GEOS2115/2915: Oceans, Coasts & Climate Change

Credit points:
6

Teachers: Prof Dietmar Müller, A/Prof Ana Vila Concejo, A/Prof Jody Webster

Session:
Semester 1

Classes: 26 one-hour lectures, 11 two hour practical classes.

Assessment: Lab reports and assignments (60%), one 2-hour exam (40%)

Unit Description

This unit of study introduces core concepts about how the formation of ocean basins and their influence on climate govern the development of coasts and continental margins. These concepts provide a framework for understanding the geographic variation of coasts, continental shelves and sediment accumulations in the deep ocean. Ocean-basin evolution is explained in terms of movements within the Earth’s interior and how these movements determine the geometry of ocean basins, and their alpine counterparts, which interact with the global circulation of the ocean and atmosphere. This interaction plays a key role in marine sedimentation and controls the environmental conditions responsible for the development of coral reefs and other ecosystems. The Unit of Study systematically outlines how these factors have played out to produce, by gradual change, the coasts and continental margins we see today, as well as the less familiar deposits hidden beneath the sea and coastal lands. The Unit thereby outlines how knowledge of responses to climate change in the past allow us to predict environmental responses to accelerated climate change occurring now and in the future due to the industrial greenhouse effect, and places these responses into perspective against the geological record. Overall, the Unit aims to provide familiarity with fundamental phenomena central to the study of marine geoscience and environmental impacts, introduced through process-oriented explanations. The Unit of Study is structured around GIS-based practical sessions and problem-based project work, for which lectures provide the theoretical background.

Textbooks - Online reading material provided via Fisher Library and the University LMS and Essentials of Oceanography, Alan P. Trujillo and Harold V. Thurman, 608 p., Prentice Hall.

Unit of Study Aims and Objectives:

The Unit is designed to provide an introduction to key aspects of marine geoscience and the methods used to investigate the seafloor and the materials of which it is composed. Several aspects of marine environment will be examined in detail. These include: a) the formation of the ocean basins and marine sediments; b) the characteristic sediments, processes and structure of the continental margins; c) reconstruction of past global climatic conditions and coastal environments from deposits of seafloor sediments; and d) how plate tectonics and ocean basin geometry influence the distribution of oceanic currents and how interactions between these phenomena influence global climate and global climate change at a variety of timescales.

Oceans, Coasts & Climate  GEOS2115 Unit of Study
One of the key aims of the Unit of Study is to emphasize unification of theory in presenting principles.

The Unit provides background relevant to four Senior units in marine geoscience (Coastal Environments & Processes, GIS in Coastal management, Geophysical Methods, Sedimentary & Environmental Geology).

**Learning Outcomes:**

At the end of this course students will be able to:

- Describe the characteristics of the ocean basins and their adjacent continental margins.
- Differentiate between typical rock associations from different marine settings.
- Synthesize sedimentary core data in a paleo-oceanographic context.
- Understand the basic components of the Earth’s climate system and implications of future model projections.
- Describe and understand the long-term cycle governing the growth and destruction of ocean basins.
- Distinguish between different plate boundary types and the tectonically-driven processes they generate.
- Understand the competing influences on sea level change at different time-scales.
- Classify and characterize different kinds of plate boundaries.
- Use GIS-type applications.
Assessment, Policies and Administrative Information

All students are required to read and understand the University's policies that are relevant to their program of study. These policies are provided on the Academic Board's webpage and include the Assessment Policy and Assessment Procedures. In particular students are advised to reacquaint themselves regularly with the policies and procedures that apply to assessment, plagiarism, and special consideration as well as the student code of conduct.

