



# CBMS302

## Chemistry Capstone

S2 Day 2015

*Dept of Chemistry & Biomolecular Sciences*

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#### Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

## General Information

### Unit convenor and teaching staff

Unit Convenor

Ian Jamie

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

Contact via 9850 8293

F7B 236

Anytime

Lecturer

Christopher McRae

[christopher.mcrae@mq.edu.au](mailto:christopher.mcrae@mq.edu.au)

Contact via 9850 8288

F7B 328

Students are encouraged to arrange a meeting via email.

Credit points

3

Prerequisites

Corequisites

6cp from (CBMS303 or CBMS304 or CBMS306 or CBMS307 or CBMS308 or CBMS332)

Co-badged status

Unit description

This unit investigates some areas of current chemistry, such as developments in green chemistry, development of organic solar cells, alternative fuels, and similar areas. You will be able to apply your chemistry knowledge and skills to issues relevant to our current and future society. We will look at the idea of the 'ethical chemist', and through workshops with industry employers and recruiters we will get you ready to apply for positions in industry and academia. An important part of the unit will be a self-directed laboratory investigation into a topic of current interest, for example, biodiesel synthesis and characterisation, development of novel materials, and new synthesis methods. You will plan and carry out the investigation, and report on the outcomes. You will have the opportunity to use sophisticated research instruments and to refine your laboratory skills.

## 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:

At the conclusion of this unit students will be able to identify and discuss issues of relevance to contemporary society, using the context of contemporary chemistry.

At the conclusion of this unit students will be able to exhibit mastery of broad chemical knowledge concerning the fundamentals in the basic areas of the discipline, and be able to use the knowledge and skills gained during your studies to analyse issues of current interest and relevance.

At the conclusion of this unit students will be able to exhibit problem-solving skills by identifying the essential parts of a research problem and formulating a strategy for solving the problem.

At the conclusion of this unit students will be able to undertake research, including understanding and articulating the objective of the project, carry out appropriate experiments, and record, analyse and present the results of the study.

At the conclusion of this unit students will be able to place the activities of chemists in a professional ethics context.

## Assessment Tasks

Name	Weighting	Due
<u>Research Project Proposal</u>	5%	End of Week 3
<u>Execution of Project</u>	15%	All Semester
<u>Written Report</u>	25%	Week 13
<u>Class Presentations</u>	10%	Week 4
<u>Essay</u>	10%	Week 10
<u>Employment Analysis</u>	5%	Week 7
<u>Assignments</u>	10%	Weekly
<u>Poster</u>	10%	Week 13
<u>Oral Report</u>	5%	Week 13
<u>Reflections</u>	5%	Weekly

## Research Project Proposal

Due: **End of Week 3**

Weighting: **5%**

A written proposal that emulates a typical grant application employed in academic research.

On successful completion you will be able to:

- At the conclusion of this unit students will be able to identify and discuss issues of relevance to contemporary society, using the context of contemporary chemistry.
- At the conclusion of this unit students will be able to exhibit mastery of broad chemical knowledge concerning the fundamentals in the basic areas of the discipline, and be able to use the knowledge and skills gained during your studies to analyse issues of current interest and relevance.
- At the conclusion of this unit students will be able to exhibit problem-solving skills by identifying the essential parts of a research problem and formulating a strategy for solving the problem.
- At the conclusion of this unit students will be able to undertake research, including understanding and articulating the objective of the project, carry out appropriate experiments, and record, analyse and present the results of the study.
- At the conclusion of this unit students will be able to place the activities of chemists in a professional ethics context.

## Execution of Project

Due: **All Semester**

Weighting: **15%**

Assessment of conduct in the laboratory and project preparation, contribution to the group effort, general knowledge and skills associated with the research project.

On successful completion you will be able to:

- At the conclusion of this unit students will be able to identify and discuss issues of relevance to contemporary society, using the context of contemporary chemistry.
- At the conclusion of this unit students will be able to exhibit mastery of broad chemical knowledge concerning the fundamentals in the basic areas of the discipline, and be able to use the knowledge and skills gained during your studies to analyse issues of current interest and relevance.
- At the conclusion of this unit students will be able to exhibit problem-solving skills by identifying the essential parts of a research problem and formulating a strategy for

solving the problem.

