



# GEOS375

## Environmental Geology

S2 Day 2015

*Dept of Earth and Planetary Sciences*

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## General Information

### Unit convenor and teaching staff

#### Unit Convenor

Stefan Loehr

[stefan.loehr@mq.edu.au](mailto:stefan.loehr@mq.edu.au)

arrange via email

#### Additional Teaching Staff

Nathan Daczko

[nathan.daczko@mq.edu.au](mailto:nathan.daczko@mq.edu.au)

arrange via email

#### Lecturer

Craig O'Neill

[craig.oneill@mq.edu.au](mailto:craig.oneill@mq.edu.au)

arrange via email

### Credit points

3

### Prerequisites

ENVE266 or GEOS206

### Corequisites

GEOS207 and 3cp from GEOS units at 300 level

### Co-badged status

### Unit description

This unit deals with the interaction of people and the geological environment, including issues arising from people's occupation and exploitation of the Earth. The unit covers both urban and resource geology, and geological hazards. Students work on three projects based on realistic workplace scenarios including preparing tenders, data analysis and report writing using industry standard styles. One project involves the collection of data at a field site. The lecture program includes invited speakers from industry.

## 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:

- Understanding of the tools and methods that are used in environmental geology
- Competence in applying geoscientific principles to understanding the world around you
- Capacity to employ appropriate geoscientific tools to solve environmental problems and to interpret the results
- Understanding of the legal framework and industry-standard guidelines used by environmental scientists
- Understanding the scientific method
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

## General Assessment Information

All submissions must have a Faculty of Science and Engineering assignment coversheet that can be downloaded from the unit web site. The sequence and the deadlines for receipt of the assignments in the Science Centre (MUSE C7A Level 1) for internal students (or to COE for external students) are:

<b>Project 1 Tender document:</b>	<b>9.00 am:</b>	<b>11<sup>th</sup> Aug 2015 (Externals 18<sup>th</sup> Aug)</b>
<b>Project 1 Individual Report:</b>	<b>9.00 am:</b>	<b>1<sup>st</sup> Sept 2015</b>
<b>Project 2 Group Presentation:</b>	<b>9.00 am:</b>	<b>8<sup>th</sup> Sept 2015</b>
<b>Project 2 Individual Report:</b>	<b>9.00 am:</b>	<b>13<sup>th</sup> Oct 2015</b>
<b>Project 3 Individual Report:</b>	<b>9.00 am:</b>	<b>10<sup>th</sup> Nov 2015</b>

One of the submission dates for external students is later than for the internals to correspond with on-campus sessions and the presentation of material.

**Students must keep a photocopy of their reports.**

5% will be deducted for each day or part of a day that assignments are received after the deadline. Extensions for late assignments will be granted *only* if misadventure (including incapacitating sickness) can be demonstrated.

If you need to apply for an extension, you must EMAIL THE UNIT CONVENOR BEFORE THE DUE DATE of the assignment and state the reason you are seeking an extension. This will not be granted automatically, but will be considered on a case-by-case basis.

### Projects:

Students will work in small "company" groups of 4-5 people. Each of the projects will involve an individual and a group component. Data analysis and discussion of results will be completed in

groups but each student will submit **individual project reports**. The project reports will include the purpose and the results of the studies (including diagrams, maps and references) and will conform to industry standards for the specific investigation. You will be given specific details of what is expected for both the group and individual components when you begin each project.

### **Presentation and discussion:**

Each group will present and lead a discussion/debate for Project 2. This will consist of a 15 minute (max.) presentation and subsequent class discussion relevant to your groups focus. You will be expected to produce a one-page handout summary of the discussion for the class within one week. A computer with MS Powerpoint will be available. Seminars will be held during the practical sessions. Each seminar grade is based on the assessment of the issues, the clarity of your presentation and discussion, and the usefulness of the handout.

### **Final examination:**

The final exam will cover material from the lectures, practicals, and project reports. Questions will draw on information and ideas from different areas to give an integrated view of the unit. The exam will include questions that ask you to apply your knowledge to interpret and solve problems.

