GSE 803

Science in Environmental Management

S1 Evening 2015

Dept of Environmental Sciences

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
Kerrie Tomkins
kerrie.tomkins@mq.edu.au
Contact via kerrie.tomkins@mq.edu.au

Lecturer
Kate Lee
kathryn.lee@mq.edu.au
Contact via kathryn.lee@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 MClimCh 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:

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.

Assessment Tasks

Name	Weighting	Due
Literature review	40%	2 April 2015
Learning Exercises	20%	16 March 2015 / 11 May 2015
Research Project	40%	25 May 2015

Literature review

Due: **2 April 2015**
Weighting: **40%**

At the first meeting for this unit you will be randomly assigned to one of the disciplines of environmental science. **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 assigned discipline. Each student should independently decide which specific topic to review. The topic must be in the category of the assigned discipline.

You are also encouraged to look critically at scientific data. In the first lecture we 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.

Your review should be no longer than 3500 words, excluding title page, executive summary, tables, graphs and reference list. Use sub-headings to structure your review. You must use the

guidelines provided in the GSE Writing Guide.

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

The final assignment mark will be marked out of 40, 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

· *Clearly articulates aims and scope of review*

· *Accurately and succinctly describes objectives and outcomes of review literature*

8

Analysis

· *Contribution of reviewed literature*

· *Evidence evaluated critically*

· *Strengths and weaknesses clearly identified*

20

Presentation

· *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*

12

· Penalty: Late Submission (10% per day)

Total

40

On successful completion you will be able to:

- 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.

Learning Exercises

Due: **16 March 2015 / 11 May 2015**
Weighting: **20%**

Two exercises will be distributed during the geoscience and ecology components of the unit. Participants must complete both exercises. It is important that exercises are completed promptly following the lectures to reinforce the learning process.

Marks: 10 marks for each exercise; 20 marks total. ie. 20% of the total unit mark.

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

Geoscience: 16 March 2015

Ecology: 11 May 2015

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.

On successful completion you will be able to:

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

Research Project

Due: **25 May 2015**
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 assessible 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 Group Project Workshop.

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 tbelow. All members of the group must play an active part in either preparation of the material or its presentation.

Criterion

Weighting

Content

· *Quality of research*

· *Relevance to assignment objectives*

8

Design

· *Structure*

· *Logic*

· *Effectiveness*

· *Originality*

4

Visual aids

· *Text (clear, brief, focused)*

· *Illustrations (clarity, relevance)*

· *Originality*

4

Questions

· *answered the question that was asked*

· *brief and comprehensive answers*

· *reveal good depth of knowledge*

4

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

· *Timing (balanced, total time effectively used);*

· *Manner (natural, purposeful, eye contact);*

· *Vocal quality & language (varied, pleasant, appropriate)*

5

Participation

· *Participation to the presentation*

· *Participation to answering questions*

· *Participation to presentation discussion*

· *Attendance*

5

Total

10

On successful completion you will be able to:

- 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.

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.

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.

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.

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

Journal Articles

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

Unit Schedule

Week	Topics	Lecturer
1	Introduction to Environmental Science What is science? Introduction to Scientific Method and Practice	Tomkins
2	Geoscience basic concepts	Tomkins
3	Geoscience in Environmental Management: some examples	Tomkins
4	Climate change and geoscience	Tomkins
5	No class	-
6	No class	-
	MID SEMESTER BREAK	
7	No class	-
8	Ecology basic concepts	Lee
9	Ecology in Environmental Management: some examples	Lee

10	Climate change and ecology	Lee
11	Group project workshop	Lee
12	Group Project Presentation	Lee
13	Group Project Presentation	Lee

Learning and Teaching Activities

Lectures

Lectures from 2 academic staff members on geoscience 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

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/

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.

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

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

- Understand the scientific methodology and its application to analysing and managing environmental problems.
- Develop skills in both individual research and working in groups.

Assessment task

- Research Project

Learning and teaching activity

- Lectures from 2 academic staff members on geoscience and ecology
- Class discussions throughout the lectures, specifically during the student presentations
- In-class workshops on case studies
- Readings of peer-reviewed journal articles

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

- 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.

Assessment tasks

- Literature review
- Learning Exercises
- Research Project

Learning and teaching activities

- Lectures from 2 academic staff members on geoscience and ecology
- Class discussions throughout the lectures, specifically during the student presentations
- In-class workshops on case studies
- Readings of peer-reviewed journal articles

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

- 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 both individual research and working in groups.

Assessment tasks

- Literature review
- Learning Exercises
- Research Project

Learning and teaching activities

- Lectures from 2 academic staff members on geoscience and ecology
- Class discussions throughout the lectures, specifically during the student presentations
- In-class workshops on case studies
- Readings of peer-reviewed journal articles

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

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

Assessment tasks

- Literature review
- Learning Exercises
- Research Project

Learning and teaching activities

- Lectures from 2 academic staff members on geoscience and ecology
- Class discussions throughout the lectures, specifically during the student presentations
- In-class workshops on case studies
- Readings of peer-reviewed journal articles

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

- 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.

Assessment tasks

- Literature review
- Research Project

Learning and teaching activities

- Class discussions throughout the lectures, specifically during the student presentations

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

- Be able to critically review peer-reviewed scientific literature that deals with environmental science problems.
- Develop skills in both individual research and working in groups.
- Apply scientific knowledge to develop realistic strategies for dealing with complex environmental problems.

Assessment task

- Research Project

Learning and teaching activity

- Lectures from 2 academic staff members on geoscience and ecology
- Class discussions throughout the lectures, specifically during the student presentations
- In-class workshops on case studies