- At the conclusion of this unit students will be able to undertake research, including understanding and articulating the objective of the project, carry out appropriate experiments, and record, analyse and present the results of the study.

## Written Report

Due: **Week 13**

Weighting: **25%**

Formal written report on the research project. Individually prepared and submitted.

On successful completion you will be able to:

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- At the conclusion of this unit students will be able to place the activities of chemists in a professional ethics context.

## Class Presentations

Due: **Week 4**

Weighting: **10%**

Short Presentations on Paper of Interest

On successful completion you will be able to:

- At the conclusion of this unit students will be able to identify and discuss issues of relevance to contemporary society, using the context of contemporary chemistry.
- At the conclusion of this unit students will be able to exhibit mastery of broad chemical knowledge concerning the fundamentals in the basic areas of the discipline, and be able

to use the knowledge and skills gained during your studies to analyse issues of current interest and relevance.

- At the conclusion of this unit students will be able to undertake research, including understanding and articulating the objective of the project, carry out appropriate experiments, and record, analyse and present the results of the study.
- At the conclusion of this unit students will be able to place the activities of chemists in a professional ethics context.

## Essay

Due: **Week 10**

Weighting: **10%**

Essay on an area of current chemistry

On successful completion you will be able to:

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- At the conclusion of this unit students will be able to exhibit problem-solving skills by identifying the essential parts of a research problem and formulating a strategy for solving the problem.
- At the conclusion of this unit students will be able to undertake research, including understanding and articulating the objective of the project, carry out appropriate experiments, and record, analyse and present the results of the study.
- At the conclusion of this unit students will be able to place the activities of chemists in a professional ethics context.

## Employment Analysis

Due: **Week 7**

Weighting: **5%**

A short self-analysis of employability in the chemistry profession.

On successful completion you will be able to:

- At the conclusion of this unit students will be able to undertake research, including

understanding and articulating the objective of the project, carry out appropriate experiments, and record, analyse and present the results of the study.

- At the conclusion of this unit students will be able to place the activities of chemists in a professional ethics context.

## Assignments

Due: **Weekly**

Weighting: **10%**

A range of multiple choice or short-answer questions covering the sub-disciplines of chemistry.

On successful completion you will be able to:

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- At the conclusion of this unit students will be able to exhibit problem-solving skills by identifying the essential parts of a research problem and formulating a strategy for solving the problem.
- At the conclusion of this unit students will be able to undertake research, including understanding and articulating the objective of the project, carry out appropriate experiments, and record, analyse and present the results of the study.

## Poster

Due: **Week 13**

Weighting: **10%**

A poster illustrating the research project. A group submission.

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- At the conclusion of this unit students will be able to place the activities of chemists in a professional ethics context.

## Oral Report

Due: **Week 13**

Weighting: **5%**

Discussion with Lecturer concerning your laboratory experience

On successful completion you will be able to:

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## Reflections

Due: **Weekly**

Weighting: **5%**

A weekly reflection on undertaking a research project.

On successful completion you will be able to:

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- At the conclusion of this unit students will be able to exhibit problem-solving skills by



identifying the essential parts of a research problem and formulating a strategy for solving the problem.

- At the conclusion of this unit students will be able to undertake research, including understanding and articulating the objective of the project, carry out appropriate experiments, and record, analyse and present the results of the study.
- At the conclusion of this unit students will be able to place the activities of chemists in a professional ethics context.

## Delivery and Resources

### Classes

**Timetable:** Please check <http://www.timetables.mq.edu.au/> for the official timetable of the unit. Note that this unit is meant to have a high degree of flexibility and the official timetable is a guide only.

**Lectures/Tutorial/Seminars:** The coursework component of this unit will be used to explore topics of relevance to contemporary chemistry and employment in the Chemistry field. Attendance is compulsory. At times we will use the time allocated to laboratory work for workshops and extended seminar programs.

