



GEOS126

Marine Geoscience

S2 Day 2018

Dept of Earth and Planetary Sciences

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Disclaimer

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General Information

Unit convenor and teaching staff

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By Appointment

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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:

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.

Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.

Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.

Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.

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.

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.

Understand scientific methodology.

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.

Describe the main changes in global climate in the Cenozoic

Demonstrate foundational learning skills including active engagement in their learning process.

General Assessment Information

General Assessment Information

All assessment tasks must be submitted electronically via the iLearn site. Students must keep a copy of their reports. The exact submission deadline will be published on the unit iLearn site.

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.

Weekly quizzes: These will cover material from the lectures, practicals and weekly readings. They contribute 16% of your final mark, and are also a hurdle requirement. In order to pass the unit you must complete at least 8 out of 12 quizzes. Please note that individual quiz questions are not time limited, if you are unsure about an answer you can take the time to go back to your textbook or lecture notes.

Practical participation: You must attend and participate in at least 10 of the 12 weekly practical classes to pass this unit. Please contact your tutor or the unit convenor as soon as possible if you have difficulty attending and participating in any classes. There may be alternatives available to make up the work, e.g. attend one of the other pracs that week. If there are circumstances that

mean you miss a class, you can apply for disruption to study.

Exam and special consideration: The final exam is worth 40% of your final mark. If you receive [special consideration](#) for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the [policy](#) prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn (bit.ly/FSESupp) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

Assessment Tasks

Name	Weighting	Hurdle	Due
Practical participation	0%	Yes	Weeks 1 to 12
Weekly iLearn Quizzes	20%	Yes	Weeks 2 to 13
ACC Report	20%	No	Week 7
Port Hacking Report	20%	No	Week 12
Final Exam	40%	No	Final exam period

Practical participation

Due: **Weeks 1 to 12**

Weighting: **0%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)

You must attend and participate in at least 10 of the 12 weekly practical classes to pass this unit. This is a hurdle requirement.

On successful completion you will be able to:

- 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.
- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.

- Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 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.
- 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.
- Demonstrate foundational learning skills including active engagement in their learning process.

Weekly iLearn Quizzes

Due: **Weeks 2 to 13**

Weighting: **20%**

This is a hurdle assessment task (see [assessment policy](#) for more information on hurdle assessment tasks)

Weekly online quizzes which cover material from the lectures, practicals and weekly readings are assessed. In order to pass the unit you must complete at least 8 out of 12 quizzes. This is a hurdle requirement.

On successful completion you will be able to:

- 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.
- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
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- Demonstrate foundational learning skills including active engagement in their learning process.

ACC Report

Due: **Week 7**

Weighting: **20%**

The Southern Ocean formed with the separation of Antarctica from Australia and South America, allowing the Antarctic Circumpolar Current to commence in the late Palaeogene. This is thought to have had a significant impact on ocean circulation, global climate, as well as the evolution and distribution of marine biota. Your report will investigate the processes driving the ACC today, when the ACC commenced, and the impact it's commencement had on global ocean circulation & climate.

On successful completion you will be able to:

- 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.
- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
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- Understand scientific methodology.
- 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.
- Describe the main changes in global climate in the Cenozoic
- Demonstrate foundational learning skills including active engagement in their learning process.

Port Hacking Report

Due: **Week 12**

Weighting: **20%**

You will be investigating sediment, bathymetric and water quality data collected during the Port Hacking field trip. You will analyse the sediments collected during the trip in order to identify the sources of the sediment, and how they got to be deposited at the locations they are presently found. This report has a group and an individual component.

On successful completion you will be able to:

- 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.
- Describe the source of ocean sediment, both organic and inorganic, and the processes that control where this sediment is deposited over time.
- Understand scientific methodology.
- 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.
- Demonstrate foundational learning skills including active engagement in their learning process.

Final Exam

Due: **Final exam period**

Weighting: **40%**

The Final Exam will cover material from the lectures, practicals, weekly readings and assignments.

On successful completion you will be able to:

- 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.
- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
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- Demonstrate foundational learning skills including active engagement in their learning process.

Delivery and Resources

The class will be delivered through iLearn, lectures, practicals as well as set weekly reading. In addition, you are encourage to do your own research.

You are required to attend 1 lecture session and 1 two-hour practical session each week. Practical and lectures start in WEEK 1 (30 July-3 Aug).

LECTURES - The weekly lecture is on **Wednesdays 10 - 11 AM in 23WW T1 (W5A T1)**. Lectures will be recorded by Echo 360 for iLecture (links from iLearn) and will be live streamed. However, we strongly suggest that you use the recordings as a revision aid, and not a reason to stay away from lectures. Our experience is that internal students benefit greatly from attendance at the live lectures. A pdf copy of the lecture slides and related material will be provided on the iLearn unit website.

