



GEOS251

Minerals, Energy and the Environment

S1 Day 2014

Earth and Planetary Sciences

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>Assessment Tasks</u>	3
<u>Delivery and Resources</u>	8
<u>Unit Schedule</u>	8
<u>Policies and Procedures</u>	9
<u>Graduate Capabilities</u>	11

Disclaimer

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

General Information

Unit convenor and teaching staff

Unit Convenor

Bruce Schaefer

bruce.schaefer@mq.edu.au

Contact via bruce.schaefer@mq.edu.au

Credit points

3

Prerequisites

12cp

Corequisites

Co-badged status

Unit description

This is a general education unit that introduces students to the technical, social, economic and environmental aspects that lie behind the production and use of mineral and energy resources in Australia and the rest of the world. The end products of these resources are familiar to us as steel for cars, aluminium for pots and pans, crude oil for petrol and coal for electricity. Nowadays, we have to consider acid rain, the greenhouse effect, heavy metal pollution, radiation, land degradation and land rights. Scarcity and resource exhaustion are also concerns. We demand and accept the goods and services provided by the minerals industries, including the increased wealth resulting from mineral exports, yet increasingly oppose the development of the resources that produce these goods. This does not mean that opposition to development is necessarily bad, or that development is necessarily good. What it does mean is that it is important to look at the broad picture rather than emotions. Learn about questions like: What is the economic importance of Australian mining? What are the environmental problems associated with this mining? Where are Australia's fossil fuels? How long will they last? Debate topics like: Should Australia adopt nuclear power as a 'clean' energy source? Should Australia, like Norway, insist on mining companies contributing to long term community wealth?

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:

An understanding of which are the major resources necessary for our modern society to function

Insights into the economic drivers for the optimization of these resources

Appreciation for the role and necessity for government, community and industry in determining policy

An ability to research and evaluate evidence regarding issues in the minerals, energy and environmental industries

Assess the validity of scientific information

Communicate the findings of individual and group driven research through scientific writing and presentations

Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assessment Tasks

Name	Weighting	Due
<u>Assignment 1</u>	5%	21/03/2014
<u>Assignment 2</u>	15%	12/4/2014
<u>Assignment 3</u>	20%	16/5/2014
<u>Online Quizzes</u>	10%	Periodically
<u>Final Examination</u>	40%	TBA
<u>The ReadinGAME</u>	10%	Ongoing

Assignment 1

Due: **21/03/2014**

Weighting: **5%**

Assignment 1: (worth 5% of total mark)

This will be smaller than the other assignments. You will be assigned an everyday object and asked to research the origin of two resources used in its manufacture. Its aim is to get you to a) use the internet in a sensible manner to acquire knowledge and insight. b) summarise this comprehensively and c) present the information in a short, 3 min presentation and summary sheet of A4.

On successful completion you will be able to:

- An understanding of which are the major resources necessary for our modern society to function
- Insights into the economic drivers for the optimization of these resources
- An ability to research and evaluate evidence regarding issues in the minerals, energy and environmental industries
- Communicate the findings of individual and group driven research through scientific writing and presentations

Assignment 2

Due: **12/4/2014**

Weighting: **15%**

Assignment 2:

These are longer format written assignments which will require, research and referencing to discuss Uranium mining and nuclear waste disposal

Research Component (65%)

In no more than 1 page per part, you are asked to:

- a. Describe and briefly evaluate the benefits and costs to Australia of uranium mining.
- b. Explain why Western Australia is considered a prime location for establishing a high-level nuclear waste repository.
- c. Outline the potential benefits of building such a repository.
- d. Outline the potential problems of building such a repository.

Individual Component (35%)

As an individual, you are asked to respond to the following (max 1 page per part):

- a. In your opinion, should Australia allow mining of its uranium deposits? If so, under what conditions?

Justify your answer.

- b. Discuss whether you would support building of a high-level waste repository facility in Australia,

giving reasons for, and reservations in, your answer.

- c. If you are in favour of building such a repository, explain how you would go about selling the idea to

the Australian public and government; if not, offer your preferred solution to the issue of global nuclear

waste

A brief introduction to the assignment and summary are also expected. Accurate referencing of all

sources of information is essential.

