CBMS103

Organic and Biological Chemistry - The Chemistry of Life

S2 Day 2014

Chemistry and Biomolecular Sciences

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
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Lecturer, Tutor
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Credit points
3

Prerequisites
(CBMS101(P) or HSC Chemistry Band 4) or admission to GCertBiotech

Corequisites

Co-badged status

Unit description
This unit presents the fundamentals of organic chemistry, which is the study of chemical compounds containing carbon. Such compounds are the major components of living systems. The unit is therefore particularly suitable for students who wish to major in chemistry or biomolecular sciences, as well as those pursuing related disciplines in biological, medical and health sciences. The themes presented are relevant to molecular transformations in both the living world and in the laboratory. The coursework encompasses a systematic study of the structures and typical reactions of the major classes of functional groups (alkanes; alkenes; aromatic compounds; alkyl halides; alcohols; aldehydes and ketones; carboxylic acids; and amines). This includes the chemical properties of important biomolecules such as amino acids, proteins, carbohydrates and nucleic acids.

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:

Identify and understand the key structural and bonding characteristics of organic molecules

Recognise and name key functional groups of organic compounds

Recognise and identify stereochemistry and conformational properties of organic molecules

Correlate the structural and bonding features of key functional groups with their reactivity

Write the mechanisms of key chemical reactions and predict their stereochemical outcome

Recognise reactions suitable for synthesising and interconverting functional groups

Name reagents given starting materials and products

Name and draw the structures of starting materials given reagents and products

Predict and name the structure of a product(s) given starting materials and reagents

Propose a short multistep synthetic sequence using key reactions to achieve the synthesis of a target molecule

Identify major biomolecules and understand their functional group chemistry

Undertake basic laboratory procedures for isolating, synthesising and identifying organic compounds or functional groups, using chemistry specific apparatus and techniques and safe laboratory practices

Accurately record your laboratory observations in an appropriate scientific manner

Analyse experimental results to solve related problems

Explain organic and biological concepts clearly in the tutorial class to colleagues and the tutor and in written format in exams and laboratory reports

Work with colleagues to undertake experiments in a safe and harmonious way

Have a deep understanding of organic and biological chemistry concepts and be able to apply those to new problems

Assessment Tasks

Name	Weighting	Due
In-class and on-line quizzes	15%	Week 4, 6, 8, 10, 12, 13
Mid-term Exam	15%	Week 7
Laboratory	20%	every 2nd week
Final Examination	50%	University Examination Period

In-class and on-line quizzes

Due: **Week 4, 6, 8, 10, 12, 13**
Weighting: **15%**

There will be two in-class quizzes, one on **Friday** of **week 4** (Aug 29) and one on **Thursday** of **week 12** (Nov 6) and four on-line quizzes due on **Friday** of **week 6** (Sept 12), **Friday** of **week 8** (Oct 10), **Friday** of **week 10** (Oct 24) and **Friday** of **week 13** (Nov 14). You will find that these quizzes assist you in revising the course material as the course progresses. All quizzes contain only multiple choice questions. For the in-class quizzes, the answers will be explained immediately afterwards. For the on-line quizzes, further specific details on how to access these will be provided in week 1/2.

On successful completion you will be able to:

- Identify and understand the key structural and bonding characteristics of organic molecules
- Recognise and name key functional groups of organic compounds
- Recognise and identify stereochemistry and conformational properties of organic molecules
- Correlate the structural and bonding features of key functional groups with their reactivity
- Write the mechanisms of key chemical reactions and predict their stereochemical outcome

- Recognise reactions suitable for synthesising and interconverting functional groups
- Name reagents given starting materials and products
- Name and draw the structures of starting materials given reagents and products
- Predict and name the structure of a product(s) given starting materials and reagents
- Identify major biomolecules and understand their functional group chemistry
- Have a deep understanding of organic and biological chemistry concepts and be able to apply those to new problems

Mid-term Exam

Due: **Week 7**
Weighting: **15%**

There will be a 50 minute test (/15%) in Week 7, Friday September 19, 9.05am sharp. This will cover lectures up to the end of aromatic compounds. This is designed to give you specific feedback on your understanding of the topics up to this stage to assist you in your further study of the unit.

There will be no make-up exam for the mid-term exam. Medical certificates or official documents must be lodged along with a special consideration form online at ask.mq.edu.au as soon as possible if you are absent for the mid-term. In this case, if the circumstances are accepted as valid, your final exam mark will be used for the missed mid-term mark (*i.e.* final exam mark will be out of 65%).