PRACTICALS - There is a one 2 hour practical each week. **Attendance and participation in these pracs is COMPULSORY** – you must participate in at least 10/13 pracs to pass the unit. Practical are in 11WW 250 (formerly known as E5A 250). There are seven possible practical classes: <http://www.timetables.mq.edu.au/> You may not change practical classes once session 1 begins unless you have written permission from the unit convenor.

Textbook

You are required to purchase a copy of the Sverdrup & Armbrust textbook "An Introduction to the world's oceans", which is an excellent introductory level textbook. Make sure you get the most recent edition (10th edition). You can buy a copy from the co-op bookshop, or cheaper online via booko.com.au or similar. We will complement this with two other freely available supplementary textbooks to cover gaps in the Sverdrup textbook: Segar's "Introduction to Ocean Science (4th Edition)" - available via the authors website - and Seibold & Berger's "The Sea Floor" - available as a downloadable ebook via the MQ library. Another great resource is the Encyclopedia of Marine Geosciences (Springer, available as ebook through the library). Additional readings will be made available via iLearn as required.

Please remember that the weekly readings are compulsory, you will have to keep on top of these to do well in GEOS126. The quizzes and the exam will include material from the readings that we will not have time to cover in any detail in the lectures or in the practical sessions.

Fieldtrip

A half-day fieldtrip/cruise on Port Hacking in Week 6 (Saturday 8th of September) will give you some hands-on marine science experience. We will measure physical and chemical water properties using ship-based instruments, and collect sediment samples at various depths and locations in the Port Hacking estuary. You will continue working on the data and samples you collect in the second half of semester, this work will form the basis of your second report. Participation in the fieldtrip is not compulsory, but you are strongly encouraged to attend. Feedback consistently shows that the fieldtrip is the part of GEOS126 that students enjoy the most.

Unit Schedule

2018 Schedule	Lecture Topic	Practical	Assignments	Lecturer
Week 1	The Ocean Planet - intro to marine geoscience	Intro, Coordinate Systems & Vertical Exaggeration	Online quizzes (Weeks 1-13)	Stefan Löhr
Week 2	Plate Tectonics – Birth & death of ocean basins	Intro to plate tectonics: volcanism, earthquakes, mountain building, basin spreading rates, subduction etc		Steven Hansen
Week 3	Morphology of ocean basins	Causes and implications of basin size & shape		Hansen or Löhr
		Coriolis, atmospheric circulation & climate		Stefan Löhr
Week 5	Ocean circulation	Drivers of ocean circulation & experiment		Stefan Löhr
Week 6	Mountains to the sea - weathering, erosion & transport of sediments	Basic sediment properties		Stefan Löhr
Port Hacking Fieldtrip (1/2 day) - Saturday 8th September. Choose from AM or PM trip offerings.				
Week 7	Ocean chemistry	Why is the ocean salty? Basics of ocean chemistry	Initiation, causes and consequences of ACC	Stefan Löhr
Mid Semester Break				
Week 8	Life in the oceans: plankton, nekton and benthos	Port Hacking samples Pt 1		Martin Ostrowski or Löhr
Week 9	Sedimentary processes on coast and shelf. Sediment transport	Port Hacking samples Pt2		Stefan Löhr
Week 10	Sediments of the slope & deep sea	Classification of sedimentary rocks & sedimentary structures.		Stefan Löhr
Week 11	Causes and impact of sea level change	TBD		Stefan Löhr
Week 12	The deep sea record of Cenozoic climate & environmental change	TBD		Stefan Löhr
Week 13	Back to the future: how will anthropogenic climate change impact the oceans	Revision for exam	Pt Hacking report	Stefan Löhr

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/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

- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
- Describe the deep and shallow circulation patterns of the ocean and what influences their configuration now and in the past.
- 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.
- Understand scientific methodology.
- 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.

Assessment tasks

- Practical participation
- ACC Report
- Port Hacking Report

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

- 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.
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- 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.
- Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

- Practical participation
- Port Hacking Report

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

- 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.

- 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.
- Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

- Practical participation
- Weekly iLearn Quizzes
- ACC Report
- Port Hacking Report

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

- 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.
- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
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- Describe the main changes in global climate in the Cenozoic

Assessment tasks

- Practical participation
- Weekly iLearn Quizzes
- ACC Report
- Port Hacking Report
- 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

- 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.
- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
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- Understand scientific methodology.
- 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.

Assessment tasks

- Practical participation
- ACC Report

- Port Hacking Report
- 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

- 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.
- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
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- 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.
- Demonstrate foundational learning skills including active engagement in their learning process.

Assessment tasks

- Practical participation
- ACC Report
- Port Hacking Report

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

- 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.
- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
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- Describe the main changes in global climate in the Cenozoic

Assessment tasks

- Practical participation
- ACC Report
- Port Hacking Report
- 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

- 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.

- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
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- Describe the main changes in global climate in the Cenozoic

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

- 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.
- Understand how ocean basins have changed their configuration through time due to the operation of plate tectonics.
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