Assessment Tasks – Weighting and Due Dates

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Due Date (Provisional)</th>
<th>Weighting</th>
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</thead>
<tbody>
<tr>
<td>Coastal Exercises</td>
<td>Week 3</td>
<td>0.15</td>
</tr>
<tr>
<td>Antarctic Circumpolar Current Tectonics, Oceans, and Climate Essay</td>
<td>Weeks 4-6</td>
<td>0.12</td>
</tr>
<tr>
<td>Tectonics Quiz</td>
<td>Week 10</td>
<td>0.05</td>
</tr>
<tr>
<td>Atlantis Practical Report</td>
<td>Week 10</td>
<td>0.15</td>
</tr>
<tr>
<td>Reef logging and sea level change modeling</td>
<td>Weeks 11-13</td>
<td>0.15</td>
</tr>
<tr>
<td>Final Exam</td>
<td>See exam schedule</td>
<td>0.4</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>1</strong></td>
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</tbody>
</table>

Particular points relevant to the assessment of this unit of study

1. All assessable course work is to be submitted via USYD eLearning website for the Unit (unless otherwise stated).

   Late work will incur a **105%** penalty for every 24 hours after the submission deadline. It may be that special circumstances arise which may allow you to submit work after the submission deadlines. This will require that you obtain and submit the appropriate special-consideration form (http://sydney.edu.au/science/cstudent/ug/forms.shtml#special_permission) and submit it with appropriate supporting evidence with the piece of assessed work. The most common of these special circumstances is short-term illness which will require that a medical practitioner complete the professional practitioner’s certificate which is included in the Faculty of Science special consideration form. This material should be submitted firstly at the Faculty Office within five days of your return to the campus. (Note that is usually a good idea to inform the Unit of Study coordinator prior to the submission date if you are affected in this way).

2. Marks for the assessment tasks and grades awarded for the unit **will** conform to the University's assessment policies and procedures. A recent change to this policy requires that marks be awarded relative to a set of standards that describe a graduated hierarchy of the levels of achievement. The marks assigned to the various grades pass, credit, distinction, high distinction remain as they were prior to the change in the policy. The grades* are described below along with the criteria that will be used to identify the various levels of achievement. Note the acknowledgement of the several sources (e.g, SLS 2014) from which these grade descriptors were modified; given below, see section on plagiarism).

   In reference to these grades students should note that:

*Oceans, Coasts & Climate*  
*GEOS2115 Unit of Study*
a) all assessment tasks will normally contain an at least one item that will enable the full range of achievement levels to be demonstrated, although students should note that some, and perhaps the majority of the individual items, activities or questions presented in each of the assessment tasks will be intended to establish that students have achieved a pass or credit level of achievement.

b) that distinctions and high distinctions would normally only be awarded to students who have performed at a high level in all assessment tasks – in this context ‘performed at a high level in all assessment tasks’ means that distinction students will have achieved a credit minimum in all individual items of assessed work and will have achieved a distinction level of achievement (or better) for the majority of the assessment tasks. High distinction students will have achieved a distinction minimum in all individual items of assessed work and will have achieved a high distinction level of achievement for the majority of the assessment tasks.
Fail (Below 50%)

Work may fail for any or all of the following criteria

- No answer or response is provided
- Does not address or otherwise answer the question
- Contains numerous minor errors or presents a significant misconception
- Presents irrelevant material
- No evidence of research or analysis
- Presents a significantly inaccurate or flawed argument
- The answer is incomprehensible or difficult to understand due to significant problems with grammar, expression or structure

Pass (Between 50% and 64%)

Work awarded a passing grade will usually achieve the following minimum standards or present the described characteristics

- An appropriate but superficial answer or response is provided
- Presents relevant material in a superficial manner or in a simplistic descriptive style
- Correctly identifies key point or points (facts) but does not develop an appropriate explanation or argument if this is required
- Contains some minor errors or presents minor inaccuracies and misconceptions
- Little or no evidence of in-depth analysis or deep understanding of the concept
- Answers can be understood but may be poorly worded or somewhat flawed due to poor grammar, expression or structure

Credit (Between 65% and 74%)