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- Predict and name the structure of a product(s) given starting materials and reagents
- Propose a short multistep synthetic sequence using key reactions to achieve the synthesis of a target molecule
- Explain organic and biological concepts clearly in the tutorial class to colleagues and the

tutor and in written format in exams and laboratory reports
- Have a deep understanding of organic and biological chemistry concepts and be able to apply those to new problems

Laboratory

Due: **every 2nd week**
Weighting: **20%**

Full details on the breakdown of the laboratory assessment are given in the laboratory manual. The mark includes pre-lab, in-lab and post-lab reports and a practical exam. **A passing grade in the practical component is required to pass the unit.** The assessment tasks start off simple and build on skills and knowledge developed throughout the course.

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- Identify and understand the key structural and bonding characteristics of organic molecules
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- Predict and name the structure of a product(s) given starting materials and reagents
- Undertake basic laboratory procedures for isolating, synthesising and identifying organic compounds or functional groups, using chemistry specific apparatus and techniques and safe laboratory practices
- Accurately record your laboratory observations in an appropriate scientific manner
- Analyse experimental results to solve related problems
- Explain organic and biological concepts clearly in the tutorial class to colleagues and the tutor and in written format in exams and laboratory reports
- Work with colleagues to undertake experiments in a safe and harmonious way
- Have a deep understanding of organic and biological chemistry concepts and be able to apply those to new problems

Final Examination

Due: **University Examination Period**
Weighting: **50%**

The final exam (50%) will be 3 hours in length with 10 minutes reading time. It is designed to address specific understanding of all the topics presented within the course and to show that the knowledge obtained can be applied to new problems.

Your marks (in-class and online quizzes, mid-term exam, laboratory) will be placed on the CBMS103 web site. The **minimum requirement** to achieve a passing grade for CBMS103 is **satisfactory performance** in separately **both** the **coursework** component 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. 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 at ask.mq.edu.au.

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- Analyse experimental results to solve related problems
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Delivery and Resources

CLASSES

· **Timetable:** Please check www.timetables@mq.edu.au for the official timetable of the unit.

· **Lectures:** Monday 11.05–11.55am W2.4A Macquarie Theatre; Thursday 1.05–1.55pm W6D Lotus Theatre; Friday 9.05–9.55pm Macquarie Theatre.

· The lecture notes for the first lecture in week 1 will be provided. ALL SUBSEQUENT LECTURE MATERIAL WILL BE EXPECTED TO BE DOWNLOADED FROM THE WEB SITE at ilearn.mq.edu.au. Lecture recordings and video capture links (under echo) are also found at the unit website. Lectures will be used to emphasise key points and concepts with relevant examples. Studying the material to be covered BEFORE coming to a lecture will strongly help you get the most out of the lectures.

· **Tutorials:** These are compulsory, with one class every week, commencing from week 2. During tutorial time the problems assigned (see tutorial list at the end of this document) will be discussed. These problems closely resemble the types of problems in exams and are designed to help you gauge how much command you have on the materials covered. **You MUST work on these problems on your own before the tutorial so as to fully take advantage of this exercise and should bring in the textbooks, lecture notes and accompanying resources such as the model kit to assist the session.**

· Laboratory classes: The laboratory classes for CBMS103 run from **weeks 2-13** in E7B308 and E7B320. These are **compulsory**. You will be allocated ONE laboratory class **every 2nd week**. This will be based on the details provided during your enrolment. Laboratory classes will begin in **week 2** for students allocated **Group A** laboratory classes and **week 3** for students allocated **Group B** laboratory classes. **Please refer to the laboratory manual for further details**.

· Your allocated laboratory day and group (A or B) and tutorial time will be available on the unit web page. During week 1 you can email A/Prof Joanne Jamie (joanne.jamie@mq.edu.au) if your allocation is in conflict with other **academic** timetables or commitments that are beyond your control. In your email you must include the following information: your name; **student number**; phone number; email address; the reason why the assigned laboratory and/or tutorial day/time is not appropriate for you; and possible alternative allocation(s). A/Prof Jamie will reallocate you as appropriate.

REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

Prescribed Texts and Materials:

J. McMurry, "Fundamentals of Organic Chemistry" (7th Edition)

S. McMurry, “Study Guide and Solutions Manual” (7th Edition)

D. P. Weeks, “Pushing Electrons”, 3rd Edition

Molecular Modelling Kit

(The above are a bundled package at the Co-op bookshop. Upon request they may also be sold separately). The text is also available as an e-book - please enquire with the bookshop.

CBMS103 Laboratory Manual (available from Co-op bookshop and downloadable from the unit web site)

CBMS103 lecture notes can be obtained from the unit web site. Notes for the first lecture will be provided in the first lecture.