**Laboratory Work:** This is a large component of CBMS302. Your self-directed research project will help you to understand which techniques you have learnt over the past few years can be used in a given practical situation. You will design the project, using literature procedures as a guide. Considerable preparation is therefore needed. Practical sessions will be organised in a semi-formalised manner, with sufficient flexibility to allow individualised investigations.

### Required and Recommended Texts and/or Materials

None prescribed. This unit will draw upon the recent chemical literature, accessed through journals (paper and electronic) as source material for the topics being studied.

### Technology Used and Required

You will be using modern and sophisticated research instrumentation when conducting your research. This will be provided by the Department.

You will acquire current scientific literature using database search tools such as SciFinder Scholar, Reaxys, PubMed and Scirus.

You will be giving seminars and submitting documents. It is expected that these will be prepared in a professional manner. Access to presentation software, such as Powerpoint, and word processing software will be necessary.

### Unit Web Page

The URL of the CBMS302 web site is: [ileam.mq.edu.au](http://ileam.mq.edu.au)

You will be asked for a username and password. Your username is your student MQID. Your

MQID and password have been mailed to you by the University. If you have lost them go to the student portal: [my.mq.edu.au](http://my.mq.edu.au)

## Teaching and Learning Strategy

This unit is designed to have a flexible, open and self-directed learning environment. Much of the learning in the coursework component of the course will involve readings and discussion of those readings. You will be expected to exhibit a grasp of contemporary chemistry through application of your previous and current learning in the units that comprise your Major, by in class discussions and presentations and through essays and the final examination.

The essays provide a mechanism developing your level of understanding of the topic and your ability to communicate to others. They also provide, to some extent, a method of providing objective assessment of your level of attainment.

Active participation by you in the lectures/tutorial, seminars and laboratory sessions is expected. This means that you are expected to ask questions and contribute to the discussions during lectures/tutorials, seminars and in the laboratory.

The research project is intended to provide you with the opportunity to act as a real research chemist. It will be your responsibility to understand the problem, first through the literature and then in the lab. You will be expected to justify your research plan, and to present your research results to your peers. The research project consists of planning, execution and communication of results. These sections will be assessed through a written proposal for the project, performance in the laboratory, a written report (journal article format), and an oral presentation on the project. Some of these may be given as group work (to be determined by consensus).

## Unit Schedule

To be discussed in class.

Lab classes will begin as soon as groups are ready to start.

## Learning and Teaching Activities

### Lectures/Tutorials

Active participation by you in the lectures/tutorial, seminars and laboratory sessions is expected. This means that you are expected to ask questions and contribute to the discussions during lectures/tutorials, seminars and in the laboratory.

### Research Project

The research project is intended to provide you with the opportunity to act as a real research chemist. It will be your responsibility to understand the problem, first through the literature and then in the lab. You will be expected to justify your research plan, and to present your research results to your peers. The research project consists of planning, execution and communication of results. These sections will be assessed through a written proposal for the project, performance in the laboratory, a written report (journal article format), and an oral presentation on the project. Some of these may be given as group work (to be determined by consensus).

## Essays, Presentations, Assignments, Employment Exercises

These provide a mechanism to help you develop an understanding of the topics, your own level of attainments and preparedness for the step beyond the degree, and your ability to communicate to others. They also provide, to some extent, a method of providing objective assessment of your level of attainment.

## Policies and Procedures

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

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

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

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

## Student Code of Conduct

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

## Results

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

## Student Support

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

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)

- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## Student Enquiries

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit <http://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

### 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

- At the conclusion of this unit students will be able to identify and discuss issues of relevance to contemporary society, using the context of contemporary chemistry.
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- At the conclusion of this unit students will be able to place the activities of chemists in a professional ethics context.

