



# CBMS234

## Alchemy, Drugs and the Quest for Immortality

S2 External 2015

*Science and Engineering Faculty level units*

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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

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F7B328

Lecturer in Charge

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F7B232

Credit points

3

Prerequisites

15cp or admission to GCertBiotech

Corequisites

Co-badged status

CBMS123

Unit description

Alchemy is the art and science of converting one substance into another and it has been an important factor in shaping our society. Metals, ceramics, drugs and plastics have changed and enhanced our lifestyle. Drugs, fertilisers and pesticides have saved millions of lives, but not without some unforeseen environmental or social problems. When this happens, decisions have to be made and costs weighed against benefits. An appreciation of such issues is needed for better understanding of important problems that face society. This unit explores the way chemistry affects our lives, and the way chemists work things out. The unit does not aim to teach chemistry but looks at the impact that chemical sciences has had on civilisation, and where the latest molecular innovations are likely to lead us. The commercial significance of key biological processes and industries is addressed, emphasising the Australian context. The unit also examines connections between chemistry and other scientific fields as diverse as psychology, finance, medicine, environmental studies and astronomy, as well as revealing aesthetic and philosophical aspects of chemistry. This unit is taught online with a combination of topical lectures and multimedia material.

## 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 issues facing humanity that are caused by chemicals or have their solution in chemistry

Be able to discuss important issues that have a chemical basis from a rational perspective

Be able to critically evaluate non-specialist literature (e.g. Newspapers) that discuss chemical and biochemical issues

Understand the role of chemistry and the molecular sciences in drug discovery and medicine

Understand the role of chemistry as the source and solution of environmental issues

Understand the role of chemistry in industry

Understand how chemists approach scientific and seek to solve chemical questions

Identify chemical issues facing humanity

## Assessment Tasks

Name	Weighting	Due
<a href="#">Workshop 1</a>	8%	Week 3
<a href="#">Workshop 2</a>	8%	Week 7
<a href="#">Workshop 3</a>	8%	Week 9
<a href="#">Workshop 4</a>	8%	Week 11
<a href="#">Workshop 5</a>	8%	Week 13
<a href="#">Essay 1</a>	20%	Week 5
<a href="#">Essay 2</a>	20%	Week 8
<a href="#">Essay 3</a>	20%	Week 12

### Workshop 1

Due: **Week 3**

Weighting: **8%**

Chemistry: Then and Now

On successful completion you will be able to:

- Identify issues facing humanity that are caused by chemicals or have have their solution in chemistry
- Understand the role of chemistry in industry
- Identify chemical issues facing humanity

## Workshop 2

Due: **Week 7**

Weighting: **8%**

Drugs or Biomolecules

On successful completion you will be able to:

- Identify issues facing humanity that are caused by chemicals or have have their solution in chemistry
- Understand the role of chemistry and the molecular sciences in drug discovery and medicine
- Identify chemical issues facing humanity

## Workshop 3

Due: **Week 9**

Weighting: **8%**

Catalysts - Industrial / Biological

On successful completion you will be able to:

- Identify issues facing humanity that are caused by chemicals or have have their solution in chemistry
- Identify chemical issues facing humanity

## Workshop 4

Due: **Week 11**

Weighting: **8%**

Environmental Chemistry

On successful completion you will be able to:

- Identify issues facing humanity that are caused by chemicals or have have their solution in chemistry
- Understand the role of chemistry as the source and solution of environmental issues
- Identify chemical issues facing humanity

## Workshop 5

Due: **Week 13**

Weighting: **8%**

Chemical Identity and New Materials

On successful completion you will be able to:

- Identify issues facing humanity that are caused by chemicals or have have their solution in chemistry
- Understand how chemists approach scientific and seek to solve chemical questions
- Identify chemical issues facing humanity

## Essay 1

Due: **Week 5**

Weighting: **20%**

**Pick either a Book Chapter or a Chemical Industry and write an essay**

On successful completion you will be able to:

- Be able to discuss important issues that have a chemical basis from a rational perspective
- Understand the role of chemistry in industry
- Identify chemical issues facing humanity

## Essay 2

Due: **Week 8**

Weighting: **20%**

**Write a Poem! On Chemistry, chemical philosophy or the lectures so far**

**or**

**Write a critical Essay on the philosophy of Science if it had been written by chemists**

On successful completion you will be able to:

- Be able to critically evaluate non-specialist literature (e.g. Newspapers) that discuss chemical and biochemical issues

- Understand how chemists approach scientific and seek to solve chemical questions
- Identify chemical issues facing humanity

## Essay 3

Due: **Week 12**

Weighting: **20%**

**The life and works of a famous chemist of Nobel laureate**

or

**The ethical, political and social responsibility of chemists**

On successful completion you will be able to:

- Understand how chemists approach scientific and seek to solve chemical questions

## Delivery and Resources

All lectures, assessment, feedback and resources for this unit are on iLearn.

