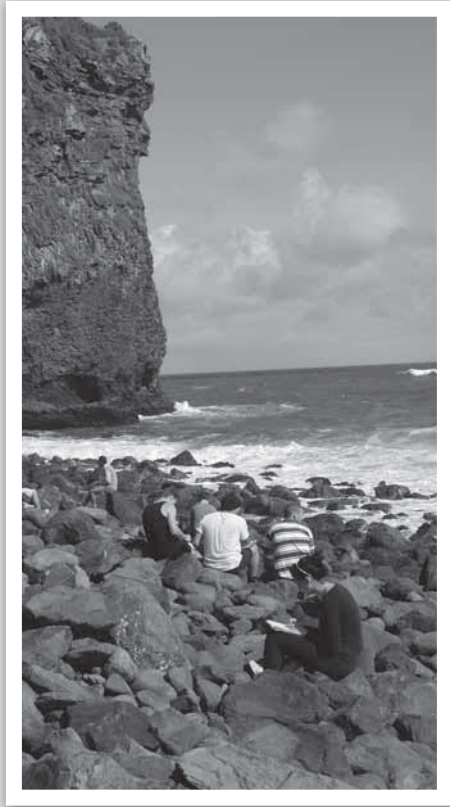


EARTH SCIENCES



CONTACT DETAILS

www.earth.waikato.ac.nz

Department of Earth & Ocean Sciences
University of Waikato
Private Bag 3105
Hamilton 3240
New Zealand

Departmental Administrator

Sydney Wright
Room: E2.07
Phone: +64 7 838 4024
Fax: +64 7 856 0115
Email: earth@waikato.ac.nz

Graduate Co-ordinator

Professor David Lowe
Room: DE1.02
Email: d.lowe@waikato.ac.nz

INTRODUCTION

An understanding of Earth sciences is vital if we are to sustainably manage the Earth's energy, water, mineral, soil and coastal resources. The Earth sciences are also the key to predicting and managing responses to natural hazards such as floods, earthquakes, tsunami, landslides and volcanic eruptions.

The Department of Earth & Ocean Sciences is located in a major growth area of New Zealand, within which a wide range of regional activities relate directly to all areas of the Earth sciences (eg resource exploration, extraction and management; water supply and treatment; agriculture, forestry, horticulture, urban development and land-use; geothermal and hydroelectric power).

We recognise the fundamental importance of the Earth's physical environment and resources – landforms, rocks, sediments, soils, water, oceans and climate – for New Zealand's development, and this philosophy is maintained as a central and integrating theme for both teaching and research in the Department. A major objective of the Department is to provide graduates with a range of educational and vocational skills of international standing in Earth sciences, which will permit them access to a broad range of professional opportunities, both within New Zealand and overseas.

While research activities in Earth sciences span a wide range of topics, the Department presently focuses on five major fields of interest, each supported by the primary research interests of several academic staff. These fields are:

- » Coastal marine processes and management
- » Climatic and environmental change: past, present and future
- » Sedimentary basins and resources
- » Sustainable management of land and water resources and hazards
- » Volcanic processes and hazards.

The Department of Earth & Ocean Sciences is committed to undertaking both pure and applied Earth sciences research. Applied research is often supported by research contracts with outside organisations. A feature of some of the research projects in the Department of Earth & Ocean Sciences is the development of close links with other geoscience research institutions, both in New Zealand and overseas.

ACADEMIC STAFF

Dr Dave Campbell – Chairperson

BSc(Hons), PhD *Otago*

Email: d.campbell@waikato.ac.nz

Research interests: Surface water hydrology and ecohydrology, especially applied to wetland environments; surface-atmosphere processes in hydrology and climatology, including evaporation, energy and water balance studies; ecosystem carbon exchange; and micrometeorological methods.

Dr Megan Balks

BSc(Hons) *Massey*, PhD *Waikato*, FNZSSS

Email: m.balks@waikato.ac.nz

Research interests: Pedology and applied soil physics. Specifically: effects of effluent irrigation on soil properties; Antarctic soils and permafrost; and environmental effects of human activities on soils in New Zealand and Antarctica.

