



GEOS126

Marine Geoscience

S2 Day 2014

Earth and Planetary Sciences

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General Information

Unit convenor and teaching staff

Unit Convenor

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Credit points

3

Prerequisites

Corequisites

Co-badged status

Unit description

This unit introduces students to the marine environment through study of the oceans, past and present. From the perspective of a marine scientist this unit considers: aspects of the geological history and dynamics of the oceans; recent techniques for probing the ocean's depths; physical oceanographic processes; ocean circulation patterns; depositional environments; marine environments supporting life; long term global climate change; and human interactions with the marine environment. The unit includes practical exercises including a boat trip to investigate sediment in a local estuary.

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:

9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
8. Understand scientific methodology.

7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
5. Comprehend that ocean waters have not always had exactly the same composition as at present and understand some of the processes that change this composition.
4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Assessment Tasks

Name	Weighting	Due
<u>Research Project 1</u>	12%	Week 5
<u>Research Project 2</u>	12%	Week 9
<u>Research Project 3</u>	12%	Week 13
<u>Quizzes</u>	9%	Weekly
<u>Tutor's Mark</u>	5%	Weekly
<u>Final Exam</u>	50%	Final exam period

Research Project 1

Due: **Week 5**

Weighting: **12%**

You will be investigating data collected from the Port Hacking field trip (second Saturday in Semester 2). With this data you will: identify the features and rates of coastal erosion; examine siliciclastic deposition in oceans, describe the geophysical tools used for imaging and logging the sediments; appreciate that distribution of marine fossils is influenced by environmental factors. This helps us interpret past environments.

On successful completion you will be able to:

- 9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
- 8. Understand scientific methodology.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Research Project 2

Due: **Week 9**

Weighting: **12%**

In this research project, you will learn to: distinguish the factors that determine ocean floor bathymetry and relief; understand how ocean basins have changed their configurations through time due to the operation of plate tectonics; recognise that present ocean basins have not always existed, and that the evidence for the youth of present oceans lies in the ocean floor basement and the sediments; appreciate the role of plate tectonics in the birth and demise of oceans.

On successful completion you will be able to:

- 9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
- 8. Understand scientific methodology.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
- 1. Understand the science behind a number of marine geoscience issues including those

related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Research Project 3

Due: **Week 13**

Weighting: **12%**

In this Research Project, you will find that: ocean waters have not always had exactly the same composition as at present; establish that deep and shallow circulation patterns of the ocean are influenced by the shape and configuration of the ocean basins; understand the link between changes in the ocean basins brought about by plate tectonics and resultant changes in sea level, ocean circulation etc.; e.g. periods of fast and slow spreading; appreciate that periods of glaciation and growth of ice caps, as well as other factors have caused changes in ocean circulation, and composition; find that marine environments have always been an important part of the biosphere and have played a significant part in the evolution of life on earth.

On successful completion you will be able to:

- 9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
- 8. Understand scientific methodology.
- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 5. Comprehend that ocean waters have not always had exactly the same composition as at present and understand some of the processes that change this composition.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Quizzes

Due: **Weekly**

Weighting: **9%**

Quizzes will be given weekly, starting Week 2 and will be based on the lecture and research project material

On successful completion you will be able to:

- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 5. Comprehend that ocean waters have not always had exactly the same composition as at present and understand some of the processes that change this composition.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Tutor's Mark

Due: **Weekly**

Weighting: **5%**

Mark based on participation given to you by your tutor. The tutor will factor in such things as attendance patterns, participation in group and class discussions, readiness for each learning activity, ability to answer questions and general enthusiasm.

On successful completion you will be able to:

- 9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
- 8. Understand scientific methodology.
- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.

- 5. Comprehend that ocean waters have not always had exactly the same composition as at present and understand some of the processes that change this composition.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Final Exam

Due: **Final exam period**

Weighting: **50%**

The Final Exam will cover material from the lectures, research projects and the practicals.

On successful completion you will be able to:

- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 5. Comprehend that ocean waters have not always had exactly the same composition as at present and understand some of the processes that change this composition.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Delivery and Resources

The class will be delivered through iLearn, lectures and workshops. Materials for the Research

Projects will be made available in class and then later on iLearn. We also encourage you to do your own research.

For each project you will hand in one part that is a combined effort from the group and an individual component. The individual component will be a one or two page written report (plus diagrams, maps and references), which will concentrate on the synthesis of the ideas and conclusions. You will be given specific details of what is expected for both the group and individual components when you begin each research project.