Further reading material is also available in the library:

J. McMurry, "Organic Chemistry" (6th Edition)

Solomans, “Organic Chemistry” (5th Edition)

M. J. Winter, “Chemical Bonding” (Oxford Chemistry Primer No. 15)

M. E. Alonso, “The Art of Problem Solving in Organic Chemistry”

UNIT WEB PAGE

The web page for this unit can be found at ilearn.mq.edu.au. Just login and follow the prompts to CBMS103 (external). You can use any web browser such as Firefox, Internet Explorer or Safari to login.

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/ for more information.

You will be asked for a username and password. Your User Name 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 onehelp.mq.edu.au. More information about OneHelp can be found at http://informatics.mq.edu.au/help/.

You are expected to access the unit web site frequently This contains important information including notes on ALL the topics to be covered; What You Need to Know Sheets; your marks for

practicals, quizzes and mid-session exam; and past exam papers, including with answers. Additionally, the web site will also be used to post important messages and links to internet facilities and sites of relevance to the course, downloadable software, and lots of other interesting material.

Technology Used

You are expected to access the unit web site on a frequent basis and download pdf files. If you do not have your own computer you may wish to access the CBMS103 web resources on campus using the PC computers in the Library or in the C5C computer laboratories.

· To view notes on all the topics and past exams on the unit web site, you will require Adobe Acrobat Reader Version 9 or later to be installed on your computer. Acrobat Reader can be downloaded from the Adobe web site http://get.adobe.com/uk/reader/. If you are using the computers in the library, then Acrobat has already been installed.

· Please note information will also be sent by email to your student email account so please look at your email account on a frequent basis.

You will also be required to use an Online Web Learning (OWL) System for assessment tasks and practice problems. This requires software that is freely downloaded, but is also available for you to use on the library PCs and those in the C5C computer laboratories. Further details on this will be provided on the first day of the first on-campus session.

Teaching and Learning Strategy

CBMS103 is a 3 credit point half year unit and will require an average of 9 hours of work per week (contact hours plus self study time). For students with weak chemistry backgrounds, more time than the 9 hours per week will probably be necessary to perform satisfactorily in this unit.

CBMS103 consists of 3 hours of lectures and a 1 hour tutorial every week (except week 1) and a 4 hour laboratory class every 2nd week. CBMS103 is designed to allow you to develop an understanding of organic and biological chemistry and the practical skills to undertake simple organic chemistry experiments in an efficient and safe manner. The lecture material, tutorials and laboratories complement each other, and along with quizzes (in lectures, on-line and in laboratory classes), have been developed to increase your understanding of the topics so you can achieve the learning outcomes.

The unit expectation is that you will:

· Attend all lectures or when not possible listen to the recorded lectures

· Attend all tutorials and attempt the set exercises

· Demonstrate reasonable competence in all laboratory preparation exercises and attend each laboratory class

· Demonstrate reasonable competence in the post-laboratory exercises submitted by the due dates

· Perform satisfactorily in the laboratory and coursework assessment tasks

· Spend an average of no less than 3 hours per week of private study in addition to class contact.

If you prepare and attend all components of the unit and work consistently and continuously throughout the semester, you should be able to develop a strong understanding of the chemistry of organic compounds, including of biological significance, and perform satisfactorily in this unit. A clear correlation has been seen between student attendance and satisfactory completion of this subject. Students who try to memorise just before exams typically do not do well in this unit. Instead a deeper understanding of the concepts is required.

· **Lectures** will be presented formally, although quizzes and general questions may be asked in class, demonstrations provided, and examples of problems worked through, to strengthen and increase understanding of the concepts. Most lecture material will be available on the unit web site, while other material will be provided in the lecture class. **You are expected to download the lecture material and bring it into the lecture class** so you can spend most of the time listening to the lecturer rather than transcribing. **Do not assume these notes or recordings/ video capture are a suitable substitute to attending the lectures.** Students historically fall behind and perform poorly if they do not attend the lecture classes and often further material is provided in the lecture class, so a student that does not attend the class will not be as well prepared as they would otherwise be. Learning is an active process, and as such, you must engage with the material. This means downloading and reading the lecture notes and relevant sections of the textbook (and beyond) **before** and **after** lectures is strongly recommended. Quizzes and a mid session test will be run in the lecture classes. The quizzes will be multiple choice and short, but cover material in recent weeks prior to that days lecture, therefore all students are expected to keep up to date with lecture material through revision each week. Additional on-line quizzes will also be provided. The quizzes and mid session test are designed to allow you to continuously learn and to identify what you understand and the areas that you need to spend more time on, with minimal assessment penalty.