## **Assessment Tasks**

Name	Weighting	Due
<u>Tenders/exercises</u>	10%	multiple, see below
<u>Project reports</u>	55%	multiple, see below
<u>Presentation and discussion</u>	5%	see below
<u>Final examination</u>	30%	University examination period

### **Tenders/exercises**

Due: **multiple, see below**

Weighting: **10%**

Tender documents and exercises

On successful completion you will be able to:

- Understanding of the tools and methods that are used in environmental geology
- Competence in applying geoscientific principles to understanding the world around you
- Capacity to employ appropriate geoscientific tools to solve environmental problems and to interpret the results
- Understanding of the legal framework and industry-standard guidelines used by environmental scientists

- Understanding the scientific method
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

## Project reports

Due: **multiple, see below**

Weighting: **55%**

Project reports

On successful completion you will be able to:

- Understanding of the tools and methods that are used in environmental geology
- Competence in applying geoscientific principles to understanding the world around you
- Capacity to employ appropriate geoscientific tools to solve environmental problems and to interpret the results
- Understanding of the legal framework and industry-standard guidelines used by environmental scientists
- Understanding the scientific method
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

## Presentation and discussion

Due: **see below**

Weighting: **5%**

Presentation and discussion

On successful completion you will be able to:

- Understanding of the tools and methods that are used in environmental geology
- Competence in applying geoscientific principles to understanding the world around you
- Competence in accessing, using and synthesising appropriate information
- Capacity to present ideas clearly with supporting evidence

## Final examination

Due: **University examination period**

Weighting: **30%**

Final examination

On successful completion you will be able to:

- Understanding of the tools and methods that are used in environmental geology
- Competence in applying geoscientific principles to understanding the world around you
- Capacity to employ appropriate geoscientific tools to solve environmental problems and to interpret the results
- Understanding the scientific method
- Competence in accessing, using and synthesising appropriate information

## **Delivery and Resources**

1 hr lecture and 3 hour practical class each week of semester.

**Lecture:** Tuesdays 11 am - 12 pm, E8A 386

**Practical:** Thursdays 9 am - 12 pm, E5A 210

Lecture slides and related material are provided on the iLearn unit website.

### **On campus sessions for external students:**

Sat 8th August: 9am-5pm at MQ (E5A 230)

Sat 17th Oct: 9am-5pm at MQ (E5A 230)

### **Texts**

There is no prescribed text for this unit. If you are interested in buying a reference book, I suggest:

Bell, F.G. 1998. Environmental Geology: principles and practice. Blackwell Science, London.

### **Reference books: References held in the Library Reserve, are:**

Bell, F.G. 1998. Environmental Geology: principles and practice. Blackwell Science, London.

Keller, E.A., 2000. Environmental Geology. Prentice Hall, 562 pp.

*There are a large number of books in the library that deal with aspects of environmental geology. Some of the following areas will be of interest (given as library call number):*

GB1005 - hydrogeology

QE38 - environmental geology

QE515 - geochemistry

KUC155 - environmental law

S593 - soil testing

TA703 - geotechnical engineering

TA705/6 - engineering geology

TD153 - environmental modelling

TD193 - environmental chemistry

TD195 - environmental impact statements

TD426/427 - contaminated groundwater

TD878 - contaminated land guidelines

## Web Access

Further information on this unit can be accessed through the web address below.

<http://ilearn.mq.edu.au>

## Unit Schedule

Date	Wk	Lecture (E8A 386)	Practical (E5A 210)	
28 <sup>th</sup> July	1	Introduction to Environmental Geology [SL]	<b>Lecture:</b> Pasminco smelter site [TM]. <b>Project 1:</b> Formation of Groups, initial plans; preparation of tenders. [SL]	<b>Project 1:</b>  Analysis of an old industrial and contaminated site - the Pasminco smelter site and surrounds, Lake Macquarie, NSW
4 <sup>th</sup> Aug	2	Contaminated Site Assessment [WG]	<b>Exercise:</b> Analysis of a site history using aerial photos.  <b>Project 1:</b> Discussion of guidelines, production of site plans (samples sent to lab) [SL]	
8 <sup>th</sup> Aug	Externals: On Campus session 9am-5pm (E5A 230). [SL]			
11 <sup>th</sup> Aug	3	Guidelines and legal framework for contaminated site assessment [NJ]	<b>Exercise:</b> Core logging exercise.  <b>Exercise:</b> Dealing with chemical databases.  <b>Project 1:</b> Continuation of project work. [ND]	
18 <sup>rd</sup> Aug	4	Case study: Homebush bay, NSW [JH]	<b>Project 1:</b> Discussion of chemical data received from lab; display and interpretation of data. [ND]	

