



# ENVS803

## Science in Environmental Management

S1 Evening 2016

*Dept of Environmental Sciences*

### Contents

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<a href="#"><u>General Information</u></a>	2
<a href="#"><u>Learning Outcomes</u></a>	3
<a href="#"><u>Assessment Tasks</u></a>	3
<a href="#"><u>Delivery and Resources</u></a>	8
<a href="#"><u>Unit Schedule</u></a>	10
<a href="#"><u>Learning and Teaching Activities</u></a>	11
<a href="#"><u>Policies and Procedures</u></a>	11
<a href="#"><u>Graduate Capabilities</u></a>	13

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## General Information

### Unit convenor and teaching staff

Convenor

Kate Lee

[kathryn.lee@mq.edu.au](mailto:kathryn.lee@mq.edu.au)

Lecturer

Kerrie Tomkins

[kerrie.tomkins@mq.edu.au](mailto:kerrie.tomkins@mq.edu.au)

Lecturer

Vladimir Strezov

[vladimir.strezov@mq.edu.au](mailto:vladimir.strezov@mq.edu.au)

### Credit points

4

### Prerequisites

Admission to MEnv or PGDipEnv or PGCertEnv or MEnvEd or PGDipEnvEd or PGCertEnvEd or MEnvMgt or PGCertEnvMgt or MEnvStud or PGDipEnvStud or MEnvPlan or MEnvSc or MSusDev or PGDipSusDev or PGCertSusDev or MWldMgt or PGDipWldMgt or PGCertWldMgt or MClmCh or MSc in Remote Sensing and GIS or PGDipSc in Remote Sensing and GIS or PGCertSc in Remote Sensing and GIS or GradCertEnv or GradDipEnv or GradCertSusDev or GradDipSusDev or MConsBiol or GradDipConsBiol

### Corequisites

### Co-badged status

### Unit description

The aim of this unit is to provide understanding of how environmental science influences management and decision making. The unit introduces students to the major chemical, physical and ecological processes that effect and control natural and anthropogenic environmental impacts. In this unit the disciplinary concerns and environmental principles within geoscience, ecology, chemistry and physics of pollution are explored and linkages among these disciplines emphasised from the viewpoint of science.

## 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:

1. Understand the scientific methodology and its application to analysing and managing environmental problems.
2. Be able to critically review peer-reviewed scientific literature that deals with environmental science problems.
3. Develop skills in synthesising information on environmental science research, and presenting it in written, oral and visual forms.
4. Develop skills in both individual research and working in groups.
5. Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

## Assessment Tasks

Name	Weighting	Due
<u>Literature review</u>	30%	5 May 2016
<u>Learning Exercises</u>	30%	Variable
<u>Research Project</u>	40%	2 June 2016

### Literature review

Due: **5 May 2016**

Weighting: **30%**

You must choose a topic within one of the disciplines of environmental science (geoscience, environmental chemistry or ecology). **You must restrict your review to the role of science in environmental management for that discipline.** You may decide to review one specific topic or a range of topics within that discipline.

Scientific papers can be pretty daunting at first but this is the form in which original research first appears. Primary scientific references describe the rationale for the investigation, the approaches, methods and the findings. Secondary references are a step removed from the original work and include review articles. You will be **writing a review article**, and you must include **at least 15 peer reviewed scientific papers** that report the results of research in your chosen discipline. Each student should independently decide which specific topic to review.

The topic must be in the category of one of the environmental disciplines covered in this course (i.e. geoscience, environmental chemistry or ecology). You are also encouraged to look critically at scientific data. In the first lecture you will learn about the nature of science and why scientific experiments can be so difficult to carry out. The experimental design and execution inevitably

has many shortcomings and if you come to appreciate the inherent difficulties you will be better equipped to spot weaknesses in published research and to undertake critical review. In the first Scientific Writing Workshop (Literature reviews) you will learn how to set out your topic and how to present your critical analysis of the literature.

**Your review should be no longer than 3000 words**, excluding title page, executive summary, tables, graphs and reference list. Use sub-headings to structure your review.

Assessment will be according to guidelines provided at the first lecture.

Extensions will only be granted for exceptional circumstance (which does not include workload or computer problems!) and with prior written permission by the unit convenor (Kate Lee).

Unapproved late submission will attract a 10% per calendar day penalty.

The final assignment mark will be marked out of 30, as the contribution to the final mark in the unit. The marks allocated for the various assessment criteria are as in the table below.