· **Tutorials** will be run to assist your understanding of the course material. Suggested questions to be covered for each tutorial class are provided at the end of this document. Attempting the questions before the tutorial class to identify what you need assistance on is highly recommended. The tutor will often ask for students to assist in answering the questions throughout the class. Attendance records will be kept, and while tutorials do not contribute formally to your mark, poor tutorial attendance may be viewed unfavourably and could affect the final mark if a student is on a grade boundary.

· **Laboratory classes** are designed to develop basic laboratory skills, general safety practices and critical and analytical thought. Pre-laboratory questions are designed to make sure you are ready for the laboratory work and have grasped the relevant theory and safety practices necessary. In-lab and post-lab work are designed to allow you to appropriately record your

experimental observations and your calculations in a detailed and accurate manner and assess your understanding of the theory behind the experiments conducted and to use this understanding to solve related problems. The laboratory experiments are scaffolded such that the expectations of pre-lab, in-lab and post-lab reports increase throughout the course as understanding of the concepts and skill in how to record the data and interpret results develops.

Unit Schedule

Week	Mon	Thurs	Fri
1 Aug 4, 7, 8	L1 - Introduction	L2 Structure and Bonding (McMurry Ch1)	L3 - Structure and Bonding (McMurry Ch1)
2 Aug11, 14, 15	L4 - Structure and Bonding, Acids and Bases (McMurry Ch1)	L5 - Alkanes and Cycloalkanes (McMurry Ch2)	L6 - Alkanes and Cycloalkanes (McMurry Ch2)
3 Aug 18, 21, 22	L7 - Isomerism and stereochemistry (McMurry Ch6)	L8 – Isomerism and Stereochemistry (McMurry Ch6)	L9 – Isomerism and Stereochemistry (McMurry Ch6)
4 Aug 25, 28, 29	L10 – Reaction Mechanisms, Alkenes (McMurry Ch3)	L11 - Reactions of Alkenes (McMurry Ch4)	Quiz 1 (in-class L2-stereochemistry inclusive) L12 -Reactions of Alkynes (McMurry Ch4)
5 Sept 1, 4, 5	L13 Aromatic Compounds (McMurry Ch5)	L14 – Aromatic Compounds (McMurry Ch5)	L15 - Aromatic Compounds (McMurry Ch5)
6 Sept 8, 11, 12	L16 – Alkyl Halides (McMurry Ch7)	L17 – Alkyl Halides (McMurry Ch7)	Quiz 2 (on-line alkenes, alkynes,aromatic compounds) L18 – Alkyl Halides (McMurry Ch7)
7 Sept 15, 18, 19	L19 -Alcohols, Ethers & Phenols (McMurry Ch8)	L20 - Alcohols, Ethers & Phenols (McMurry Ch8)	L21 - Mid-TermTest (up to end of aromatics)
	Mid-semester break		
8 Oct 9, 10	Public Holiday	L22 – Aldehydes and Ketones (McMurry Ch9)	L23 - Quiz 3 (on-line alkyl halides, alcohols, phenols and ethers) L24- REVIEW OF MID SESSION TEST

9 Oct 13, 16, 17	L24 – Aldehydes and Ketones (McMurry Ch7, Ch 9)	L25 - Carbohydrates (McMurry Ch14)	L26 – Carbohydrates (McMurry Ch14)
10 Oct 20, 23, 24	L27 - Carboxylic Acids and Derivatives (McMurry Ch10)	L28 – Carboxylic Acids and Derivatives (McMurry Ch10)	Quiz 4 (on-line alcohols, phenols, ethers, aldehydes and ketones) L29 – Amines (McMurry Ch12)
11 Oct 27, 20, 31	L30 - Amino acids and Peptides (McMurry Ch15)	L31 - Amino Acids and Peptides (McMurry Ch15)	L32 - Amino Acids and Peptides (McMurry Ch15)
12 Nov 3, 6, 7	L33 - Amino Acids and Peptides, Nucleic Acids (McMurry Ch15)	Quiz 5 (in-class carbohydrates, carboxylic acids and derivatives) L34 – Summary and Review	L35 - Summary and Review
13 Nov 10, 13, 14	L36 - Summary and Review	L37 – Summary and Review	Quiz 6 (on-line amines, amino acids and Peptides) L38 -Summary and Review