Associate Professor Earl Bardsley

BSc(Hons), MSc, PhD *Otago*

Email: e.bardsley@waikato.ac.nz

Research activities: Applied hydrology including groundwater resource evaluation and optimal operation of water systems; quantitative analysis; stochastic flood theory; optimisation applications, catchment; modelling and hydrological and climatological trend analysis.

Associate Professor Roger Briggs

MSc, PhD *Auckland*, FAusIMM

Email: r.briggs@waikato.ac.nz

Research interests: Petrology, geochemistry and mineralogy of volcanic rocks in South Auckland/Waikato, Coromandel and Taupo volcanic zones; stratigraphy and petrology of ignimbrites; trace element and isotope geochemistry; and magmatic processes.

Dr Karin Bryan

BSc(Hons) *Toronto*, PhD *Dalhousie*

Email: k.bryan@waikato.ac.nz

Research interests: Coastal oceanography and sediment transport. In particular: wave properties; sediment-wave interactions; coastal storm hazards; surf-zone currents; turbulence induced by breaking waves; monitoring morphological change on beaches using sub-aerial video; physical controls on biological processes; and sedimentation patterns on the continental shelf and in estuaries.

Dr Willem de Lange

MSc, DPhil *Waikato*

Email: w.delange@waikato.ac.nz

Research interests: Oceanography, coastal processes and climatic hazards; tsunami and storm surge prediction and mitigation; wave-induced sediment transport on the continental shelf and within estuaries; dispersal of materials in the coastal zone; and numerical modelling.

Professor Peter Kamp

MSc, PhD *Waikato*

Email: p.kamp@waikato.ac.nz

Research interests: Sedimentary geology; sequence stratigraphy applied to NZ Cenozoic basins (Taranaki, Wanganui, East Coast); tectonic development of New Zealand; fission track thermochronology and U-Th/He thermochronometry applied to uplift/denudation history of New Zealand and thermal history of sedimentary basins.

Professor David J. Lowe

MSc, PhD *Waikato*, FRSNZ, FNZSSS

Email: d.lowe@waikato.ac.nz

Research interests: Tephrochronology (correlation of tephra deposits and their application to dating geological, ecological or archaeological deposits/events); pedology (origin, distribution and classification of soils); and Quaternary science (palaeoenvironmental reconstruction).

Dr Vicki Moon

MSc, PhD *Waikato*

Email: v.moon@waikato.ac.nz

Research interests: Geomechanics and engineering geology, particularly soft rocks; volcanic and pyroclastic materials; weathering; mass wasting of weathered and altered rocks; and soil erosion from development sites.

Dr Julia Mullarney

BA(Hons) *Cambridge*, MSc *Bristol*, PhD *ANU*

Email: juliam@waikato.ac.nz

Research interests: Physical oceanography, coastal ocean dynamics and geophysical fluid dynamics. In particular: exploring mixing and turbulence processes in coastal environments based on field observations; use of laboratory experiments to elucidate fundamental physical processes that cannot be resolved in large-scale models; and vegetation dynamics.

Professor Cam Nelson

BSc(Hons) *Wellington*, PhD *Auckland*, FRSNZ

Email: c.nelson@waikato.ac.nz

Research interests: Sedimentary and marine geology, especially the sedimentology and diagenesis of non-tropical shelf carbonate deposits, and the application of stable isotopes in paleoceanography and paleoclimatology. Basin analysis of Cenozoic sedimentary basins in North Island, New Zealand.

Dr Adrian Pittari

BSc(Hons) *Melbourne*, PhD *Monash*

Email: apittari@waikato.ac.nz

Research interests: Physical volcanology of modern and ancient volcanic deposits. In particular: caldera dynamics; explosive conduit-vent processes; lateral and vertical process variations in pyroclastic deposits; ignimbrite emplacement processes; kimberlite volcanology; and volcanoclastic deposits in sedimentary successions.

Associate Professor Louis Schipper

BSc, MSc, PhD *Waikato*, FNZSSS, FSSSA

Email: l.schipper@waikato.ac.nz

Research interests: Nitrogen cycling with a focus on denitrification and nitrogen storage in soil organic matter; soil quality and long-term changes in organic matter; impacts of land use change; carbon fluxes and nutrient cycling in agricultural and indigenous ecosystems, including wetlands; and microbial ecology and diversity.