**Criterion Weighting** *Description* 6 · Clearly articulates aims and scope of review

· Accurately and succinctly describes objectives and outcomes of review literature

*Analysis* 16

· Contribution of reviewed literature

· Evidence evaluated critically

· Strengths and weaknesses clearly identified

*Presentation* 8

· Well-planned review with clear structure, sub-headings and logical argument firmly based on the literature cited

· Well written paper formatted for effective communication with correct grammar and spelling and correct use of professional terminology as appropriate

· Literature correctly cited and full bibliographic details provided

**Total** 30

This Assessment Task relates to the following Learning Outcomes:

• Understand the scientific methodology and its application to analysing and managing environmental problems.

• Be able to critically review peer-reviewed scientific literature that deals with environmental science problems.

• Develop skills in synthesising information on environmental science research, and presenting it in written, oral and visual forms.

• Develop skills in both individual research and working in groups.

- Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

On successful completion you will be able to:

- 1. Understand the scientific methodology and its application to analysing and managing environmental problems.
- 2. Be able to critically review peer-reviewed scientific literature that deals with environmental science problems.
- 3. Develop skills in synthesising information on environmental science research, and presenting it in written, oral and visual forms.
- 4. Develop skills in both individual research and working in groups.
- 5. Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

## Learning Exercises

Due: **Variable**

Weighting: **30%**

Exercises will be distributed during the geoscience, environmental chemistry and ecology components of the unit. Participants must complete all three exercises. It is important that exercises are completed promptly following the lectures to reinforce the learning process.

Marks: 10 marks for each exercise; 30 marks total. ie. 30% of the total unit mark.

Due: The due dates for each take home exercise are:

Geoscience: 31 March 2016

Environmental Chemistry: 28 April 2016

Ecology: 12 May 2016

Late exercises: Late penalties - 0.5 marks off for each day of late submission. No exercise will be accepted one week after its due date.

This Assessment Task relates to the following Learning Outcomes:

- Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

On successful completion you will be able to:

- 5. Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

## Research Project

Due: **2 June 2016**

Weighting: **40%**

Students will be assigned to groups of about 4 participants to undertake research on a topic related to the science of climate change, its impacts and management strategies. Suggested topics will be provided prior to the commencement of classes following the mid-semester break.

Groups will need to meet outside of class time to decide on their topic, allocate research tasks, collate material and develop the final presentation.

Marks: This assignment is composed of three parts:

1. Research Abstract, which must be completed by each student individually, worth 10 marks, or 10 % of the total unit mark
2. Oral presentation of research findings. The presentation will be undertaken in groups; worth 20 marks, or 20 % of the total unit mark.
3. Participation in research, which will be assessed individually during the presentations; worth 10 marks, or 10 % of the total unit mark.

The abstract, which needs to be completed individually, should include a brief yet informative title describing the research, the authors name, affiliation and be a maximum of 500 words. Hints on how to write a good abstract will be provided in the Scientific Writing Skills Workshop:

Abstracts

For the presentation, groups will be allocated 5 minutes per participant in the group + 10 minutes for questions (groups containing 3 participants will have 15 minutes for the presentation, while those with 4 participants will have 20 minutes time for presentations). Groups will give their presentations to the rest of the class. You may use any presentation format you like: lecture, seminar, poster, role-play, video etc. Groups will be allocated a single mark of up to 20% of the total mark for the teamwork presentation, which will be assessed according to criteria below. All members of the group must play an active part in either preparation of the material or its presentation.

### Criterion

### Weighting

*Content*

8

- Quality of research
  
- Relevance to assignment objectives

*Design 4*

- Structure
- Logic
- Effectiveness
- Originality

#### *Visual aids*

4

- Text (clear, brief, focused)
- Illustrations (clarity, relevance)
- Originality

#### *Questions*

4

- answered the question that was asked
- brief and comprehensive answers
- reveal good depth of knowledge

**Total 20**

Each group member will receive additional mark of up to 10% of the total mark for individual participation in the preparation, delivery and question-answer parts of the presentation, in accordance with the follow criteria.

**Criterion Weighting** *Delivery* 5 · Timing (balanced, total time effectively used); · Manner (natural, purposeful, eye contact); · Vocal quality & language (varied, pleasant, appropriate)  
*Participation* 5 · Participation to the presentation · Participation to answering questions · Participation to presentation discussion · Attendance **Total 10**

This Assessment Task relates to the following Learning Outcomes:

- Understand the scientific methodology and its application to analysing and managing environmental problems.
- Be able to critically review peer-reviewed scientific literature that deals with environmental

science problems.