The web page for these units can be found at: <http://ilearn.mq.edu.au/> You are expected to access the web pages regularly, where you may find announcements, links to interesting internet facilities and sites of interest to the course, downloadable software, and lots of other interesting stuff. In addition all the lectures and printed notes for the lectures will be found only on the unit web page and it is up to you to keep up with the lectures and assessments. You are expected to have access to the internet and access the unit iLearn site on a regular basis. Please note information may also be sent by e-mail to your student e-mail account so please look at your e-mail account on a regular basis.

All lectures are on-line via the Echo360 EchoCenter page in iLearn. If you are unfamiliar with the Echo360 EchoCenter then refer to the "Student Guide to Echo360 Lecture Recordings" available from: [http://www.mq.edu.au/iLearn/student\\_info/lecture\\_recordings.htm](http://www.mq.edu.au/iLearn/student_info/lecture_recordings.htm).

All unit notes are presented as PDF files that require acrobat reader ([http://get.acrobat.com/reader/](http://get.acrobat.com/)).

All other resources are available at the Library

## Unit Schedule

**Lecturers:** PK = Prof. Peter Karuso; JJ = Dr Joanne Jamie\*; MN = Ms Maree Nelson\*; BO = Prof. Brian Orr\*

Week # commencing	e-lecture <i>Office hours:</i> Tuesday 1–2	e-lecture <i>Office hours:</i> Friday 10–11	Assignment / <i>activities</i> scheduled this week
0 .. 20 Jul	Read Unit Guide and familiarise yourself with the iLearn resources	Read Unit Guide and familiarise yourself with the iLearn resources	<i>Complete the unit prequiz</i>

## Unit guide CBMS234 Alchemy, Drugs and the Quest for Immortality

1 .. 27 Jul	<b>L1:</b> Chemistry through the Ages BO	<b>L2:</b> Elements of Chemistry BO	<i>Familiarisation with unit notes, Library services, e-resources.; Complete the unit prequiz</i>
2 .. 3 Aug	<b>LIVE LECTURE L0</b> Introductory Remarks and navigating this unit 1 PM # <b>LECTURE IN C5C T1#</b>	<b>L3:</b> Aluminium from Ore to Oven BO <i>plus</i> Preview of <b>L4, L5 &amp; E1</b> <b>L4:</b> Bridges for Civilisation BO	<i>Last Chance:</i> <i>Complete the unit prequiz</i> <i>Prepare for Workshop W1</i>
3 .. 10 Aug	<b>L5:</b> Chemistry – Creative, Useful BO and Central	<b>L6:</b> Health, Life & Natural Products PK – Shipworm to Carbolic Acid  <b>... W1 is due at 9 am Friday</b>	<b>W1 Pick a Pair of Elements</b> <i>Prepare for Workshop W1 and Essay E1</i>
4 .. 17 Aug	<b>L7:</b> Health, Life & Natural Products PK – Salvarsan to Penicillin; The quest for immortality	<b>L8:</b> Health, Life & Natural Products - PK What Do Molecules Look Like?	<i>Prepare for Essay E1</i>
5 .. 24 Aug	<b>L9:</b> Health, Life & Natural Products JJ – Chemicals from Nature  <b>... E1 is due at 9 am Monday</b>	<b>L10:</b> Biochemical Catalysts PK – Enzymes at Work	<b>E1 Pick either a Book Chapter or a Chemical Industry</b>
6 .. 31 Aug	<b>L11:</b> Industrial Catalysts – BO The Legacy of Fritz Haber	<b>L12:</b> Molecules Everywhere BO Space, Primordial Slime	<i>Prepare for Workshop 2</i>
7 .. 7 Sept	<b>L13:</b> Is Chemistry Art or Science? PK	<b>L14:</b> New Materials – Modern Alchemy JJ  <b>... W2 is due at 9 am Friday</b>	<b>W2 Pick a Pair of either Drugs or Biomolecules</b>
<b>RECESS (14 Sept – 27 Sept) prepare essay 2</b>			
8 .. 28 Sept	<b>L15:</b> Chemistry in and for the Environment #1 MN  <b>... E2 is due at 9 am Tuesday</b>	<b>L16:</b> Chemistry in and for the Environment #2 MN	<b>E2 Write a Poem! On Chemistry, chemical philosophy or the lectures so far</b> <i>Prepare for Workshop 3</i>
9 .. 6 Oct	<b>L17:</b> Chemical Identity PK – What are you?	<b>L18:</b> Chemical Identity JJ – How much of you is there?  <b>... W3 is due at 9 am Friday</b>	<b>W3 Catalysts - Biological and Industrial</b>
10 .. 12 Oct	<b>L19:</b> Chemical Identity PK – What is going on?	<b>L20:</b> Chemical identity PK – The same ... but different	<i>Prepare for Workshop 4</i>
11 .. 19 Oct	<b>L21:</b> When Things Go PK Wrong ...	<b>L22:</b> A Famous Chemist – BO Linus Pauling  <b>... W4 is due at 9 am Friday</b>	<b>W4 Environmental Chemistry</b> <i>Prepare for Essay E3</i>