PAPERS

ERTH501-12B (HAM) – Research Methodology

15 Points

This paper is normally compulsory for all MSc and MSc(Tech) students enrolled in Earth Sciences. General research methodology is covered including preparation of a research proposal and presentation of results.

Convenor(s): Associate Professor Earl Bardsley
 Restriction(s): BIOL502
 Assessment: Internal assessment/examination ratio: 1 : 0

ERTH512-12A/B/C (HAM) – Special Topic

15 Points

Guided individual study on an aspect of Earth and Ocean Sciences. By arrangement, and with the approval of the Graduate Co-ordinator of Earth and Ocean Sciences.

Convenor(s): Professor David Lowe
 Restriction(s): ERTH511
 Assessment: Internal assessment/examination ratio: 1 : 0

ERTH513-12B (HAM) – Special Topic

15 Points

Guided individual study on an aspect of Earth and Ocean Sciences. By arrangement, and with the approval of the graduate co-ordinator of Earth and Ocean Sciences.

Convenor(s): Professor David Lowe
 Restriction(s): ERTH511
 Assessment: Internal assessment/examination ratio: 1 : 0

ERTH524-12A (HAM) – Volcanic Processes and Hazards

15 Points

A study of volcanic landforms, physical characteristics of volcanic deposits, processes associated with the eruption, transport and deposition of volcanic products, tephrochronology, and volcanic hazards in active volcanic regions.

Convenor(s): Dr Adrian Pittari
 Prerequisite(s): ERTH321
 Restriction(s): ERTH521
 Assessment: Internal assessment/examination ratio: 3 : 2

ERTH525-12B (HAM) – Volcanic Petrology and Geochemistry

15 Points

A study of the petrology and geochemistry of volcanic rocks, the origin of magmas and their sources, magmatic processes, and an introduction to mineral deposits in volcanic environments and geothermal systems.

Convenor(s): To be advised
 Prerequisite(s): ERTH321
 Restriction(s): ERTH521
 Assessment: Internal assessment/examination ratio: 3 : 2

ERTH526-12B (HAM) – Field Analysis of Sedimentary Basins

15 Points

A paper teaching the application of field and some laboratory methods in the analysis of sedimentary successions basins.

Convenor(s): Professor Peter Kamp
 Prerequisite(s): ERTH322
 Restriction(s): ERTH522
 Assessment: Internal assessment/examination ratio: 1 : 0

ERTH527-12A (HAM) – Sedimentary and Petroleum Geology*15 Points*

A paper documenting the application of sedimentary geological and geophysical principles in the exploration and analysis of petroleum systems of New Zealand and other sedimentary basins.

Convenor(s): Professor Cam Nelson
Prerequisite(s): ERTH322
Restriction(s): ERTH522
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH528-12A (HAM) – Quaternary: Past Environments*15 Points*

This paper examines environmental change during the Quaternary – the last 2.6 million years – and analyses some important methods and evidence used in reconstructing past environments using a stratigraphic framework and geochronology.

Convenor(s): Professor David Lowe
Prerequisite(s): 40 points at 300 level in Earth Sciences.
 ERTH321 and ERTH322 are highly recommended.
Restriction(s): ERTH523
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH533-12B (HAM) – Soil and Greenhouse Gases*15 Points*

This paper examines the role that soils and their management play in the production and consumption of the greenhouse gases including a specific focus on the importance of soil carbon.

Convenor(s): Associate Professor Louis Schipper
Prerequisite(s): ERTH334
Restriction(s): ERTH531
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH535-12A (HAM) – Land and Soil Evaluation*15 Points*

This paper examines how soil and land may be evaluated to provide an improved understanding of sustainable land management, taking into account productivity and environmental goals.

Convenor(s): Professor David Lowe
Prerequisite(s): ERTH333 or ERTH334 or ERTH384
Restriction(s): ERTH531
Assessment: Internal assessment/examination ratio: 3 : 2

ERTH547-12B (HAM) – Hydrology and Water Resources*15 Points*

Optimal use of water resources is an essential part of national economic development. Hydrological science is considered with emphasis on techniques of water resource studies through hydrological model construction and simulations.

