementary exam.** It is normally unwise to sit an exam if illness or other circumstances will significantly affect your performance.

If an absence is **anticipated** (perhaps for a mandatory religious or University associated sporting event) you must inform the unit convenor **in advance** that this will be the case and discuss alternative arrangements. It is your responsibility to undertake this. Notification after the event of an anticipated absence will not be looked upon favourably. For any unjustified absences students will receive a zero mark for the assessment task. Insufficient progress in the unit as evidenced by missing laboratory classes and tests could be grounds for withdrawal.

Suggested Study Schedule

CBMS101X – 2014 – Suggested Study Schedule

As a three credit point subject CBMS101 requires an average of 9 hours per week contact and study time. In the non on-campus weeks, ~5 - 7 hours/week of study time would be typical. It is important that you do get into a regular study pattern for this unit and don't try to cram in the days just prior to the on-campus session or final exam. Try to establish regular study periods and adhere to them strictly. Follow all the usual recommendations for establishing sound study habits, *i.e.*, have your own desk or table; always sit in the same place; when it is "study time", sit down at your desk even if you don't feel inclined to do so. **Attempting the problems at the end of each chapter without looking at the solution manual first will be essential for you to self-assess if you have really understood the material.** Contact Maree Nelson as soon as you feel that you are struggling so that we can provide advice before it is too late.

Week	Week Starting	Study Tasks
1	4 August	Read chapters 1-5 of the text book, Tro, using the lecture slides as a summary of the key points. Attempt as many of the recommended tutorial problems as possible. Note any "problem areas" you have to Maree Nelson (preferably beforehand) for discussion at the first on-campus session. Read the laboratory notes for Experiment 1. Do pre-lab for E1.

2	11 Aug	Read chapters 6-8 of the text book, using the lecture slides as a summary of the key points. Attempt as many of the recommended tutorial problems as possible. Note any “problem areas” to Maree Nelson for the first on-campus session. Read E2 and do pre-lab for E2.
16-17 August: On-Campus Session 1		
3	18 Aug	An enormous amount of material was covered in the first on-campus session so take some time going over it. It is very important you come to grips with this material **NOW** as it will be essential for the proper understanding of material to come Note any “problem areas” to Maree Nelson for the second on-campus session.
4	25 Aug	Study chapter 9 and attempt the related tutorial problems. Note any “problem areas” to Maree Nelson for the second on-campus session.
5	1 Sept	Read chapter 11 (gases) and attempt related tutorial problems. Note any “problem areas” to Maree Nelson for the second on-campus.
6	8 Sept	Read chapter 10 (chemical bonding) and attempt the related tutorial problems. Note any “problem areas” to Maree Nelson for the second on-campus session.
7	15 Sept	Read chapter 12 (intermolecular forces) and attempt the related tutorial problems. To prepare for the mid semester exam revise the topics up to and including gases; look at the What You Need to Know Sheets and attempt tutorial problems and past mid term tests that are available on ilearn. Note any “problem areas” to Maree Nelson for the second on-campus session.

	22 Sept	Continue to revise material for the mid term test. Read relevant parts of chapters on energy (3.8-3.12, 8.7, 12.4-12.5) and attempt the related tutorial problems. Read through Experiments 3 and 4 and the relevant parts of text book. Do prelab for E3 and E4. Note any “problem areas” to Maree Nelson for the second on-campus session.
26-28 September: On-Campus Session 2. Mid Semester Exam on 28		
	29 Sept	Take some time to review what was covered during the on-campus session 2. Look at the What You Need to Know Sheet on the web site as a guide. Read the relevant sections of chapter 14, Acids and Bases and attempt the recommended tutorial. Note any “problem areas” to Maree Nelson for the third on-campus session.
8	6 Oct	Read the relevant sections of chapter 15, Chemical Equilibrium and attempt the recommended tutorial problems. Note any “problem areas” to Maree Nelson for the third on-campus session.
9	13 Oct	Read the relevant sections of chapter 16, Electrochemistry and attempt the recommended tutorial problem. Note any “problem areas” to Maree Nelson for the third on-campus session.
10	20 Oct	Read the relevant sections of chapter 18, Organic Chemistry and attempt the recommended tutorial problems. Note any “problem areas” to Maree Nelson for the third on-campus session.
25-26 October: On-Campus Session 3		
11	27 Oct	Take some time to review what was covered during the on-campus session 3. Start to revise all material. Look at the What You Need to Know Sheets, problems assigned previously and past exam questions to guide you. Ask questions!

12,13	3 Nov onwards	Revise all material and go through past exams and problems from the text book. Ask questions!

Syllabus

Syllabus

CBMS101X Foundations of Chemistry 2014

Textbook: **INTRODUCTORY CHEMISTRY** by Nivaldo J. Tro, Fourth Edition, 2014, Pearson New International Edition.

The Chemical World **CH1**

Measurement and Problem Solving **CH2**

Matter **CH3**

Sections 3.1-3.7 presented in on-campus session 1; sections 3.8-3.12 presented in on-campus session 2.

Atoms and Elements **CH4**

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

Molecules and Compounds	**CH5**
Constant Composition of Compounds	5.2
Chemical Formulae	5.3, 5.5
Elements and Compounds	5.4
Naming Compounds	5.6-5.10

Chemical Composition	**CH6**
Mass and Moles	6.1-6.5
Mass Percent Composition	6.6-6.7
Calculating Empirical F	6.8
Calculating Molecular	6.9

Chemical Reactions	**CH7**
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

Quantities in Chemical Reactions	**CH8**
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

Electrons in Atoms and the Periodic Table	**CH9**
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

Chemical Bonding	**CH10**
Lewis Structures	10.2-10.6
Predicting the Shapes of Molecules	10.7
Electronegativity and Polarity	10.8

Gases	**CH11**
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

Liquids, Solids and Intermolecular Forces	**CH12**
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

Solutions	**CH13**
Homogeneous Mixtures	13.2-13.4
Mass Percent	13.5
Molarity	13.6
Dilution	13.7
Stoichiometry	13.8

Acids and Bases	**CH14**
Definitions	14.2-14.4
Reactions of Acids and Bases	14.5
Titrations	14.6
Strong and Weak Acids and Bases	14.7
Amphoteric Water	14.8
pH and pOH	14.9
Acid Rain	14.11

Chemical Equilibrium	**CH15**
Reaction Rate	15.2
Dynamic Equilibrium	15.3
Equilibrium Constant	15.4-15.6
Le Chatelier's Principle	15.7-15.10
Catalysts	15.12

Electrochemistry	**CH16**
Definitions	16.2
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

Organic Chemistry	**CH18**
The Carbon Atom	18.3
Hydrocarbons	18.4
Alkanes	18.5-18.7
Alkenes and Alkynes	18.8
Some Hydrocarbon Reactions	18.9
Functional Groups	18.11
Alcohols	18.12
Ethers	18.13
Aldehydes and Ketones	18.14
Carboxylic Acids and Esters	18.15
Amines	18.16