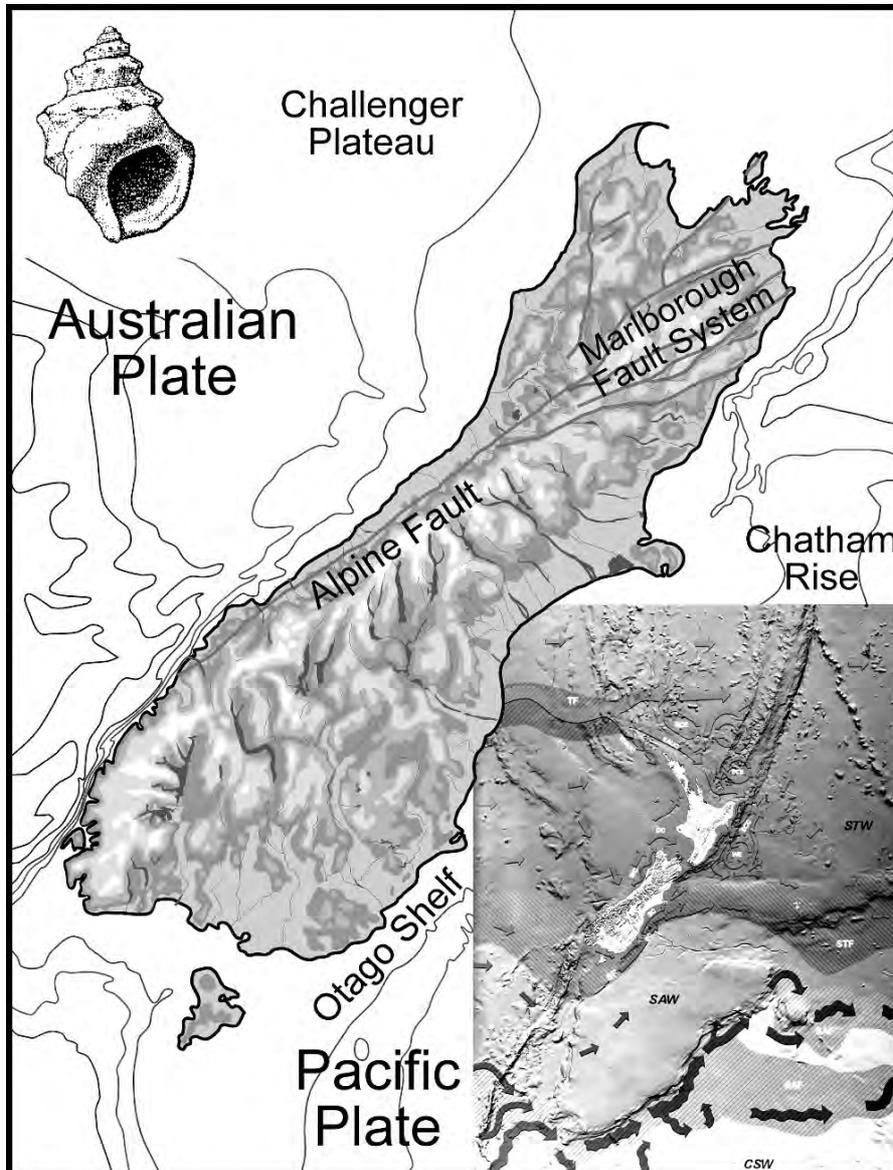




Departments of Geology and Marine Science



EAOS111 Laboratory Manual Semester 1, 2020

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INTRODUCTION

Welcome to Earth and Ocean Science (EAOS111): your introduction to planet Earth, inside and out. In this multidisciplinary paper you will gain an understanding of the origin of our universe, oceans, mountains, climate change, and mass extinctions: it's all connected.

EAOS111 commences with an overview of our place on planet Earth, the solar system, and deep space. It then covers a vast number of topics by way of the unifying theme of Earth "spheres": Atmosphere, Geosphere, Hydrosphere, Cryosphere, and Biosphere. Topics such as climate and atmospheric/oceanic circulation, plate tectonics and associated hazards, weathering and erosion/deposition, past and present life, glaciers and ice sheets, and the impact of humans on the planet are covered. You will finish the course with a holistic understanding of planet Earth, and a good feel for topics worth pursuing at more advanced levels.