12 .. 26 Oct	<b>L23</b> is next week (see below)  ... <b>E3 is due at 9 am Monday</b>	<b>L24:</b> Chemical Issues MN	Prepare for Workshop W5
13 .. 9 Nov	<b>L23:</b> Stop Press – The 2015 Nobel Prize in Chemistry, PK LIVE LECTURE 1 PM # LECTURE IN C5C T1#	... <b>W5 is due at 9 am Friday</b>	<b>W5</b> Identity, Structure, Composition & Change

**Note:** CBMS reserves the right to vary details of this schedule if necessary

\* Please note, the e-lectures given by Prof. Brian Orr and Maree Nelson are administered by Dr Chris McRae and those delivered by Joanne Jamie are administered by Prof Peter Karuso

## 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://stu>



[units.mq.edu.au/support/](https://units.mq.edu.au/support/)

## Learning Skills

Learning Skills ([mq.edu.au/learningskills](https://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](https://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

- Understand the role of chemistry and the molecular sciences in drug discovery and medicine
- Understand how chemists approach scientific and seek to solve chemical questions

### Assessment tasks

- Workshop 2
- Workshop 5
- Essay 2

- Essay 3

## 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

- Be able to critically evaluate non-specialist literature (e.g. Newspapers) that discuss chemical and biochemical issues
- Identify chemical issues facing humanity

### Assessment tasks

- Workshop 1
- Workshop 2
- Workshop 3
- Workshop 4
- Workshop 5
- Essay 1
- Essay 2

## 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

- Be able to discuss important issues that have a chemical basis from a rational perspective
- Understand the role of chemistry and the molecular sciences in drug discovery and medicine

## Assessment tasks

- Workshop 2
- Essay 1

## 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 issues facing humanity that are caused by chemicals or have their solution in chemistry
- Be able to discuss important issues that have a chemical basis from a rational perspective
- Be able to critically evaluate non-specialist literature (e.g. Newspapers) that discuss chemical and biochemical issues
- Understand the role of chemistry as the source and solution of environmental issues

## Assessment tasks

- Workshop 1
- Workshop 2
- Workshop 3
- Workshop 4
- Workshop 5
- Essay 1
- Essay 2

## 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 outcome

- Understand how chemists approach scientific and seek to solve chemical questions

## Assessment tasks

- Workshop 5
- Essay 2
- Essay 3

## 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

- Identify issues facing humanity that are caused by chemicals or have have their solution in chemistry
- Be able to discuss important issues that have a chemical basis from a rational perspective
- Understand the role of chemistry in industry

## Assessment tasks

- Workshop 1
- Workshop 2
- Workshop 3
- Workshop 4
- Workshop 5
- Essay 1

## 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

- Identify issues facing humanity that are caused by chemicals or have their solution in chemistry
- Be able to discuss important issues that have a chemical basis from a rational perspective
- Be able to critically evaluate non-specialist literature (e.g. Newspapers) that discuss chemical and biochemical issues
- Understand the role of chemistry as the source and solution of environmental issues
- Understand the role of chemistry in industry
- Identify chemical issues facing humanity

## Assessment tasks

- Workshop 1
- Workshop 2
- Workshop 3
- Workshop 4
- Workshop 5
- Essay 1
- Essay 2

## 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

- Identify issues facing humanity that are caused by chemicals or have their solution in chemistry
- Be able to discuss important issues that have a chemical basis from a rational perspective
- Be able to critically evaluate non-specialist literature (e.g. Newspapers) that discuss chemical and biochemical issues
- Understand the role of chemistry as the source and solution of environmental issues
- Understand the role of chemistry in industry
- Identify chemical issues facing humanity

## **Assessment tasks**

- Workshop 1
- Workshop 2
- Workshop 3
- Workshop 4
- Workshop 5
- Essay 1
- Essay 2

## **Changes from Previous Offering**

1. The first live lecture (L0) is now in week 2
2. Chris McRae will deliver L0