On successful completion you will be able to:

- An understanding of which are the major resources necessary for our modern society to function
- Appreciation for the role and necessity for government, community and industry in determining policy
- An ability to research and evaluate evidence regarding issues in the minerals, energy and environmental industries
- Assess the validity of scientific information
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assignment 3

Due: **16/5/2014**

Weighting: **20%**

Assignment 3:

These are longer format written assignments which will require research and referencing to discuss Carbon Capture and Storage.

Research Component (65%)

In no more than 1 page per part, you are asked to:

1. Describe what the reasons could be for Australia wanting to contribute to the development of CCS while developing countries such as India and China continue to build power stations but are not at the forefront of CCS.
2. Describe and evaluate what the main concerns are of Carbon Capture and Storage.
3. Describe how CCS will affect the cost of electricity for an average Australian house hold and what the main contributions to this change in cost are.

4. Tabulate the current contribution of each of the main renewable energy sources (e.g., wind, solar) to Australia's electricity supply. Briefly evaluate the importance of each energy source to Australia's overall electricity supply.

Individual Component (35%)

As an individual, you are asked to respond to the following (max 1 page per part):

1. Explain if you think CCS is a feasible option for Australia in reducing its carbon emissions and also explain why.

2. Compare the time that is needed for CCS to become large scale to

- firstly, the timing of the global CO₂ reduction targets which the G8 has set themselves
- and secondly, the time it takes to plan and build a new power station

Give your view on how this could affect the development of CCS

3. What alternatives would you present if CCS would turn out not to be viable? Name at least three and explain why you think these options are most likely to tackle the problem of reducing CO₂ emissions.

On successful completion you will be able to:

- An understanding of which are the major resources necessary for our modern society to function
- Appreciation for the role and necessity for government, community and industry in determining policy
- An ability to research and evaluate evidence regarding issues in the minerals, energy and environmental industries
- Assess the validity of scientific information
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Online Quizzes

Due: **Periodically**

Weighting: **10%**

4 online quizzes will be conducted during the course of the semester at intervals corresponding to approximately every three weeks.

On successful completion you will be able to:

- An understanding of which are the major resources necessary for our modern society to function
- Insights into the economic drivers for the optimization of these resources

Final Examination

Due: **TBA**

Weighting: **40%**

A written 2 hour exam covering ALL aspects of the unit, including practical and assignment tasks.

On successful completion you will be able to:

- An ability to research and evaluate evidence regarding issues in the minerals, energy and environmental industries
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

The ReadinGAME

Due: **Ongoing**

Weighting: **10%**

An online interactive quiz based game designed to enhance your learning of key concepts and drive deeper insights into the material. Since the topics we will be investigating are relevant to everyday issues, and commonly appear in the news as well as scientific studies, this is an opportunity to access the wealth of material in the public domain.

A 10% Quiz at the end of semester will be sourced from questions entered by students participating in the ReadinGAME

On successful completion you will be able to:

- An understanding of which are the major resources necessary for our modern society to function
- Appreciation for the role and necessity for government, community and industry in determining policy
- An ability to research and evaluate evidence regarding issues in the minerals, energy and environmental industries

- Assess the validity of scientific information
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Delivery and Resources

Two one hour lectures per week, and tutorial/practical sessions roughly every fortnight. Check the most recent timetable on iLearn and announcements in lectures for variations. Please stay in your allocated tutorial times as we have small rooms allocated to us!

Resources (both electronic and references in the library) for assignments and starting resources for the ReadinGAME can be found on iLearn.