Timetable may be subject to minor changes

Learning and Teaching Activities

Lectures

Lectures will be presented formally, although quizzes and general questions may be asked in class, demonstrations provided, and examples of problems worked through, to strengthen and increase understanding of the concepts. Most lecture material will be available on the unit web site, while other material will be provided in the lecture class. You are expected to download the lecture material and bring it into the lecture class so you can spend most of the time listening to the lecturer rather than transcribing. Do not assume these notes or recordings/video capture are a suitable substitute to attending the lectures. Students historically fall behind and perform poorly if they do not attend the lecture classes and often further material is provided in the lecture class, so a student that does not attend the class will not be as well prepared as they would otherwise be. Learning is an active process, and as such, you must engage with the material. This means downloading and reading the lecture notes and relevant sections of the textbook (and beyond) before and after lectures is strongly recommended. Quizzes and a mid session test will be run in the lecture classes. The quizzes will be multiple choice and short, but cover material in recent weeks prior to that days lecture, therefore all students are expected to keep up to date with lecture material through revision each week. Additional on-line quizzes will also be provided. The

quizzes and mid session test are designed to allow you to continuously learn and to identify what you understand and the areas that you need to spend more time on, with minimal assessment penalty.

Tutorials

Tutorials will be run to assist your understanding of the course material. Suggested questions to be covered for each tutorial class are provided at the end of this document. Attempting the questions before the tutorial class to identify what you need assistance on is highly recommended. The tutor will often ask for students to assist in answering the questions throughout the class. Attendance records will be kept, and while tutorials do not contribute formally to your mark, poor tutorial attendance may be viewed unfavourably and could affect the final mark if a student is on a grade boundary.

Laboratory classes

Laboratory classes are designed to develop basic laboratory skills, general safety practices and critical and analytical thought. Pre-laboratory questions are designed to make sure you are ready for the laboratory work and have grasped the relevant theory and safety practices necessary. In-lab and post-lab work are designed to allow you to appropriately record your experimental observations and your calculations in a detailed and accurate manner and assess your understanding of the theory behind the experiments conducted and to use this understanding to solve related problems. The laboratory experiments are scaffolded such that the expectations of pre-lab, in-lab and post-lab reports increase throughout the course as understanding of the concepts and skill in how to record the data and interpret results develops.

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

- Accurately record your laboratory observations in an appropriate scientific manner
- Work with colleagues to undertake experiments in a safe and harmonious way

Assessment task

- Laboratory

Learning and teaching activity

- Tutorials will be run to assist your understanding of the course material. Suggested questions to be covered for each tutorial class are provided at the end of this document. Attempting the questions before the tutorial class to identify what you need assistance on is highly recommended. The tutor will often ask for students to assist in answering the questions throughout the class. Attendance records will be kept, and while tutorials do not contribute formally to your mark, poor tutorial attendance may be viewed unfavourably and could affect the final mark if a student is on a grade boundary.
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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

- Explain organic and biological concepts clearly in the tutorial class to colleagues and the tutor and in written format in exams and laboratory reports
- Have a deep understanding of organic and biological chemistry concepts and be able to

apply those to new problems

Assessment tasks

- In-class and on-line quizzes
- Mid-term Exam
- Laboratory
- Final Examination

Learning and teaching activities

- Lectures will be presented formally, although quizzes and general questions may be asked in class, demonstrations provided, and examples of problems worked through, to strengthen and increase understanding of the concepts. Most lecture material will be available on the unit web site, while other material will be provided in the lecture class. You are expected to download the lecture material and bring it into the lecture class so you can spend most of the time listening to the lecturer rather than transcribing. Do not assume these notes or recordings/video capture are a suitable substitute to attending the lectures. Students historically fall behind and perform poorly if they do not attend the lecture classes and often further material is provided in the lecture class, so a student that does not attend the class will not be as well prepared as they would otherwise be. Learning is an active process, and as such, you must engage with the material. This means downloading and reading the lecture notes and relevant sections of the textbook (and beyond) before and after lectures is strongly recommended. Quizzes and a mid session test will be run in the lecture classes. The quizzes will be multiple choice and short, but cover material in recent weeks prior to that days lecture, therefore all students are expected to keep up to date with lecture material through revision each week. Additional on-line quizzes will also be provided. The quizzes and mid session test are designed to allow you to continuously learn and to identify what you understand and the areas that you need to spend more time on, with minimal assessment penalty.
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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

- Identify and understand the key structural and bonding characteristics of organic molecules
- Recognise and name key functional groups of organic compounds
- Recognise and identify stereochemistry and conformational properties of organic molecules
- Correlate the structural and bonding features of key functional groups with their reactivity
- Write the mechanisms of key chemical reactions and predict their stereochemical outcome
- Recognise reactions suitable for synthesising and interconverting functional groups
- Name reagents given starting materials and products
- Name and draw the structures of starting materials given reagents and products
- Predict and name the structure of a product(s) given starting materials and reagents
- Propose a short multistep synthetic sequence using key reactions to achieve the synthesis of a target molecule
- Identify major biomolecules and understand their functional group chemistry
- Undertake basic laboratory procedures for isolating, synthesising and identifying organic compounds or functional groups, using chemistry specific apparatus and techniques and safe laboratory practices
- Analyse experimental results to solve related problems
- Explain organic and biological concepts clearly in the tutorial class to colleagues and the tutor and in written format in exams and laboratory reports
- Have a deep understanding of organic and biological chemistry concepts and be able to apply those to new problems