COURSE LEARNING OUTCOMES

- Understand and describe the processes that shape Earth's surface, interior and oceans
- Draw connections between the various components of the Earth system
- Apply concepts introduced in lectures and laboratories to field settings
- Understand the concept of geologic time in relation to physical and biological systems
- Understand the physical and biological controls on the distribution of Earth materials and make predictions based on this understanding

GEOLOGY TEACHING STAFF

CRR Dr Christina Riesselman

JMP Dr Michael Palin

MS Professor Mark Stirling (EAOS111 coordinator)

Mark.stirling@otago.ac.nz

CEM Dr Candace Martin

CO Dr Christian Ohneiser

ARG Associate Professor Andrew Gorman (undergrad course advisor)

Andrew.gorman@otago.ac.nz

REF Professor R. Ewan Fordyce

SB Dr Sophie Briggs (Teaching Fellow)

Sophie.briggs@otago.ac.nz

MARINE SCIENCE TEACHING STAFF

BA Dr Bridie Allan

CL Dr Cliff Law

AS Professor Abby Smith

RS Dr Rob Smith

JM Dr Jean McKinnon

CRR Dr Christina Riesselman

Geology Museum:

Mineral, rock and fossil specimens are on display in the Geology Museum at the south end of the Geology building. The Museum is open to students and the public from 9.00 am - until 5.30 pm during weekdays.

More information about the EAOS111 and other Geology and Marine Science courses is available on the Geology Department and Marine Science Department websites.

Geology: <http://www.otago.ac.nz/Geology/>

Marine Science: <http://www.otago.ac.nz/marinescience/>

OFFICE HOURS

Teaching Fellow Sophie Briggs holds regular office hours during which she is available to answer any questions you have about the course. Drop by during office hours to chat about lecture/lab content, assessments, or the course in general:

Sophie Briggs: Room Gn4, Geology

Monday 11:00-11:50am

Thursday 10:00-10:50am

TEXTBOOK

The Blue Planet: An Introduction to Earth System Science 3rd Edition by Brian J. Skinner & Barbara W. Murck (2011), J. Wiley & Sons Inc.
Available from the University Bookshop.

ADDITIONAL READING

Seismicity of the Earth 1900-2010: Eastern Margin of the Australia Plate, USGS Poster (2011). <https://pubs.usgs.gov/of/2010/1083/i/>

A Continent on the Move: New Zealand Geoscience into the 21st Century. Graham, I. 2008 (Chief Editor). Geological Society of New Zealand and GNS Science, Wellington. 388pp. (Science Library)

Oceanography: an invitation to Marine Science. Garrison, T. 2007. Brooks & cole, 582 pp. (Science Library)

Photographic guide to Rocks and Minerals of New Zealand. Mortimer, N. et al. 2011, GNS Science Publications (Science Library)

READINGS

All readings should be completed before the lecture for which they are assigned. Some readings will be discussed in class.

STUDY HELP

The HEDC Student Learning Development (SLD) at Otago has lots of great resources to help you with your studies. If they can't answer your question, they'll know who can! Visit them on the ground floor of the Information Services Building (central library building) in the southwest corner (near where you pick up your student ID card), or browse their offerings online at

<https://www.otago.ac.nz/hedc/students/index.html>.

In addition:

- If you live in a hall of residence, inquire with your RA or Master to see if your college offers a tutorial for EAOS111.
- If you do not live in a hall of residence, you may be eligible to participate in the SLC's EAOS111 Peer Assisted Study Sessions (PASS). Learn more about PASS at <https://www.otago.ac.nz/hedc/students/pass/index.html>
- Peer Assisted Numeracy (PAN) sessions are fun, weekly, 50 minute interactive numeracy sessions facilitated by expertly trained students to help develop your knowledge and confidence with the numeracy required to be successful in first year quantitative papers. Register at <https://www.otago.ac.nz/hedc/students/pass/index.html>

New to Otago? If so, the University has heaps of resources just for you. Check them out at <https://www.otago.ac.nz/first-year-students/study/>

RESOURCES

Lab Book:

Your EAOS111 lab book is yours to keep. Write your name on it and keep it up-to-date. You can recycle your binder by returning it to the Geology Admin Office.

Handouts:

You will not receive paper handouts for EAOS111. Lecturers who provide handouts will endeavour to upload PDFs to Blackboard before lectures so you can bring in your preferred format (paper, digital, etc). These will remain available on Blackboard for the entire semester, allowing you to access handouts at higher resolution and in colour. **Some of your lecturers will not provide handouts and many draw diagrams on the whiteboard: always bring a pen and paper to class so you can include sketches in your notes.**

Blackboard:

Blackboard (<https://blackboard.otago.ac.nz/>) will be used extensively for this paper:

- Announcements will be posted on Blackboard and/or sent to your **student email address** via the Blackboard email facility.
- You can easily contact individual instructors via email.
- Some internal assessments (Blackboard Exit Tests) will be conducted on Blackboard.
- Internal assessment marks will be uploaded as they are completed during the semester.
- Handouts (see below) and Otago Capture recordings for most lectures can be downloaded from Blackboard.
- All of the laboratory exercises printed in this book are also available via Blackboard. Some of them are augmented by colour diagrams. The laboratory exercises are in pdf format and must be downloaded from the Blackboard server to the computer you are using before they can be viewed. If you cannot view the files, download and install the free Adobe Acrobat Reader from <http://www.adobe.com/>.