Work awarded a credit grade will usually achieve the following minimum standards or present the described characteristics

- An appropriate, accurate and reasonable detailed answer or response is provided
- Appropriate key point or points (facts) and/or concepts clearly presented without significant errors or misconceptions
- Presents relevant material concisely with facts clearly integrated into the explanation
- Accurate quotation and/or source identification when appropriate.
- Evidence of some independent research or critical analysis of concept or problem
- Answers are easily understood with both clear expression and structure if appropriate

Distinction (Between 75% and 84%)

Work awarded a distinction grade will usually achieve the following minimum standards or present the described characteristics

- Accurately answers the question in a convincing, confident manner
- Presents relevant material accurately in a concise manner or with the facts well-integrated into a comprehensive explanation or argument
- Accurate quotation and/or source identification when appropriate.
- Evidence of extensive independent research
- Evidence of extensive critical analysis of concept, and/or innovative perspective on the topic, and/or deep understanding of problem
- Answers are well written, with clear structure and cogent expression

High Distinction (Above 85%)

Work awarded a distinction grade will usually achieve the following minimum standards or present the described characteristics

- Accurately answers the question in an impressive, compelling, or highly persuasive manner
- Presents relevant material accurately in a thoroughly convincing or forceful manner or with the facts well-integrated into an extended and comprehensive explanation or argument
- Accurate quotation and/or source identification when appropriate.
- Evidence of exhaustive independent research
- Evidence of extensive critical analysis of concept, and/or innovative perspective on the topic, and/or deep understanding of problem
- Answers demonstrate striking originality, an innovative approach, or impressive analytical skill
- Answers are exceptionally well written, with excellent structure expression
- Is otherwise exceptional in some way
Policies:

Academic dishonesty is discussed in the University’s Policy for Academic Honesty in Coursework and you are responsible for upholding all components of the policy. There are some components that need clarification for this unit, due to the nature of the written assignments. Specifically:

Section 3. Academic dishonesty

(1) The University procedures relating to academic dishonesty must be invoked where an examiner considers that the student has presented another person’s ideas, findings or written work as his or her own by copying or reproducing them without due acknowledgment of the source and with the intent to deceive the examiner.

By way of an example of how such acknowledgment should be indicated, the grade descriptors on the previous page are modified from a number of University sources including the University of Sydney Faculty of Science, Academic Board, Sydney Law School and Sydney Business School websites http://sydney.edu.au and in particular Unit of Study Outlines e.g. LAWS5000 Foundations of Law, Semester One, 2014, Unit of Study Outline which would be properly cited using the standard Harvard format

Sydney Law School 2014 (SLS 2014): LAWS5000 Foundations of Law, Semester One, 2014, Unit of Study


(2) It is reasonable to consider that the student has intended to deceive the examiner where: (a) substantial portions of the work submitted for assessment were copied from another student, or from the work of a former student, in a manner which clearly exceeds the boundaries of legitimate co-operation or groupwork.

It is acceptable, and encouraged, to work with other students. Sometimes we learn things best from our peers. However, it is not acceptable to (1) submit work that is identical to that of another student who is currently or was previously enrolled in this unit of study and/or (2) use previously marked exercises to create your work. While the intellectual ideas that underlie your answers may be garnered as part of a group, you must independently create your own tables, graphs, and wording when answering questions for submitted work. You are advised that if you utilise old assignments from students who are enrolled in this unit or have previously taken this unit for assistance in their own work you will be “submitting another student’s work”. For the purposes of this course, students who use old assignments and the students who provide them violate the policy and will be disciplined to the full extent of the policy, which can include expulsion from the University. All other components of the policy are applicable as stated in the Policy on Academic Honesty in Coursework.
Unit of Study Program:

The program consists of 265 lectures, 9-11 practical sessions (2 hours each) and 3-2 Workshops (1 hour each). Some of the practicals and workshops for GEOS2115 and GEOS2915 are different, but the lectures are the same.