Convenor(s): Associate Professor Earl Bardsley
Prerequisite(s): ERTH345 or ERTH346
Restriction(s): ERTH541
Assessment: Internal assessment/examination ratio: 3 : 2

PAPERS

ERTH548-12A (HAM) – Ecohydrology

15 Points

Ecohydrology is the interdisciplinary study of the interactions between water and ecosystems. It views water, carbon and energy as essential ingredients for living systems, and recognises that ecosystems may modify the hydrological systems of which they are a part. This paper bridges the gap between hydrological, soils, ecological and climate sciences.

Convenor(s): *Dr David Campbell*
 Prerequisite(s): *ERTH345 or ERTH346*
 Restriction(s): *ERTH541*
 Assessment: *Internal assessment/examination ratio: 3 : 2*

ERTH552-12B (HAM) – Rock Slope Engineering

15 Points

This paper considers rock mechanics within engineering geology, including: the strength of intact rocks and rock joints; engineering geological hazards; slope stability modelling; and an applied site investigation project.

Convenor(s): *Dr Vicki Moon*
 Prerequisite(s): *ERTH352*
 Restriction(s): *ERTH551*
 Assessment: *Internal assessment/examination ratio: 3 : 2*

ERTH562-12A (HAM) – Coastal Sedimentation

15 Points

This paper addresses modern contentious issues of coastal sedimentation and sedimentary processes within a range of sedimentary environments. Both fundamental and applied contexts are examined.

Convenor(s): *Dr Willem de Lange*
 Prerequisite(s): *ERTH343*
 Restriction(s): *ERTH543*
 Assessment: *Internal assessment/examination ratio: 3 : 2*

ERTH563-12A (HAM) – Coastal Oceanography

15 Points

This paper provides an understanding of processes controlling movement of water in the ocean, including longwaves, baroclinic and barotropic circulation, wind-driven processes, surf-zone waves and currents, and nearbed currents in the coastal ocean.

Convenor(s): *Dr Karin Bryan and Dr Julia Mullarney*
 Prerequisite(s): *ERTH344*
 Restriction(s): *ERTH546*
 Assessment: *Internal assessment/examination ratio: 3 : 2*

ERTH564-12B (HAM) – Modelling for Coastal Engineering

15 Points

This paper examines the use of conceptual, empirical and numerical models of coastal systems.

Convenor(s): *Dr Willem de Lange and Dr Julia Mullarney*
 Prerequisite(s): *ERTH344*
 Restriction(s): *ERTH543 and ERTH546*
 Assessment: *Internal assessment/examination ratio: 1 : 0*

ERTH565-12B (HAM) – Time Series Analysis for Environmental Scientists*15 Points*

This paper explores the use of timeseries to provide a deeper understanding of processes in Earth and environmental sciences. It assumes only a basic knowledge of statistics, but a more advanced knowledge of processes in the ocean, atmosphere, lakes or rivers.

Convenor(s): Dr Karin Bryan

Prerequisite(s): Any of ERTH344, ERTH343, ERTH345, ERTH346, ERTH384 and a basic knowledge of 1st year statistics.

Assessment: Internal assessment/examination ratio: 3 : 2

ERTH590-12A/B/Y (HAM) – Directed Study*30 Points*

This paper allows in-depth study and research of a specific topic.

Convenor(s): To be advised

Assessment: Internal assessment/examination ratio: 1 : 0

ENV524-12A (HAM) – Environmental Evaluation*15 Points*

Explores the interface between science and environmental planning. Insight into the resource consent process and the role of science in supporting sustainable resource management under the RMA is developed.

Convenor(s): Dr Megan Balks

Restriction(s): ENV521

Assessment: Internal assessment/examination ratio: 1 : 0

Note(s): Not all courses listed may necessarily be offered, and may depend on staff availability and numbers of students.

Dissertations and Theses for MSc and MSc(Tech)

POINTS	CODE	TITLE
30	ERTH591-12C (HAM)	Dissertation
60	ERTH592-12C (HAM)	Dissertation
90	ERTH593-12C (HAM)	Earth Sciences Thesis
120	ERTH594-12C (HAM)	Earth Sciences Thesis