FIELD TRIPS

Applying concepts introduced in lectures and laboratories to field settings is one of the core learning outcomes of EAOS111. The course provides lots of opportunities to get into the field:

- Two day-long weekend field trips to learn about the geology of North Otago and the Taieri River (sign up the week before each trip).
- A short cruise on the University's research vessel *Polaris II* (most during lab time, with additional morning and Saturday sections) to learn about marine geology and geophysics in Otago Harbour and around Tairoa Head (sign up the week before the cruise)

Field trips are compulsory, and each trip is worth 5-6% of the final mark. Attendance on both weekend trips and satisfactory completion of the associated worksheets will earn you 11% toward the paper. Worksheets are handed in during lab and marked "Satisfactory" (100%) or "Unsatisfactory" (0%). In addition, the Final Exam includes questions related to the field trips.

ASSESSMENT

Your final grade for EAOS111 is made up of the following:

Assessment	Percentage	Due Date
Lab Assessments / BET's	24%	See Lab Introduction for details
North Otago Field trip assessment	6%	Due end of Lab 3 (March 9-13)
Taieri Field trip assessment	5%	Due end of Lab 5 (March 30-April 3)
In Class Exam	10%	Friday April 3 during lecture time
Final Exam	55%	During the mid year exam period

Essential Library skills quiz on Blackboard (worth an extra 2% of 'extra credit') due Friday 6 March @ 5:00pm

POLICIES

Health Declaration:

If you are unable to complete an internal assessment (including assessed labs and field trips) due to health or personal reasons, you must submit appropriate documentation explaining your situation. Documentation can be a medical certificate from your doctor, or a Health Declaration Form (go to www.otago.ac.nz/studenthealth/forms). Written documentation should be given to Course Coordinator Mark Stirling or Teaching Fellow Sophie Briggs as soon as possible.

Late Work Policy:

Work handed in late will incur the following deductions:

1 day late: -10%

2 days late: -20%

3 days late: -40%

4 days late: -50%

5 or more days late : -100%

Talk to Teaching Fellow Sophie Briggs about exceptions to this policy. The late penalty is applied to available marks, not given marks.

Academic Integrity:

Academic integrity means being honest in your studying and assessments. It is the basis for ethical decision-making and behaviour in an academic context. Academic integrity is informed by the values of honesty, trust, responsibility, fairness, respect and courage. Students are expected to be aware of, and act in accordance with, the University's Academic Integrity Policy.

Academic Misconduct, such as plagiarism or cheating, is a breach of Academic Integrity and is taken very seriously by the University. Types of misconduct include plagiarism, copying, unauthorised collaboration, taking unauthorised material into a test or exam, impersonation, and assisting someone else's misconduct. A more extensive list of the types of academic misconduct and associated processes and penalties is available in the University's Student Academic Misconduct Procedures.

It is your responsibility to be aware of and use acceptable academic practices when completing your assessments. To access the information in the Academic Integrity Policy and learn more, please visit the University's Academic Integrity website at www.otago.ac.nz/study/academicintegrity or ask at the Student Learning Centre or Library. If you have any questions, ask your lecturer.

STUDENT SUPPORT

Disabilities:

The Geology Department encourages students to seek support if they find they are having difficulty with their studies due to a disability, temporary or permanent impairments, injury or chronic illness or deafness.

Contact either:

Professor Mark Stirling
Room 1s12, first floor, Geology Department
phone 470-3539
email: mark.stirling@otago.ac.nz OR

Disability Information and Support
Phone: 479 8235
Email: disabilities@otago.ac.nz
Website: <http://www.otago.ac.nz/disabilities>

Kaiāwhina Network:

The Sciences Division and the wider University of Otago encourages Maori and Pasifika students to contact departmental and University Kaiāwhina Maori and Pacific Island Student Support officers

Contact:

Associate Professor Andrew Gorman
Geology Department Māori Support Contact Person
Room 2s03, second floor, Geology Department
phone 479-7516

Queer* Support

The University of Otago is dedicated to being the most inclusive campus in New Zealand, including a Queer* Friendly Staff Network and support through OUSA

Contact either:

Paulette Milnes
Geology Department, Queer Friendly Staff Network
Room 1n14, first floor, Geology Department
phone 479-7519 OR

OUSA
kelli-anne@ousa.org.nz OR
sage@ousa.org.nz

INTRODUCTION TO LABORATORY SESSIONS

There are 6 lab streams for EAOS111, each running for 2 hours and 50 minutes. You attend one lab stream per week. If you need to permanently change your lab stream you must talk with Teaching Fellow Sophie Briggs in person. For temporary lab stream changes, contact Sophie Briggs by email (sophie.briggs@otago.ac.nz) as soon as possible.