Lectures (Monday and Wednesday):
- Monday 1-2 pm Carslaw LT 173
- Wednesday 1-2 pm Carslaw LT 173

Practicals (Monday and Wednesday) Weeks 2 to 12:
- Monday 2-4 pm Madsen PC Lab 301 and Madsen Access Lab 300
- Tuesday 9-11 am Madsen PC Lab 301
- Wednesday 2-4 pm Madsen PC Lab 301

Workshops (Wednesday) Week 12-13:
- Wednesday 12-1 pm Carslaw LT 175

ANZAC Day Arrangements

For those allocated to the Tuesday practical, special arrangements will be made to hold replacement practicals during the week of ANZAC Day (Week 7). You will receive an email at the beginning of April, where you will nominate an alternative time to attend the practical. This will be an important practical, as this will be introducing the GPlates software.

Unit of Study Reading:

References and reading material will be provided via the course web site.

Comment [AT1]: Nikki booked the lectures in the same theatre this year.
### Staff Contact Information

<table>
<thead>
<tr>
<th>Lecturer</th>
<th>Location</th>
<th>Phone</th>
<th>E-mail</th>
<th>Office hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof Dietmar Müller</td>
<td>Room 406, Madsen Building (F09)</td>
<td>9036 6533</td>
<td><a href="mailto:dietmar.muller@sydney.edu.au">dietmar.muller@sydney.edu.au</a></td>
<td>Wednesdays 2 pm or by arrangement</td>
</tr>
<tr>
<td>(UoS coordinator)</td>
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<tr>
<td>A/Prof Ana Vila Concejo</td>
<td>Room 421, Madsen Building (F09)</td>
<td>9351 5190</td>
<td><a href="mailto:ana.vilaconcejo@sydney.edu.au">ana.vilaconcejo@sydney.edu.au</a></td>
<td>By arrangement</td>
</tr>
<tr>
<td>A/Prof Jody Webster</td>
<td>Room 440, Madsen Building (F09)</td>
<td>9036 6538</td>
<td><a href="mailto:jody.webster@sydney.edu.au">jody.webster@sydney.edu.au</a></td>
<td>Wednesdays 1 pm or by arrangement</td>
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<table>
<thead>
<tr>
<th>Demonstrator</th>
<th>Location</th>
<th>Phone</th>
<th>E-mail</th>
<th>Office hours</th>
</tr>
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<tbody>
<tr>
<td>Mandi Thran</td>
<td>Room 224, Madsen Building (F09)</td>
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<td><a href="mailto:amanda.thran@sydney.edu.au">amanda.thran@sydney.edu.au</a></td>
<td>Wednesdays 2 pm or by arrangement</td>
</tr>
<tr>
<td>(lead demonstrator)</td>
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<tr>
<td>Nicky Wright</td>
<td>Room 224, Madsen Building (F09)</td>
<td>--</td>
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<td>By arrangement</td>
</tr>
<tr>
<td>Thomas Fellowes</td>
<td>Room 446, Madsen Building (F09)</td>
<td>--</td>
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<td>By arrangement</td>
</tr>
<tr>
<td>Kelsey Sanborn</td>
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<td>--</td>
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<td>By arrangement</td>
</tr>
<tr>
<td>Madi Patterson</td>
<td>Room 446, Madsen Building (F09)</td>
<td>--</td>
<td><a href="mailto:madhavi.patterson@sydney.edu.au">madhavi.patterson@sydney.edu.au</a></td>
<td>By arrangement</td>
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## Program