Unit Schedule

Note that this is a Preliminary Outline only. A more complete outline will be in iLearn at the start of week 1

Week	Lecture A	Lecture B	Tutorial session
Week 1 3/3	Lect 1: Introduction BFS	Lect 2: Global Mining Industry I TR	
Week 2 10/3	Lect 3: Global Mining Industry II TR	Lect 4: Supply and Demand of Mineral Resources TR	
Week 3 17/3	Lect 5: Mining and Process technology TR	Lect 6: Financing the Minerals Industry TR	
Assignment 1 Due 5pm Fri 21/3			
Week 4 24/3	Lect 7: Mining and process technology BFS	Lect 8: Metals and industrial minerals BFS	Watch Presentations (Assignment 1) of Fellow Students (will be available on iLearn)
Week 5 31/3	Lect 9: Mining and Environment BFS	Lect 10: Land Use, Native Title BFS	<i>Watch Presentations (cont)</i>

Week 6 7/4	Lect: 11: Strategic commodities: REE BFS	Lect 12: Mining and Society BFS	<i>Strategic Commodities: REE</i>
<i>Assignment 2 Due 5pm Fri 12/4</i>			
Week 7 28/4	No Lectures- Allocated time for assignment 3		
Week 8 5/5	Lect 13: Supply, Demand, Energy BFS	Lect 14: Uranium BFS	
Week 9 12/5	Lect 15: Oil and Gas SG	Lect 16: Coal SG	<i>Tutes</i>
<i>Assignment 3 Due 5pm Fri 16/5</i>			
Week 10 19/5	Lect 17: Diamonds ER	Lect 18: Climate BFS	
Week 11 26/5	Lect 19: Alternative Energy I BFS	Lect 20: Alternative Energy II BFS	<i>Human Induced Climate Change and mass extinctions: fact or fiction?</i>
Week 12 2/6	Lect 21: Sustainable Development I BFS	Lect 22: Sustainable Development II BFS	<i>Revision Q&A</i>
Week 13 9/6	Review Lecture, Results of polling!		

BFS = Dr Bruce Schaefer; TR = A/Prof Tracy Rushmer; SG = Prof Simon George

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/

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

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

- An understanding of which are the major resources necessary for our modern society to function
- Insights into the economic drivers for the optimization of these resources
- Appreciation for the role and necessity for government, community and industry in determining policy
- Assess the validity of scientific information
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assessment tasks

- Assignment 2
- Assignment 3
- Final Examination
- The ReadinGAME

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

- An ability to research and evaluate evidence regarding issues in the minerals, energy and environmental industries

- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assessment tasks

- Assignment 2
- Assignment 3
- Final Examination
- The ReadinGAME

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

- An understanding of which are the major resources necessary for our modern society to function
- Insights into the economic drivers for the optimization of these resources
- Assess the validity of scientific information
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- Online Quizzes
- Final Examination
- The ReadinGAME

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

- An understanding of which are the major resources necessary for our modern society to function
- Insights into the economic drivers for the optimization of these resources
- An ability to research and evaluate evidence regarding issues in the minerals, energy and environmental industries
- Assess the validity of scientific information
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assessment tasks

- Assignment 2
- Assignment 3
- Online Quizzes
- Final Examination
- The ReadinGAME

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

- Insights into the economic drivers for the optimization of these resources
- An ability to research and evaluate evidence regarding issues in the minerals, energy

and environmental industries

- Assess the validity of scientific information
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- Final Examination
- The ReadinGAME

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

- An ability to research and evaluate evidence regarding issues in the minerals, energy and environmental industries
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assessment tasks

- Assignment 1
- Assignment 3
- The ReadinGAME

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Appreciation for the role and necessity for government, community and industry in determining policy
- An ability to research and evaluate evidence regarding issues in the minerals, energy and environmental industries
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- Final Examination
- The ReadinGAME

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

- An understanding of which are the major resources necessary for our modern society to function
- Insights into the economic drivers for the optimization of these resources
- Appreciation for the role and necessity for government, community and industry in determining policy
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assessment tasks

- Assignment 2
- Assignment 3
- Final Examination
- The ReadinGAME

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcomes

- An understanding of which are the major resources necessary for our modern society to function
- Insights into the economic drivers for the optimization of these resources
- Appreciation for the role and necessity for government, community and industry in determining policy
- Communicate the findings of individual and group driven research through scientific writing and presentations
- Develop informed opinions regarding societal issues, and understand what influences your personal decision making process

Assessment tasks

- Assignment 2
- Assignment 3
- Final Examination
- The ReadinGAME