Assessment tasks

- In-class and on-line quizzes

- Mid-term Exam
- Laboratory
- Final Examination

Learning and teaching activities

- Lectures will be presented formally, although quizzes and general questions may be asked in class, demonstrations provided, and examples of problems worked through, to strengthen and increase understanding of the concepts. Most lecture material will be available on the unit web site, while other material will be provided in the lecture class. You are expected to download the lecture material and bring it into the lecture class so you can spend most of the time listening to the lecturer rather than transcribing. Do not assume these notes or recordings/video capture are a suitable substitute to attending the lectures. Students historically fall behind and perform poorly if they do not attend the lecture classes and often further material is provided in the lecture class, so a student that does not attend the class will not be as well prepared as they would otherwise be. Learning is an active process, and as such, you must engage with the material. This means downloading and reading the lecture notes and relevant sections of the textbook (and beyond) before and after lectures is strongly recommended. Quizzes and a mid session test will be run in the lecture classes. The quizzes will be multiple choice and short, but cover material in recent weeks prior to that days lecture, therefore all students are expected to keep up to date with lecture material through revision each week. Additional on-line quizzes will also be provided. The quizzes and mid session test are designed to allow you to continuously learn and to identify what you understand and the areas that you need to spend more time on, with minimal assessment penalty.
- Tutorials will be run to assist your understanding of the course material. Suggested questions to be covered for each tutorial class are provided at the end of this document. Attempting the questions before the tutorial class to identify what you need assistance on is highly recommended. The tutor will often ask for students to assist in answering the questions throughout the class. Attendance records will be kept, and while tutorials do not contribute formally to your mark, poor tutorial attendance may be viewed unfavourably and could affect the final mark if a student is on a grade boundary.
- Laboratory classes are designed to develop basic laboratory skills, general safety practices and critical and analytical thought. Pre-laboratory questions are designed to make sure you are ready for the laboratory work and have grasped the relevant theory and safety practices necessary. In-lab and post-lab work are designed to allow you to appropriately record your experimental observations and your calculations in a detailed

and accurate manner and assess your understanding of the theory behind the experiments conducted and to use this understanding to solve related problems. The laboratory experiments are scaffolded such that the expectations of pre-lab, in-lab and post-lab reports increase throughout the course as understanding of the concepts and skill in how to record the data and interpret results develops.

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

- Identify and understand the key structural and bonding characteristics of organic molecules
- Recognise and identify stereochemistry and conformational properties of organic molecules
- Correlate the structural and bonding features of key functional groups with their reactivity
- Write the mechanisms of key chemical reactions and predict their stereochemical outcome
- Recognise reactions suitable for synthesising and interconverting functional groups
- Name reagents given starting materials and products
- Name and draw the structures of starting materials given reagents and products
- Predict and name the structure of a product(s) given starting materials and reagents
- Propose a short multistep synthetic sequence using key reactions to achieve the synthesis of a target molecule
- Identify major biomolecules and understand their functional group chemistry
- Analyse experimental results to solve related problems

Assessment tasks

- In-class and on-line quizzes
- Mid-term Exam
- Laboratory
- Final Examination

Learning and teaching activities

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post-lab reports increase throughout the course as understanding of the concepts and skill in how to record the data and interpret results develops.

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

- Identify and understand the key structural and bonding characteristics of organic molecules
- Recognise and identify stereochemistry and conformational properties of organic molecules
- Correlate the structural and bonding features of key functional groups with their reactivity
- Write the mechanisms of key chemical reactions and predict their stereochemical outcome
- Recognise reactions suitable for synthesising and interconverting functional groups
- Name reagents given starting materials and products
- Name and draw the structures of starting materials given reagents and products
- Predict and name the structure of a product(s) given starting materials and reagents
- Propose a short multistep synthetic sequence using key reactions to achieve the synthesis of a target molecule
- Identify major biomolecules and understand their functional group chemistry
- Undertake basic laboratory procedures for isolating, synthesising and identifying organic compounds or functional groups, using chemistry specific apparatus and techniques and safe laboratory practices
- Analyse experimental results to solve related problems

