GEOS375

Environmental Geology

S2 External 2016

Dept of Earth and Planetary Sciences

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
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Credit points
3

Prerequisites
ENVE266 or ENVS266 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 assessment tasks must be submitted electronically via the unit iLearn site. The submission deadlines are as follows:

Project 1 Report:	**5.00 PM:**	**5th Sept 2016**
Poster Presentation 1: for internal students)	**10.00 AM:**	**11th Oct 2016 (presented in class**
Project 2 Report:	**5.00 PM:**	**14th Nov 2016**

Students must keep a copy of their reports.

Late penalties: 10 % of your mark will be deducted for the first day that the assignment is received after the deadline, and 5% for each further day. 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. External students will form groups during the first on-campus session - these will remain the same for the rest of semester. Data analysis and discussion of results will be completed in the groups during the on-campus sessions, 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 when you begin each project.

Poster Presentation and Discussion:

You will independently research a topic within the broad area of the environmental impacts of resource extraction and prepare a poster and a 1-page abstract. For internal students, the posters will be presented during the week 9 practical session. External students will upload their poster to iLearn, and explain the poster to the instructor and answer any questions in a 10 minute phone or Skype conversation. A suitable time during week 9 will be arranged closer to the date for each external student. Your grade will be based on the assessment of the issues, the clarity of your presentation and discussion, and the usefulness of the 1-page abstract. You will

be given specific details of what is expected when you begin each project.

Final examination:

The final exam will cover material from the lectures, required weekly reading material, practicals, project reports and poster presentations. 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
Project reports	44%	multiple, see below
Poster discussion	16%	see below
Final examination	40%	University examination period

Project reports

Due: **multiple, see below**
Weighting: **44%**

Written individual reports for projects 1 and 2. Each worth 22% of final mark.

On successful completion you will be able to:

- Understanding of the tools and methods that are used in environmental geology
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- 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

Poster discussion

Due: **see below**
Weighting: **16%**

Presentation of poster on an aspect of environmental consequences of resource extraction

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: **40%**

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

INTERNALS: You are required to attend 1 lecture session and 1 three-hour practical session each week:

Lecture: Tuesdays 9 AM - 10 AM, C5A 301

Practical: Tuesday 10 AM - 1 PM, E5A 210

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

On campus sessions for external students:

Sat 13th August: 9am-5pm at MQ (E5A 210)

Sat 22nd Oct: 9am-5pm at MQ (E5A 210)

Texts

There is no prescribed text for this unit, but assigned readings for each week will be available on iLearn. If you are interested in buying a reference book, I suggest:

Keller, E.A., 2011. Environmental Geology (9th Edition). Pearson, 624 pp.

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

Useful reference books held in the Library include:

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

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

Lottermoser, B.G. 2010. Mine Wastes: Characterisation, Treatment & Environmental Impacts. Springer, 408 pp. (**available as an ebook from the library**)

Knödel, Lange, Voigt. 2007. Environmental Geology: Handbook of Field Methods and Case Studies. Springer Berlin Heidelberg. (**available as an ebook from the library**)

In addition, 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	Module	Week	Lecture (C5A 301)	Practical (E5A 210)

2nd Aug	Urban Geology	1	Introduction to Environmental Geology [SL]	**Exercise:** Surface & groundwater pollution. [SL]	**Module 1 Project**: Stage 2 Site Assessment of an old industrial contaminated site - the Pasminco smelter site
9th Aug	Urban Geology	2	Contaminated Site Assessment [WG]	**Project 1:** Background lecture Pasminco smelter site. [TM]. Discuss site assessment guidelines and marking criteria. Form groups; prepare sampling plans. [SL]	
13th Aug	Externals: On Campus session 9am-5pm [SL].				
16th Aug	Urban Geology	3	**Recorded lecture only:** Guidelines and legal framework for contaminated site assessment [NJ]	**Exercise:** How to plot and interpret geochemical data.	
23rd Aug	Urban Geology	4	Common brownfield contaminants [SL]	**Project 1:** Discussion of chemical data received from lab; display and interpretation of data. [SL]	
30th Aug	Urban Geology	5	Radioactive waste [SL]	**Exercise:** Conceptual site model of a fuel spill from an underground storage tank.	
6th Sept	Resource Extraction	6	Coal mining [SL]	**Exercise:** Carbon stabilization wedges exercise & discussion. Assignment of poster presentation topics [SL].	**Poster:** Present in Week 9
13th Sept	Resource Extraction	7	Coal seam & shale gas [SL]	TBA [SL]	
Mid semester break (19th – 30th September)					
4th Oct	Resource Extraction	8	Acid mine drainage [SL]	TBA [SL]	**Poster:** Present in Week 9
11th Oct	Resource Extraction	9	Hydrogeology and mining [SL]	Poster presentations [SL]	
18th Oct	Geotechnical	10	Geol. Hazards: Geological features important in slope stability [CO'N]	**Exercise:** Quantitative analysis of slope stability [CO'N]	**Module 3 Project:** Modelling slope stability
22nd Oct	Externals: On Campus session 9am-5pm [CO'N].				
25th Oct	Geotechnical	11	Analysing a slope stability problem [CO'N]	**Exercise:** GIS and slope stability [CO'N]	

1st Nov	Geotechnical	12	Analysing rock failure [CO'N]	**Exercise:** Visualising slope stability [CO'N]	
8th Nov	Geotechnical	13	TBA	Revision [SL]	

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

New Assessment Policy in effect from Session 2 2016 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/

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

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://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

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

- Project reports
- Poster discussion

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 task

- 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 task

- 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

- Project reports
- Poster 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

- Project reports
- Poster 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

- Project reports
- Poster 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

- Project reports
- Poster 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

- Project reports
- Poster 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

- Project reports
- Poster discussion