# EARTH SCIENCES
## POSTGRADUATE HANDBOOK
## 2017

THE UNIVERSITY OF AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

SCIENCE

# Welcome to Earth Sciences

**Earth Sciences is an integrated programme that combines both geology and physical geography, enabling students to undertake advanced studies in earth materials and processes.**

The Earth Sciences programme is offered by the School of Environment, one of the largest schools of its type in Australasia. We offer a diverse range of courses for postgraduate study. The School of Environment houses a vibrant community of more than 50 instructors and researchers. The mix of different interests creates a rich training and research environment.

New Zealand and the South Pacific region offer an exciting environmental laboratory to examine a range of globally relevant research questions. Our location in Auckland provides a perfect gateway to access this unique natural laboratory.

Postgraduate study in Earth Sciences is an excellent step towards a number of careers, including professional geology and geoscience. It is also a strong foundation for postgraduate research.

The School of Environment provides students with the opportunity to undertake research across a range of topics alongside many of New Zealand's leading scientists.

We have an impressive array of field equipment and analytical facilities to support our research activities. The School of Environment has a talented group of postgraduate students from around the world who help to provide a stimulating and supportive environment for your studies.

I am confident that you will find studying Earth Sciences at the University of Auckland a satisfying and rewarding experience, and we look forward to working with you to meet your academic goals.

PROFESSOR PAUL KENCH
Head
School of Environment



*Cover page photo by Eddie Beetham*

# Postgraduate studies in Earth Sciences

As the world's population increases, more energy, food, water and minerals are required from the earth. Earth scientists play a vital role in finding and developing, whilst protecting, these resources.

Earth Scientists also play critical roles in protecting the communities we live in by predicting and monitoring hazards such as volcanic eruptions, earthquakes, landslides and floods. Earth Sciences is the study of a range of branches of science concerned with evaluating the interactions of the solid earth, with surface processes, climates and biota. Examination of the nature and consequences of natural and anthropogenic changes to the earth system also form important elements of modern Earth Sciences research.

The Earth Sciences programme encompasses the disciplines of geology, geophysics and physical geography – as well as the many sub-disciplines therein.

Students will have the opportunity to extend their understanding of the Earth Sciences to establish careers in areas such as resource management, hydrology, hydrogeology, coastal management, catchment management, water resources, mineral exploration, petroleum exploration, environmental geochemistry, engineering geology, natural hazards research, meteorology and geothermal energy.

A postgraduate degree in Earth Sciences provides the required foundation for developing a successful and rewarding career. These programmes of study are required for students who want to undertake advanced research such as a Doctor of Philosophy (PhD).

See **www.science.auckland.ac.nz/phd** for more information.

## Prizes, scholarships and awards

The following prizes can be awarded to postgraduate students in Earth Sciences:

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|---|
| Jeff Allen Memorial Prize |
| Bartrum Memorial Prize |
| Arnold Lillie Prize in Geology |
| Kenneth B Cumberland Prize in Geography |

The following awards are available and may be applicable to your thesis research:

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| School of Environment Māori Masters Thesis Scholarships |
| Geology Centennial Awards |
| Brothers Memorial Award |
| RJ Mowat Memorial Scholarship in Geology |
| Sir James Gunson Scholarship |

## Earth Sciences qualifications pathway

The Bachelor of Science (BSc(Hons)) and Postgraduate Diploma in Science (PGDipSci) are one-year programmes that include advanced coursework. In addition, the BSc(Hons) programme provides some opportunity for independent research.

Students who want to take one of these rogrammes need to have fulfilled the requirements for a BSc.

- **PGDipSci:** A major in Earth Sciences, Geography, or Geology with at least 45 points at Stage III in Earth Sciences or Geology courses, or GEOG 330-331, 334, 351, 360, or equivalent
- **BSc (Hons) in Earth Sciences**: A major in Earth Sciences, Geography, or Geology and at least 90 points at Stage III with at least 45 points at Stage

III in Earth Sciences or Geology courses, or GEOG 330-331, 334, 351, 360 or equivalent. A grade average of at least a B is required in your Stage III courses.