Unit Schedule

2014 dates	Lecture Topics	Lecture by	Workshop Topics
	Monday 11-12 <u>C5C T1 Theatre</u>		
Week 1	Introduction – why study marine geoscience?	Dick Flood	Mining the Ocean Floor
Week 2	Plate tectonics – the birth and death of ocean basins	Dick Flood	Research Project 1 – Shifting sands of Port Hacking
Field trip			Boat cruise on Port Hacking
Week 3	From Mountains to the Sea: erosion, transport and deposition of sediments	Dick Flood	Research Project 1 (cont) – Shifting sands of Port Hacking
Week 4	Sedimentation on the continental shelf, slope and rise	Dick Flood	Research Project 1 (cont) – Shifting sands of Port Hacking
Week 5	Marine biogenic sediments	Simon George	Marine Sedimentary Rocks
Week 6	Geophysics: seeing through the ocean floor	Mark Lackie	Research Project 2 – Exploring Ocean Basins – Arctic Ocean
Week 7	Remote sensing	Mark Lackie	Research Project 2 (cont) – Exploring Ocean Basins
	Break		

Week 8	Reconstructing past continents using marine fossils (Public holiday so lecture recorded 2013 available on I-learn) .	Simon George	Research Project 2 (cont) – Exploring Ocean Basins
Week 9	The briny deep – oceanic circulation patterns, past and present	Dick Flood	Sediment accumulation rates
Week 10	Oceans, climate and plate tectonics	Dick Flood	Research Project 3 – Icy tales of the Antarctic
Week 11	Palaeontology and the Australian polar wander curve	Simon George	Research Project 3 (cont) - Icy tales of the Antarctic
Week 12	Tales of ancient seas, climates and isotopes	Dick Flood	Research Project 3 (cont) - Icy tales of the Antarctic
Week 13	International Ocean Discovery Program and marine geoscience research	TBA	Hand in Research Project 3 Wrap-up discussion

Report for Research project 1 is due in week 5

Report for Research project 2 is due in week 9

Report for Research project 3 is due in week 13

Learning and Teaching Activities

Research Project 1

Based on Module 1: Shifting Sands through Time • discern that erosion of the land supplies most of the detritus that covers the continental shelf and slope • identify the features and rates of coastal erosion • examine siliciclastic deposition in oceans, with particular emphasis on coastal estuarine, shallow water shelf and deep water fan sedimentation • analyse erosion, transport and depositional processes on the continental shelf, slope and rise • describe the geophysical tools used for imaging and logging the sediments • interpret the response of recent marine organisms and ecosystems to environmental factors • appreciate that distribution of marine fossils is influenced by environmental factors during the lifetime of the organism and by sediment transport and other factors after death. This helps us interpret past environments.

Research Project 2

Based on Module 2: Birth and Death of Ocean Basins. • distinguish the factors that determine ocean floor bathymetry and relief • understand how ocean basins have changed their configurations through time due to the operation of plate tectonics • recognise that present ocean basins have not always existed, and that the evidence for the youth of present oceans lies in the

ocean floor basement and the sediments • appreciate the role of plate tectonics in the birth and demise of oceans.

Research Project 3

Based on Module 3: Oceans Climates and Plate Tectonics. • comprehend that ocean waters have not always had exactly the same composition as at present • establish that deep and shallow circulation patterns of the ocean are influenced by the shape and configuration of the ocean basins • understand the link between changes in the ocean basins brought about by plate tectonics and resultant changes in sea level, ocean circulation etc.; e.g. periods of fast and slow spreading • appreciate that periods of glaciation and growth of ice caps, as well as other factors have caused changes in ocean circulation, and composition • demonstrate that changes in ancient ocean waters can be detected by observing patterns of sediment deposition; e.g. salt deposits, black shales • understand that marine environments have always been an important part of the biosphere and have played a significant part in the evolution of life on earth • examine the changes in shallow marine fauna of Australia through time • perceive that the large-scale distribution of marine fossils can be explained to a large extent by palaeogeography of the oceans and continents • show how changes in ancient ocean waters can be detected by changes in the isotopic composition of shells, ice, and so on.