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecturer</th>
<th>Lectures</th>
<th>Practicals and Workshops</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ana</td>
<td>Introduction: Ocean circulation, processes and their relationship to global climate</td>
<td>No practical</td>
</tr>
<tr>
<td>2</td>
<td>Ana</td>
<td>Global wave climate and tidal regimes Coastal morphologies and processes: Barriers (Waves)</td>
<td>Eastern Australian current and climate/coastal effects (Part 1)</td>
</tr>
<tr>
<td>3</td>
<td>Ana</td>
<td>Estuaries (Tides) Deltas (Rivers)</td>
<td>Eastern Australian current and climate/coastal effects (Part 2)</td>
</tr>
<tr>
<td>4</td>
<td>Dietmar</td>
<td>Continental Margins and Ocean sediments: Introduction Biogenic sediments</td>
<td>The interplay between tectonics, oceans and climate – GeoMapApp</td>
</tr>
<tr>
<td>5</td>
<td>Dietmar</td>
<td>Ophiolites Submarine fans</td>
<td>Tectonics, Oceans and Climate: The interplay between tectonics, oceans and climate – GeoMapApp</td>
</tr>
<tr>
<td>6</td>
<td>Dietmar</td>
<td>Remote sensing of the sea Orbital cycles</td>
<td>Tectonics, Oceans and Climate: Introduction to Plate Tectonics – quiz preparation</td>
</tr>
<tr>
<td>7</td>
<td>Dietmar (substituting for Dietmar)</td>
<td>Plate tectonics: how it works Plate tectonic boundaries</td>
<td>GIS practical 1 – Introduction to GPlates and Atlantis Practical</td>
</tr>
<tr>
<td>8</td>
<td>Dietmar</td>
<td>Ocean basin formation through plate tectonics Hot spots and mantle plumes</td>
<td>GIS practical 2 – Atlantis practical</td>
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<tr>
<td>9</td>
<td>Dietmar</td>
<td>Plate tectonic reconstructions Dynamic topography and paleogeography</td>
<td>GIS practical 3 – Atlantis practical</td>
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<tr>
<td>10</td>
<td>Dietmar</td>
<td>Sea level and coastlines since the Cretaceous Tectonics and climate</td>
<td>GIS practical 4 – Atlantis practical</td>
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<tr>
<td>11</td>
<td>Jody</td>
<td>GCM’s, past and future projections &amp; global climate change impacts</td>
<td>Reef logging and sea level change</td>
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<tr>
<td>12</td>
<td>Jody</td>
<td>GCM’s, past and future projections &amp; global climate change impacts</td>
<td>Reef logging and sea level change</td>
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<tr>
<td>13</td>
<td>Jody</td>
<td>Controls on reef growth and sedimentation</td>
<td>Workshop and independent work on reef logging</td>
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An Appendix – Additional Material on University Policies

The University’s Policies (academic honesty, assessment, disability, special consideration, etc.) apply to this unit of study in the same way that they apply to all units of study presented at the University of Sydney. Students are advised to acquaint themselves or reacquaint themselves with these policies by viewing and reading the current versions of the appropriate policies online at http://sydney.edu.au/policies/. The folder ‘Studying at Sydney’ contains the policies that are relevant to most student matters as well as the Student Code of Conduct. These documents are revised and updated on a regular basis.

The following material provides practical guidance on what to do in the case of common difficulties and issues that students may encounter and have to deal with during semester. The list is not exhaustive. If you do experience a particular difficulty or an issue of concern does arise during the semester then the first step is to raise it with the lecturing staff in class or by email.

Academic Policies relevant to student assessment, progression and coursework:

The Faculty process is to use standards based assessment for units where grades are returned and criteria based assessment for Pass / Fail only units. Special consideration for illness or misadventure may be considered when an assessment component is severely affected. Details of the information that is required to be submitted along with the appropriate procedures and forms is available at:


Start by going to the Faculty of Science Webpage, and downloading the ‘Special Consideration’ pack at the link above.

Special Arrangements for Examination and Assessment.

In exceptional circumstances alternate arrangements for exams or assessment can be made. However concessions for outside work arrangements, holidays and travel, sporting and entertainment events will not normally be given. The policy, guidelines and application form including examples of circumstances under which you might be awarded a special arrangement for an examination or assessment task can be found at:


Student Appeals against Academic Decisions.