Assessment tasks

- In-class and on-line quizzes
- Mid-term Exam
- Laboratory
- Final Examination

Learning and teaching activities

- Lectures will be presented formally, although quizzes and general questions may be asked in class, demonstrations provided, and examples of problems worked through, to strengthen and increase understanding of the concepts. Most lecture material will be available on the unit web site, while other material will be provided in the lecture class. You are expected to download the lecture material and bring it into the lecture class so you can spend most of the time listening to the lecturer rather than transcribing. Do not assume these notes or recordings/video capture are a suitable substitute to attending the lectures. Students historically fall behind and perform poorly if they do not attend the lecture classes and often further material is provided in the lecture class, so a student that does not attend the class will not be as well prepared as they would otherwise be. Learning is an active process, and as such, you must engage with the material. This means downloading and reading the lecture notes and relevant sections of the textbook (and beyond) before and after lectures is strongly recommended. Quizzes and a mid session test will be run in the lecture classes. The quizzes will be multiple choice and short, but cover material in recent weeks prior to that days lecture, therefore all students are expected to keep up to date with lecture material through revision each week. Additional on-line quizzes will also be provided. The quizzes and mid session test are designed to allow you to continuously learn and to identify what you understand and the areas that you need to spend more time on, with minimal assessment penalty.
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post-lab reports increase throughout the course as understanding of the concepts and skill in how to record the data and interpret results develops.

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 outcomes

- Recognise reactions suitable for synthesising and interconverting functional groups
- Propose a short multistep synthetic sequence using key reactions to achieve the synthesis of a target molecule

Assessment tasks

- Laboratory
- Final Examination

Learning and teaching activities

- Tutorials will be run to assist your understanding of the course material. Suggested questions to be covered for each tutorial class are provided at the end of this document. Attempting the questions before the tutorial class to identify what you need assistance on is highly recommended. The tutor will often ask for students to assist in answering the questions throughout the class. Attendance records will be kept, and while tutorials do not contribute formally to your mark, poor tutorial attendance may be viewed unfavourably and could affect the final mark if a student is on a grade boundary.

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

- Accurately record your laboratory observations in an appropriate scientific manner
- Analyse experimental results to solve related problems
- Explain organic and biological concepts clearly in the tutorial class to colleagues and the

tutor and in written format in exams and laboratory reports

Assessment tasks

- In-class and on-line quizzes
- Mid-term Exam
- Laboratory
- Final Examination

Learning and teaching activities

- Tutorials will be run to assist your understanding of the course material. Suggested questions to be covered for each tutorial class are provided at the end of this document. Attempting the questions before the tutorial class to identify what you need assistance on is highly recommended. The tutor will often ask for students to assist in answering the questions throughout the class. Attendance records will be kept, and while tutorials do not contribute formally to your mark, poor tutorial attendance may be viewed unfavourably and could affect the final mark if a student is on a grade boundary.
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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

- Undertake basic laboratory procedures for isolating, synthesising and identifying organic

compounds or functional groups, using chemistry specific apparatus and techniques and safe laboratory practices
- Accurately record your laboratory observations in an appropriate scientific manner
- Explain organic and biological concepts clearly in the tutorial class to colleagues and the tutor and in written format in exams and laboratory reports
- Work with colleagues to undertake experiments in a safe and harmonious way

Assessment task

- Laboratory

Learning and teaching activity

- Tutorials will be run to assist your understanding of the course material. Suggested questions to be covered for each tutorial class are provided at the end of this document. Attempting the questions before the tutorial class to identify what you need assistance on is highly recommended. The tutor will often ask for students to assist in answering the questions throughout the class. Attendance records will be kept, and while tutorials do not contribute formally to your mark, poor tutorial attendance may be viewed unfavourably and could affect the final mark if a student is on a grade boundary.
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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

- Accurately record your laboratory observations in an appropriate scientific manner

- Explain organic and biological concepts clearly in the tutorial class to colleagues and the tutor and in written format in exams and laboratory reports
- Work with colleagues to undertake experiments in a safe and harmonious way

Assessment task

- Laboratory

Learning and teaching activity

- Tutorials will be run to assist your understanding of the course material. Suggested questions to be covered for each tutorial class are provided at the end of this document. Attempting the questions before the tutorial class to identify what you need assistance on is highly recommended. The tutor will often ask for students to assist in answering the questions throughout the class. Attendance records will be kept, and while tutorials do not contribute formally to your mark, poor tutorial attendance may be viewed unfavourably and could affect the final mark if a student is on a grade boundary.
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Changes from Previous Offering

Changes since last offering Since its previous internal offering, some minor changes have been made to the laboratory experiments and the lecture material. This follows feedback from students in the 2013 internal CBMS103 unit.