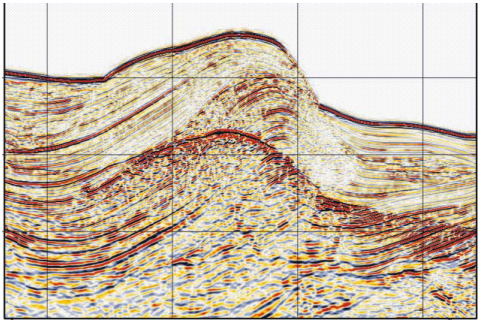
The Earth Sciences programme provides students with comprehensive knowledge across the related disciplines of geology, geography and geophysics, and allows students to focus on aspects of the Earth Sciences that are of particular interest to them.

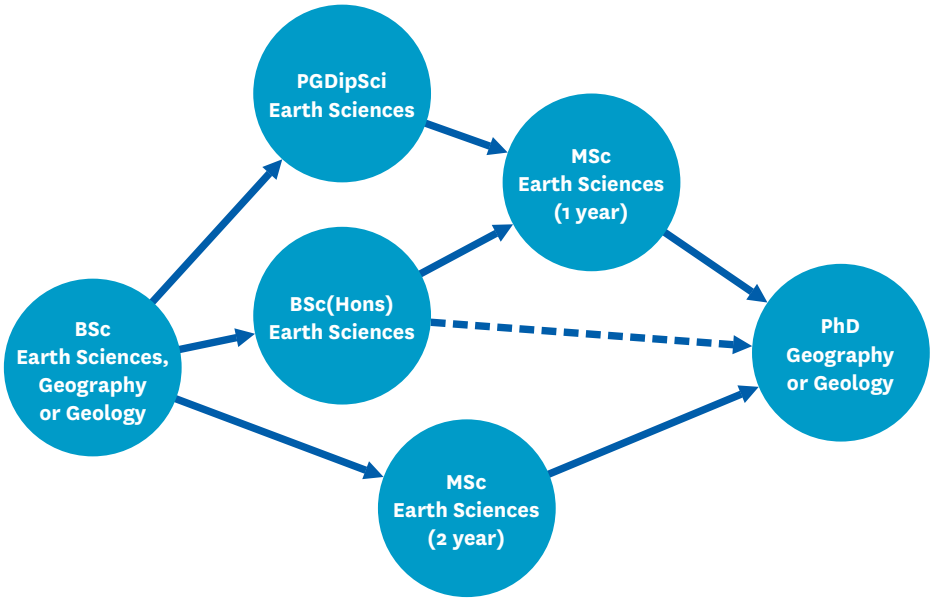
The Master of Science (MSc) is a research degree normally taken as a one year (full-time) programme following a PGDipSci or BSc(Hons), with admission requiring an average grade equivalent to at least B- over 90 points. Alternatively, it may be taken as a two-year (full-time) programme with a first year of taught courses followed by a thesis research project in the second year. The two-year programme is recommended to international students or domestic students seeking to develop a more directed research component to their postgraduate studies. Both the PGDipSci and MSc programmes may be taken part-time as well as full-time.

The degree of Doctor of Philosophy (PhD) is a 3-4 year research degree that may be taken after an MSc, or in some cases following BSc(Hons).

## Geophysics

The University of Auckland offers Geophysics programmes at both undergraduate and postgraduate level run jointly by the School of Environment and the Department of Physics. The Bachelor of Science (Honours) and Postgraduate Diploma in Science are one-year programmes offering courses and, for the BSc(Hons) a research project, for students who wish to combine geology, physics, mathematics, and computer science for the study of the earth's processes, resources and environment. Postgraduate students of Geophysics can choose from a broad range of courses and research projects spanning solid-earth geophysics, atmospheric geophysics, and physical oceanography.





# The BSc(Hons), PGDipSci and first year of two-year MSc (Earth Sciences) programmes

For BSc(Hons) at least four courses from the following (60 points) OR
for PGDipSci and MSc at least six courses from the following (90 points)