- Develop skills in synthesising information on environmental science research, and presenting it in written, oral and visual forms.
- Develop skills in both individual research and working in groups.
- Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

On successful completion you will be able to:

- 1. Understand the scientific methodology and its application to analysing and managing environmental problems.
- 2. Be able to critically review peer-reviewed scientific literature that deals with environmental science problems.
- 3. Develop skills in synthesising information on environmental science research, and presenting it in written, oral and visual forms.
- 4. Develop skills in both individual research and working in groups.
- 5. Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

## **Delivery and Resources**

### **Requirements to Complete this Unit Satisfactorily**

Students must submit all assignments, attend the group presentations and gain a final mark of at least 50% to complete this unit satisfactorily.

Students are required to attend at least 80% of the formal classes, and will be asked to sign an attendance sheet. Attendance may be taken into account when assigning final grades for the unit where marks are on the border between one grade and the next.

### **Technologies Used and Required**

Students will need access to computer to review literature and complete the assessment tasks. Submissions of the assessment tasks will be arranged through iLearn. Academic search engines (ISI Web of Knowledge and Scopus) and submission of the assessment tasks will be discussed during the first night of the class.

### **Recommended Texts/Materials**

There is no single text for this course. References will be provided with the lecture material.

*Background reading can be found in the following:*

Aplin, G (2002), *Australians and their Environment: An Introduction to Environmental*



Studies, Oxford University Press

Arms K (1994). Environmental Science, Saunders College Publishing, Fort Worth, 2nd edition.

Australian State of the Environment Committee (2006). Australia: State of the Environment 2006.

Independent report to the Commonwealth Minister for Environment and Heritage.  
CSIRO Publishing on behalf of the Department of Environment and Heritage, Canberra.

Beckmann R (1994). Environmental Science, Australian Academy of Science, Canberra.

Enger ED and Smith BF (2006). Environmental Science: a study of interrelationships,  
McGraw Hill Publish.

Huxham M and Sumner D (2000). Science and Environmental Decision Making,  
Pearson Education.

Munasinghe M and Swart R (2005). Primer on Climate Change and Sustainable  
Development, Cambridge University Press.

O'Riordan T (ed) (1995). Environmental science for environmental management,  
Longman House, Harlow.

#### *Geosciences source books*

Brierley G.J. & Fryirs K.F. (2005) Geomorphology and River Management: Applications of  
the River Styles Framework, Blackwell Publishing, Oxford, UK. GB1203.2.B755/2005

Cooke R.U. & Doornkamp J.C. (1990). Geomorphology and Environmental Management,  
2nd edition, Clarendon Press, Oxford. GB406.C64/1990

Jacobson M.C. (2000). Earth System Science: From Biogeochemical Cycles to Global  
Change. Academic Press, London. QH344.E17/2000

Marchetti M. & Rivas V. (2001). Geomorphology and Environmental Impact Assessment.

Balkema, Lisse. GB406.G46 Press F. & Siever R. (1998) Understanding Earth. Freeman, New  
York. QE28.P9/1998

Slaymaker, O. (2000). Geomorphology, Human Activity, and Global Environmental  
Change. Wiley, Chichester. GE149.G46/2000

Summerfield, M.A. (1991) Global Geomorphology, Longman Publishers,  
Singapore. GB401.5.S84

#### *Environmental Chemistry source books*

Brasseur GP, Orlando JJ and Tyndall GS (1999) Atmospheric Chemistry and Global  
Change, Oxford University Press.

Bunce NJ (1990). Environmental Chemistry, Wuerz, Winnipeg.

Connell DW (1993). *Water Pollution: Causes and Effects in Australia and New Zealand*, University of Queensland Press, Brisbane, 3rd edition.

Harrison RM (1992). *Understanding our Environment: An Introduction to Environmental Chemistry and Pollution*, Royal Society of Chemistry, London.

Laws EA (1993). *Aquatic Pollution: An Introductory Text*, Wiley, New York, 2nd edition.

Manahan SE (1991). *Environmental Chemistry*, Lewis, Chelsea, 4th or 5th edition.

O'Neill P (1998). *Environmental Chemistry*, Chapman & Hall, London.