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 special consideration request that may be found at

www.mq.edu.au/policy/docs/special_consideration/policy.html. 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. You can submit a request for special consideration at ask.mq.edu.au. This form should be submitted as soon as possible to allow due consideration.

Non-Attendance for Assessable Tasks: Students unable to attend a laboratory class, tutorial class, quizzes or exams due to illness or other extenuating circumstances must fill in a special consideration form (ask.mq.edu.au) and provide formal documentary evidence as soon as possible.

For students who do have a valid reason for the non-attendance (*via* special consideration 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 A/Prof Jamie to discuss alternative options. If the mid-term exam is missed, there will generally 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 65%).** 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.

Extensions: Students unable to complete a form of assessment (laboratory reports, quizzes) on

time due to illness or other extenuating circumstances must fill in a special consideration form (ask.mq.edu.au) and provide formal documentary evidence as soon as possible and contact A/Prof Joanne Jamie to discuss possible extensions. 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. **If there is no acceptable reason for a late submission, marks will be deducted for every day late.**

Teaching staff

· **A/Prof Joanne Jamie** Unit Convenor, Lecturer and Tutor, F7B 231, ph 9850 8283, email joanne.jamie@mq.edu.au

· **A/Prof Andrew Try,** Lecturer and Tutor, F7B 228, ph 9850 8291, email andrew.try@mq.edu.au

· **Mrs Maree Nelson** Tutor F7B 333, ph 9850 8295, email maree.nelson@mq.edu.au

A/Prof Joanne Jamie is the coordinator of this unit and should be consulted if you have administrative or organisational problems.

A/Prof Jamie will be presenting the majority of the lectures. Other staff will assist with some lecture topics during some stages A/Prof Jamie is away. A/Profs Jamie, along with A/Prof Andrew Try, Maree Nelson and Dr Fei Liu will be involved in tutorial classes.

The staff have an open door policy for any questions best dealt in person on their topics. However, it is best to organise an appointment first by phoning or emailing beforehand (put CBMS103 in the header of the email message).

Tutorial Classes

TUTORIAL CLASSES

Tutorial classes run weekly and begin in **week 2**. Tutorial attendance is compulsory. Your allocated tutorial time will be given on the ilearn unit web page.

During tutorial time the problems assigned below may be discussed. It is most likely that the tutor will choose a selection of the questions assigned based on class requests, rather than attempting every question. **You MUST work on these problems on your own before the tutorial so as to fully take advantage of this exercise and should bring in the textbooks, lecture notes and accompanying resources such as the model kit to assist the session and be prepared to ask questions on sections that you wish to have clarified.**

Session	Tutorial questions from McMurry 7th edition

Week 2	Structure and Bonding: 1.31, 1,33, 1.35, 1.37, 1.42, 1.41, 1.45, 1.48, 1.51, 1.52, 1.64
Week 3	Acids and Bases, Alkanes and Cycloalkanes: 1.59, 1.60, 2.45, 2.46, 2.47, 2.52, 2.56, 2.59, 2.60
Week 4	Stereochemistry, Alkenes Naming and Isomerisation, Reaction Mechanisms: 6.29, 6.32, 6.36, 6.41, 6.42, 3.29, 3.30, 3.31, 3.42, 3.11
Week 5	Naming and Reactions of Alkenes and Alkynes: 4.27, 4.28, 4.33, 4.39, 4.42, 4.44, 4.45a,b
Week 6	Aromatic Compounds: 5.26, 5.27, 5.32, 5.33, 5.36, 5.47, 5.48, 5.58
Week 7	Alkyl halides: 7.25, 7.26, 7.30, 7.33, 7.34, 7.36, 7.44, 7.51, 7.54
Week 8	Alcohols, Ethers and Phenols: 8.26a-d, 8.27a-e, 8.34, 8.35, 8.42, 8.46, 8.67a,b
Week 9	Aldehydes and Ketones: 9.25, 9.29a-e, 9.30, 9.32, 9.39, 9.43, 9.48
Week 10	Aldehydes and Ketones continued and Carbohydrates: 9.34, 9.42, 9.53, 14.34, 14.35, 14.37
Week 11	Carboxylic Acids and Derivatives: 10.33a-c,e-f, 10.34, 10.39, 10.44, 10.56
Week 12	Amines: 12.24, 12.25, 12.35, 12.38, 12.39, 12.47, 12.51
Week 13	Amino Acids, Peptides and Nucleic Acids: 15.26, 15.29a, 15.30, 15.32, 15.33, 15.56, 16.32, 16.11

These questions will also be placed on the CBMS103 ilearn web site.