## Assessment tasks

- Research Project Proposal
- Execution of Project
- Written Report
- Class Presentations
- Essay
- Poster
- Reflections

## Learning and teaching activities

- Active participation by you in the lectures/tutorial, seminars and laboratory sessions is expected. This means that you are expected to ask questions and contribute to the discussions during lectures/tutorials, seminars and in the laboratory.
- The research project is intended to provide you with the opportunity to act as a real research chemist. It will be your responsibility to understand the problem, first through the literature and then in the lab. You will be expected to justify your research plan, and to present your research results to your peers. The research project consists of planning, execution and communication of results. These sections will be assessed through a written proposal for the project, performance in the laboratory, a written report (journal article format), and an oral presentation on the project. Some of these may be given as group work (to be determined by consensus).
- These provide a mechanism to help you develop an understanding of the topics, your own level of attainments and preparedness for the step beyond the degree, and your ability to communicate to others. They also provide, to some extent, a method of providing objective assessment of your level of attainment.

## 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:

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## Assessment tasks

- Research Project Proposal
- Execution of Project
- Written Report
- Employment Analysis
- Assignments
- Poster
- Oral Report

## Learning and teaching activities

- Active participation by you in the lectures/tutorial, seminars and laboratory sessions is expected. This means that you are expected to ask questions and contribute to the discussions during lectures/tutorials, seminars and in the laboratory.
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ability to communicate to others. They also provide, to some extent, a method of providing objective assessment of your level of attainment.

## 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

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### Assessment tasks

- Research Project Proposal
- Execution of Project
- Written Report
- Class Presentations
- Essay
- Employment Analysis
- Assignments
- Poster
- Reflections



## Learning and teaching activities

- Active participation by you in the lectures/tutorial, seminars and laboratory sessions is expected. This means that you are expected to ask questions and contribute to the discussions during lectures/tutorials, seminars and in the laboratory.
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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

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## Assessment tasks

- Research Project Proposal
- Execution of Project
- Written Report
- Class Presentations
- Essay
- Assignments
- Poster
- Oral Report

## Learning and teaching activities

- Active participation by you in the lectures/tutorial, seminars and laboratory sessions is expected. This means that you are expected to ask questions and contribute to the discussions during lectures/tutorials, seminars and in the laboratory.
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## 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**

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## **Learning and teaching activities**

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## 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

- At the conclusion of this unit students will be able to identify and discuss issues of relevance to contemporary society, using the context of contemporary chemistry.
- At the conclusion of this unit students will be able to exhibit mastery of broad chemical knowledge concerning the fundamentals in the basic areas of the discipline, and be able to use the knowledge and skills gained during your studies to analyse issues of current interest and relevance.
- At the conclusion of this unit students will be able to exhibit problem-solving skills by identifying the essential parts of a research problem and formulating a strategy for solving the problem.
- At the conclusion of this unit students will be able to undertake research, including understanding and articulating the objective of the project, carry out appropriate experiments, and record, analyse and present the results of the study.

### Assessment tasks

- Research Project Proposal
- Execution of Project
- Written Report
- Employment Analysis

## Learning and teaching activities

- Active participation by you in the lectures/tutorial, seminars and laboratory sessions is expected. This means that you are expected to ask questions and contribute to the discussions during lectures/tutorials, seminars and in the laboratory.
- The research project is intended to provide you with the opportunity to act as a real research chemist. It will be your responsibility to understand the problem, first through the literature and then in the lab. You will be expected to justify your research plan, and to present your research results to your peers. The research project consists of planning, execution and communication of results. These sections will be assessed through a written proposal for the project, performance in the laboratory, a written report (journal article format), and an oral presentation on the project. Some of these may be given as group work (to be determined by consensus).
- These provide a mechanism to help you develop an understanding of the topics, your own level of attainments and preparedness for the step beyond the degree, and your ability to communicate to others. They also provide, to some extent, a method of providing objective assessment of your level of attainment.

## 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:

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- At the conclusion of this unit students will be able to place the activities of chemists in a professional ethics context.

## Assessment tasks

- Research Project Proposal
- Execution of Project
- Written Report
- Class Presentations
- Essay
- Employment Analysis
- Poster
- Oral Report
- Reflections

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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.

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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.

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## Changes from Previous Offering

A final examination (previously 20% of the aggregate mark) has been deleted. The weightings of other assessments tasks have been increased proportionally.