Students have the right to appeal any academic decision made by a school or the faculty. The appeal must follow the appropriate procedure so that a fair hearing is obtained. The formal application form can be obtained at:

Some Guidance On Matters Arising From Short Illnesses
Or Non-attendance at Class

Attendance Requirements

- Students must attend a minimum of 80% of timetabled lectures/tutes/pracs etc.
- Students who fail to attend 20% or more of the required classes without permission of the Head of School or Dean of the Faculty may receive the grade of Absent Fail (AF).

Assignment Submission / Late Assignments

- Students who present evidence of an attested impairment, via the Science Faculty office using the Faculty approved forms, in the period before an assignment is due can request and will be granted an extension equal to the length of the attested impairment i.e., three days impaired = three day extension.
- Requests for extensions submitted after the due date for the submission of the piece of work will not be considered unless the period of impairment coincides with the date for submission.
- Unattested late work may result in a penalty being applied. This penalty will be 5% of the maximum mark for each 24-hour period (i.e. working-day) the work is late.

Missed Practicals, Quizzes,

- Students who are impaired on the day of a practical and present appropriate evidence that attests to the impairment, via the Science Faculty office using the Faculty approved forms, will be allowed to complete the missed practical work in their own time and submit it before their next timetabled practical session.
- Students should attend examinations if they are able to do so, even if their performance might be slightly impaired by some cause at the time of the examination; for example a student impaired by trivial brief ill-health which would not usually prevent attendance at class or the student's part-time job should sit for the exam. In this case students should apply for Special Consideration via the Science Faculty office using the Faculty approved forms and if special consideration is granted their final results may be adjusted.

Jury Duty, Religious Events, Sporting Commitments

- Jury duty, military service, religious events, and sporting events are not covered by the University's Policy on special consideration. Conflicts arising from commitments of this nature with an individual student’s attendance requirements will be dealt with on a case by case basis. Applications of this nature should be made by writing directly to the Head, School of Geosciences, Edgeworth David Building (F09).
Key Principles of the Student Code of Conduct

- Commitment to high academic standards, intellectual rigour and a high quality education;
- Commitment to intellectual freedom and social responsibility;
- Recognition of the importance of ideas and the pursuit of critical and open inquiry;
- Commitment to the exercise of tolerance, honesty and respect as the hallmarks of relationships throughout the University community; and

Commitment to high standards of ethical behavior, including in the preparation, conduct, submission and publication of academic work, and during all forms of assessment, including formal examinations and informal tests

PLAGIARISM

Plagiarism means the dishonest use of another's material. It is serious misconduct to plagiarise. The University’s rules on plagiarism are outlined at:

http://sydney.edu.au/policies/

The rules make a distinction between:

- **Negligent plagiarism** (defined as: innocently, recklessly or carelessly presenting another person's work as one's own Work without Acknowledgement of the Source).

- **Dishonest plagiarism** (defined as: knowingly presenting another person's Work as one's own work without Acknowledgement of the Source)

In cases of negligent plagiarism, it is usually the case that students will be required to resubmit their work. In cases of dishonest plagiarism, the School of Geosciences reserves the right to impose the full degree of sanctions on students, which includes automatic failure for the unit of study.

To avoid plagiarizing, you should directly quote the source of material, or paraphrase it in your own words.

When submitting documents for GEOS2115 (e.g., Assignments) you will be required to attest to the originality of your work. Relevant documents will be available through the eLearning site and MUST accompany all submitted materials. These documents aim to focus your attention on the issue of plagiarism. If you any questions about what constitutes plagiarism ask your tutor, the lead tutor or one of the UoS lecturers.

Relevant Forms – Special Consideration, Special Permission etc.

Are available on the Faculty policies website at


Oceans, Coasts & Climate

GEOS2115 Unit of Study