25 <sup>th</sup> Aug	5	<b>Recorded lecture only:</b>  Radioactive land contamin. [HH]	<b>No prac.</b> Use this time to finish Project 1.	
1 <sup>st</sup> Sept	6	Resource Geology: Coal seam gas [SL]	<b>Project 2:</b> Discussion: Environ. Impact Assess. for petroleum activities;  Introduction to project. Allocation of roles [SL]	<b>Project 2:</b>  Resource Extraction Planning, Coal Seam Gas: Environmental Impact Statement
8 <sup>th</sup> Sept	7	EIS petroleum and mining legal [SL]	<b>Project 2:</b> Coal Seam Gas Presentation & Debate (online forum for externals) [SL]	
Mid semester break (14 <sup>th</sup> – 27 <sup>th</sup> September)				
29 <sup>th</sup> Sept	8	Acid mine drainage [WG]	<b>Exercise:</b> Lake and river contamination from industrial waste [SL]	
6 <sup>th</sup> Oct	9	Hydrogeology and mining [TBA]	<b>Exercise:</b> Groundwater and surface water contamination from resource extraction [SL]	
13 <sup>th</sup> Oct	10	Geol. Hazards: Geological features important in slope stability [CO'N]	<b>Exercise:</b> Quantitative analysis of slope stability [CO'N]	<b>Project 3:</b> Analysing slope stability
17 <sup>th</sup> Oct	Externals: On Campus session 9am-5pm (E5A 230). [CO'N]			
20 <sup>th</sup> Oct	11	Analysing a slope stability problem [CO'N]	Exercise: GIS and slope stability [CO'N]	
27 <sup>th</sup> Oct	12	Analysing rock failure [CO'N]	Exercise: Visualising slope stability [CO'N]	
3 <sup>rd</sup> Nov	13	Careers talk  [TBA]	Revision [SL]	

*SL: Stefan Loehr; TM: Tony Morrison; ND: Nathan Daczko; WG: Wijnand Germs, Environmental Resources Management (ERM); NJ: Niall Johnston, Environment Protection Authority (EPA); JH: John Hunt, Thiess Services; CO'N: Craig O'Neill; TBA: Guest speaker, to be confirmed.*

## 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

- Competence in applying geoscientific principles to understanding the world around you
- Application of knowledge to solving problems and evaluating ideas and information

#### Assessment tasks

- Tenders/exercises
- Project reports

### 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

- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

#### Assessment tasks

- Tenders/exercises
- Project reports

### 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**

- Understanding the scientific method
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information

### **Assessment tasks**

- Tenders/exercises
- Project reports

## **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**

- Understanding of the tools and methods that are used in environmental geology
- Capacity to employ appropriate geoscientific tools to solve environmental problems and to interpret the results
- Understanding of the legal framework and industry-standard guidelines used by environmental scientists
- Understanding the scientific method

### **Assessment tasks**

- Tenders/exercises
- Project reports
- Presentation and discussion
- Final examination

## **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**

- Competence in applying geoscientific principles to understanding the world around you
- Capacity to employ appropriate geoscientific tools to solve environmental problems and to interpret the results
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information

## **Assessment tasks**

- Tenders/exercises
- Project reports
- Presentation and discussion
- Final examination

## **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**

- Competence in applying geoscientific principles to understanding the world around you
- Capacity to employ appropriate geoscientific tools to solve environmental problems and to interpret the results
- Understanding the scientific method
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information

## **Assessment tasks**

- Tenders/exercises
- Project reports
- Presentation and discussion
- Final examination

## 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 outcome

- Capacity to present ideas clearly with supporting evidence

### Assessment tasks

- Tenders/exercises
- Project reports
- Presentation and discussion
- Final examination

## 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

- Competence in applying geoscientific principles to understanding the world around you
- Understanding of the legal framework and industry-standard guidelines used by environmental scientists
- Capacity to present ideas clearly with supporting evidence

### Assessment tasks

- Tenders/exercises
- Project reports
- Presentation and discussion

## 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 outcome**

- Understanding of the legal framework and industry-standard guidelines used by environmental scientists

## **Assessment tasks**

- Tenders/exercises
- Project reports
- Presentation and discussion