**EARTHSCI 703** · (15 points)
Hydrothermal Systems: Geothermal Energy and Ore Deposits

**EARTHSCI 705** · (15 points)
Geohazards

**EARTHSCI 707** · (15 points)
Special Topics in Earth Sciences

**EARTHSCI 713** · (15 points)
Tectonic Geomorphology

**EARTHSCI 714** · (15 points)
Earthquake Geology

**EARTHSCI 720** · (15 points)
Geochemistry of our World

**EARTHSCI 732** · (15 points)
Reconstructing Environmental Change

**EARTHSCI 752** · (15 points)
Understanding Volcanic Systems

**EARTHSCI 754** · (15 points)
Pure and Applied Sedimentology

**EARTHSCI 770** · (15 points)
Engineering Geological Mapping

**EARTHSCI 771** · (15 points)
Advanced Engineering Geology

**EARTHSCI 780** · (15 points)
Advanced Field Earth Sciences

**GEOG 730** · (15 points)
Climate Change: Past, Present and Future

**GEOG 745** · (15 points)
Applied Fluvial Geomorphology

**GEOG 746** · (15 points)
Applied Coastal Geomorphology

**GEOG 771** · (15 points)
Spatial Analysis and Geocomputation

**GEOG 772** · (15 points)
Advanced Raster Data Analysis

**GEOPHYS 760** · (15 points)
Seismic Data Analysis for Basin Exploration

**GEOPHYS 761** · (15 points)
Subsurface Imaging with Seismic and Radar Waves

**GEOPHYS 762** · (15 points)
Subsurface Characterization with Potential Field Methods

**GEOPHYS 763** · (15 points)
Advanced Applied Geophysics 3

For BSc(Hons) only (30 points)

**EARTHSCI 789** · (30 points)
BSc(Hons) Dissertation in Earth Sciences

For BSc(Hons), PGDipSci and two-year MSc, up to two courses (30 points) from 700-level

*Beach survey. Photo credit: Mark Dickson*

# Postgraduate research in Earth Sciences

Postgraduate research is highly valued and forms an important part of the BSc(Hons), MSc and PhD programmes. The following research themes identify the expertise of Earth Sciences at the University of Auckland.

## Hazards and Disasters

Research in this theme covers the breadth of hazards and disasters, from the underlying physical processes themselves and methods of assessment, through to people's vulnerabilities and capacities, and risk assessment and management.

## Climate and Society

Research deals with sensitivity of physical and human environments to climate. Themes are drawn from hydrology, agriculture, human health, eco-systems and energy, among others.

## Coasts and Rivers

The Coasts and Rivers group investigate the natural processes operating on the landscape, across a range of temporal and spatial scales, from catchment to cobble, from Holocene to a few days.

## Environmental Change

Researchers in this theme are involved in reconstructing and investigating long-term environmental change, using a range of proxies from tropical corals to Antarctic sediments.

## Volcanology, Petrology and Geochemistry

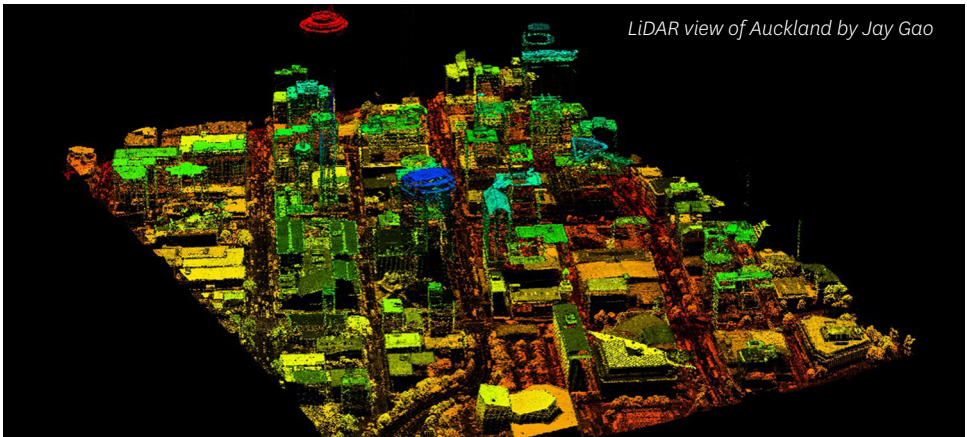
The volcanology, petrology and geochemistry group investigates magmatic and volcanologic problems on Earth and in the solar system. Research focuses in magmatic-volcanologic studies range from planetary differentiation to magma genesis and evolution to volcanic hazards. In addition to magmatic and volcanologic studies, geochemical investigations include paleoclimate, paleoceanography, environmental geochemistry and geochemical forensics.