Van Loon G.W. and Duffy S.J. (2000) *Environmental Chemistry: A Global Perspective*, Oxford UP, Oxford.

### *Ecology source books*

Begon M, Mortimer M and Thompson DJ (1996). *Population Ecology: a Unified Study of Animals and Plants*, Blackwell, Oxford, 3rd edition.

Burgman, M. and Lindenmayer, D. (1998): *Conservation Biology for the Australian Environment*. Surrey Beatty & Sons, Sydney

Krebs CJ (2001). *Ecology: the Experimental Analysis of Distribution and Abundance*, Harper, New York, 5th edition. Magurran, A. E. 2004. *Measuring Biological Diversity*. Blackwell Science, Massachusetts, 1st ed.

Townsend, C. R., Harper, J. and Begon, M. (2000) *Essentials of Ecology*, Blackwell Science, Massachusetts, 1st ed.

### *Journal Articles*

Use of ISI Web of Knowledge or Scopus to search and access scientific literature published in peer-reviewed journals.

## Unit Schedule

### ENV5803 Unit Schedule 2016 (Thurs 6-9pm)

Week	Topics	Lecturer	Assignment due dates
1	Introduction to Environmental Science What is science? Introduction to Scientific Method and Practice	Tomkins	
2	Scientific Writing Skills Workshop: Literature Reviews	Tomkins	
3	Geoscience basic concepts	Tomkins	

4	Geoscience in Environmental Management: some examples	Tomkins	
5	Environmental chemistry: basic concepts	Stresov	Exercise 1 – Geoscience Thurs 31 March
6	Environmental chemistry in Environmental Management: some examples	Stresov	
<b>MID SEMESTER BREAK</b>			
7	Environmental technologies for climate change management	Stresov	Exercise 2 – Env Chemistry Thurs 28 April
8	Ecology: basic concepts	Lee	Literature review – Thurs 5 May
9	Ecology in Environmental Management: some examples	Lee	
10	Climate change and ecology	Lee	Exercise 3 – Ecology Thurs 12 May
11	Scientific Writing Skills Workshop: Abstracts	Lee	
12	Group Project Presentations	Lee	Abstract, presentations and participation –Thurs 2 June
13	Group Project Presentations	Lee	Presentations and participation cont.

## Learning and Teaching Activities

### Lectures

Lectures from 3 academic staff members on geoscience, environmental chemistry and ecology

### Class discussions

Class discussions throughout the lectures, specifically during the student presentations

### Workshops

In-class workshops on case studies

### Personal readings

Readings of peer-reviewed journal articles

## Policies and Procedures

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

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

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

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

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

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

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

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

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

## Student Code of Conduct

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

## Results

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

## Student Support

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

## Learning Skills

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

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

## Student Services and Support

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

## Student Enquiries

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

## IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

#### Learning outcomes

- 4. Develop skills in both individual research and working in groups.
- 5. Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

#### Assessment task

- Research Project

### PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

#### Learning outcomes

- 1. Understand the scientific methodology and its application to analysing and managing environmental problems.
- 2. Be able to critically review peer-reviewed scientific literature that deals with environmental science problems.
- 5. Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

## Assessment tasks

- Literature review
- Learning Exercises
- Research Project

## PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

### Learning outcomes

- 1. Understand the scientific methodology and its application to analysing and managing environmental problems.
- 2. Be able to critically review peer-reviewed scientific literature that deals with environmental science problems.
- 3. Develop skills in synthesising information on environmental science research, and presenting it in written, oral and visual forms.
- 4. Develop skills in both individual research and working in groups.

## Assessment tasks

- Literature review
- Learning Exercises
- Research Project

## PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

### Learning outcomes

- 2. Be able to critically review peer-reviewed scientific literature that deals with environmental science problems.
- 3. Develop skills in synthesising information on environmental science research, and

presenting it in written, oral and visual forms.

- 5. Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

## **Assessment tasks**

- Literature review
- Learning Exercises
- Research Project

## **PG - Effective Communication**

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

### **Learning outcomes**

- 3. Develop skills in synthesising information on environmental science research, and presenting it in written, oral and visual forms.
- 4. Develop skills in both individual research and working in groups.

## **Assessment tasks**

- Literature review
- Research Project

## **PG - Engaged and Responsible, Active and Ethical Citizens**

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

### **Learning outcomes**

- 2. Be able to critically review peer-reviewed scientific literature that deals with environmental science problems.
- 5. Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

## Assessment task

- Research Project