Workshop week 1

First week's workshop will be on "Mining the Ocean Floor"

Workshop week 5

This week's workshop will be on "Marine Sedimentary Rocks"

Workshop week 9

This week's workshop will be on "Sediment Accumulation Rates"

Weekly quizzes

Quizzes will be given weekly starting from week 2. The quiz will examine the lecture and practical topics of the previous week as well as the research projects.

Final Exam

The final exam will cover material from the lectures, text book readings, workshops and research projects. Questions will draw on information and ideas from different modules 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 about marine geoscience.

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

- 9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
- 8. Understand scientific methodology.
- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Assessment tasks

- Quizzes
- Tutor's Mark
- Final Exam

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

- 9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Assessment tasks

- Research Project 1
- Research Project 2
- Research Project 3
- Quizzes
- Tutor's Mark
- Final Exam

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

- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 5. Comprehend that ocean waters have not always had exactly the same composition as at present and understand some of the processes that change this composition.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the

processes that control where this sediment is deposited over time.

- 2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Assessment tasks

- Research Project 1
- Research Project 2
- Research Project 3
- Quizzes
- Final Exam

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

- 9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
- 8. Understand scientific methodology.
- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 5. Comprehend that ocean waters have not always had exactly the same composition as at present and understand some of the processes that change this composition.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 2. Describe the tools used to determine what is under the oceans and how ocean basins

are constructed including deep-sea drilling, geophysical methods and remote sensing.

- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Assessment tasks

- Research Project 1
- Research Project 2
- Research Project 3
- Final Exam

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

- 9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
- 8. Understand scientific methodology.
- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Assessment tasks

- Research Project 1
- Research Project 2
- Research Project 3
- Final Exam

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

- 9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
- 8. Understand scientific methodology.
- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.

Assessment tasks

- Research Project 1
- Research Project 2
- Research Project 3
- Final Exam

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

- 9. Be competent in accessing, evaluating and synthesising appropriate information, using this to solve geoscience problems, and present ideas in a clear, concise report with supporting evidence.
- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Assessment tasks

- Research Project 1
- Research Project 2
- Research Project 3
- Tutor's Mark
- Final Exam

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

- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.

- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 5. Comprehend that ocean waters have not always had exactly the same composition as at present and understand some of the processes that change this composition.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 1. Understand the science behind a number of marine geoscience issues including those related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Assessment tasks

- Research Project 1
- Research Project 2
- Research Project 3
- Final Exam

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

- 7. Describe the causes of long-term sea level change and evaluate the major factors that may have induced “ice ages” or major glaciation events throughout Earth’s history.
- 6. Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- 5. Comprehend that ocean waters have not always had exactly the same composition as at present and understand some of the processes that change this composition.
- 4. Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 3. Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- 2. Describe the tools used to determine what is under the oceans and how ocean basins are constructed including deep-sea drilling, geophysical methods and remote sensing.
- 1. Understand the science behind a number of marine geoscience issues including those

related to shallow water sedimentation, plate tectonics in ocean basins, and climate change over geological timescales.

Assessment tasks

- Tutor's Mark
- Final Exam

Desired Standards

Grade	Standard Required
High Distinction	Demonstrates an extensive knowledge and understanding of the concepts of the course.
Distinction	Demonstrates a thorough knowledge and understanding of the concepts of the course.
Credit	Demonstrates a sound knowledge and understanding of the concepts of the course.
Pass	Demonstrates a basic knowledge and understanding of the concepts of the course.
Fail	Demonstrates a poor knowledge and understanding of the concepts of the course.

Feedback on assessment tasks

Feedback on assessment tasks is given in this unit in the following ways:

1. Our primary mode of assessment feedback: the assessment marker will present overall feedback to the class, at either a lecture, tutorial or practical class, on what aspects of the assessment task were done best and where improvement is needed in general.
2. Students are strongly encouraged to seek further feedback (at the time it is given or by making an appointment with the assessment marker) if they are unsure of any aspect of the feedback or if they want further feedback.
3. We provide you with a checklist of what is asked in the assessment task and a breakdown of the marks awarded for each component. Scoring full marks for a given component indicates that you did exceptionally well. Alternatively, scoring poorly in a component strongly suggests it required further work.
4. In the instance of scoring very poorly overall, you will be provided with written feedback on the assessment task indicating where you could improve.

Lateness of assignments and reports

Marks will be deducted for assignments and reports that are late at the rate of 10% per day, unless accompanied by a medical certificate. In other exceptional circumstances you should contact your tutor **before** the due date.