## Natural Resources

Research in this theme incorporates many aspects of the Pacific region's diverse natural resources including hydrocarbons, geothermal energy, mineral deposits and aggregates. Projects integrate structural, sedimentological, geophysical and petrophysical studies and span the fundamental and applied earth sciences.

Suggested topics may be found on the School of Environment webpage.

See **www.env.auckland.ac.nz/research**



*LiDAR view of Auckland by Jay Gao*

# Earth Sciences academic staff

**Ludmila Adam | Senior Lecturer**
Geophysics, petrophysics, resources, hazards

**Paul Augustinus | Associate Professor**
Paleoclimatology, landscape evolution

**Joel Baker | Professor**
Geochemistry, environmental chemistry

**Gretel Boswijk | Senior Lecturer**
Dendrochronology, environmental change

**Melissa Bowen | Senior Lecturer**
Oceanography, estuarine dynamics

**Gary Brierley | Professor**
River science and management

**Martin Brook| Senior Lecturer**
Engineering geology and geophysics, environmental change

**Kathy Campbell | Professor**
Paleoecology, paleoenvironments, sedimentology

**Shane Cronin | Professor**
Volcanology, natural hazards

**Mark Dickson | Senior Lecturer**
Coastal processes, geomorphic models

**Jennifer Eccles | Lecturer**
Geophysics, tectonics

**Murray Ford | Senior Lecturer**
Coral reefs, coastal processes, remote sensing

**Anthony Fowler | Associate Professor**
Climate change, hydroclimatology

**Jay Gao | Associate Professor**
GIS, remote sensing, image analysis

**Paul Kench | Professor**
Coastal processes, coral reefs

**Jan Lindsay | Associate Professor**
Volcanology, volcanic hazards

**Ingo Pecher | Senior Lecturer**
Geophysics, fluid flow

**Nick Richards | Professional Teaching Fellow**
Slope stability, soil mechanics

**Michael Rowe | Senior Lecturer**
Igneous geochemistry

**Julie Rowland | Associate Professor**
Structure, tectonics, economic geology

**Phil Shane | Associate Professor**
Volcanic geology

**Lorna Strachan | Senior Lecturer**
Sedimentology

**Jon Tunnicliffe | Lecturer**
Fluvial geomorphology, near surface geophysics

**Earth Sciences Adviser**
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# Helpful information

| | |
|---|---|
| Academic dates | www.auckland.ac.nz/dates |
| Accommodation | www.accommodation.auckland.ac.nz |
| Apply for postgraduate study | www.auckland.ac.nz/applynow |
| Career Development and Employment Services | www.cdes.auckland.ac.nz |
| Childcare | www.auckland.ac.nz/childcare |
| Degree planning and course advice | www.science.auckland.ac.nz/student-centre |
| Disability Services | www.disability.auckland.ac.nz |
| How to enrol | www.auckland.ac.nz/enrolment |
| Information for postgraduate students | www.postgraduate.ac.nz |
| International students | www.international.auckland.ac.nz |
| Libraries and Learning Services | www.library.auckland.ac.nz |
| Māori and Pacific students | www.science.auckland.ac.nz/tuakana |
| Need help? | www.askauckland.ac.nz |
| Postgraduate Student's Association | www.pgsa.org.nz |
| Rainbow Science Network for LGBTI students | www.science.auckland.ac.nz/rainbowscience |
| Scholarships, awards and fees | www.scholarships.auckland.ac.nz |
| | www.auckland.ac.nz/fees |
| | www.auckland.ac.nz/studentloansandallowances |
| Support for Science students | www.science.auckland.ac.nz/support |

***Questions about Earth Sciences?***

***Email environment@auckland.ac.nz***

*Disclaimer*

*Although every reasonable effort is made to ensure accuracy, the information in this document is provided as a general guide only for students and is subject to alteration. All students enrolling at the University of Auckland must consult its official document, the University of Auckland Calendar, to ensure that they are aware of and comply with all regulations, requirements and policies.*

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

**NEW ZEALAND CITIZENS OR PERMANENT RESIDENTS**

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Email: postgradinfo@auckland.ac.nz
Web: www.postgraduate.ac.nz
**AskAuckland: www.askauckland.ac.nz**

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