Monday	Tuesday	Wednesday	Thursday	Friday
	P2 9-11:50	P4 9-11:50		
P1 2 – 4:50	P3 2 – 4:50	P5 2 – 4:50	P6 2 – 4:50	

Missed Labs:

If you miss your lab due to health or other unavoidable reasons, it is important that you arrange to attend an alternative lab stream that week by contacting Sophie Briggs by email (sophie.briggs@otago.ac.nz) as soon as possible. When attending an alternative lab stream, see one of the instructors at the beginning of lab to let them know you are present. If you cannot attend a lab in the same week, you will need to provide documentation to the Teaching Fellow Sophie Briggs (see Health Declaration).

Lab Staff:

Labs are run by Teaching Fellow Sophie Briggs, and another 2 senior student Demonstrators who will be available to check your work and answer your questions in the lab. **Please ask us questions in the lab!** We are here for you.

Write the names of you lab staff in the space below:

What do you need to bring?

- Lab manual
- Ruler
- Pencil/eraser
- Calculator
- Coloured pencils

What happens in labs?

The activities in this lab manual make up the practical component of EAOS111. At the start of most labs there is a '**Pre-Lab**' section which is to be completed prior to your lab session. Pre-Labs are designed for you to become familiar with the context of the lab, learn the specific terminology associated with the content, and start forming hypotheses about the topic in question. You should also read through the entire lab before coming to your lab session.

Labs will be assessed either by submitting a completed portion of the lab before you leave lab, or via a Blackboard Exit Test (see below) generally due on the Monday following your lab session.

Learning Objectives:

Labs are designed for you to learn and practice the following skills:

- Read, visualise and interpret spatial representations of Earth science data
- Use a variety of methods to collect and analyse evidence
- Apply high school level math and science to real world settings
- Distinguish among evidence (data), models, assumptions, hypotheses, theories, interpretations, and predictions/recommendations
- Reason with incomplete information
- Evaluate multiple working hypotheses

A list of specific **learning objectives** is included at the start of each lab, which outline the main goals and the content that will be assessed.

Blackboard Exit Tests (BET's)

Some laboratory sessions will be assessed with an online Blackboard Exit Test (BET). BET's will consist of both multiple choice and short answer questions based on the content, activities, and discussions from your lab session. You will have approximately one week to complete the BET after your scheduled lab session.

Important information to know about BET's:

You can only receive a grade for a BET if you have attended the lab class. Make sure you have been checked off the roll during each lab, otherwise your mark will be removed from Blackboard when the BET closes.

You may use any computer with internet access to sit the BET on Blackboard. Tests are open book.

An announcement will be posted on Blackboard when the test becomes available to sit. After the deadline has passed, the test will no longer be available to sit.

You are encouraged to complete the BET as soon as possible after completing your laboratory session. Sit your BET well before the deadline so that if you have any computer issues you have time to alert the Teaching Fellow and resit the test before the deadline.

Lab Assessment

Lab	Assessment	Due	Grade
Lab 1 Discovering Zealandia / Te Riu a Māui	Map of Zealandia	End of lab (turn in to instructor)	3%
Lab 2 Deep Time and the Geologic Record	BET	Monday March 9	3%
Lab 3 Deep Time and the Geologic Record II	Geologic History + Field Trip Handout	End of lab (turn in to instructor)	6%
Lab 4 Plate Tectonics and Seismology	BET	Monday March 30	3%
Lab 5 Fluvial Processes and Landscape Evolution	Conceptual model drawing Experiment report Google Earth file	End of lab (turn in to instructor) Monday April 6	5%
Lab 6 Seafloor Sediments	BET	Monday April 20	3%
Lab 7 Diversity of Life in the Oceans	BET	Tuesday April 28	3%
Lab 8 Polaris Marine Geophysics	BET	Monday May 4	3%
Lab 9 Physical Oceanography	BET	Monday May 11	3%
Lab 10 and 11 Paleontology – Fossils and the history of life on Earth	Report	End of lab (turn in to instructor)	3%

Note: Excluding Labs 3 and 5 which are associated with field trips, your best 7 out of 8 remaining lab assessments will contribute towards your final grade for EAOS111. The 7 assessments worth 3% each will be scaled to a total internal assessment value of 24%.