

# PAPERS



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## BIOLOGICAL SCIENCES PAPERS

All 500 Level papers are delivered subject to demand and staff availability.

### BIOL503-15A (HAM) – Data Analysis and Experimental Design

15 Points

This paper will cover aspects of research design for experiments, and methods for analysis of ecological data using univariate and multivariate statistical techniques.

Convenor(s): *Dr Ian Duggan*  
 Prerequisite(s): *BSc*  
 Restriction(s): *BIOL501*  
 Assessment: *Internal assessment/examination ratio: 1 : 0*

### BIOL560-15A (HAM) – Freshwater Ecology

15 Points

A critical examination of issues including pollution, conservation, and utilisation, that freshwater ecosystems face and methods to mitigate potentially competing interests.

Convenor(s): *Associate Professor Ian Hogg*  
 Prerequisite(s): *BSc, BIOL313 or equivalent*  
 Restriction(s): *BIOL513*  
 Assessment: *Internal assessment/examination ratio: 3 : 7*

### BIOL561-15B (HAM) – Aquatic Ecosystem Modelling

15 Points

This paper examines the different types of models that may be applicable in aquatic ecosystem modelling, including statistical, empirical, and process-based models. The key steps to setting up a model application are covered as well as the limitations and pitfalls of each type of model. Applications of the models are demonstrated for different lake ecosystems, with students having an opportunity to apply the models to questions of relevance to aquatic ecosystem managers.

Convenor(s): *Professor David Hamilton*  
 Prerequisite(s): *BSc, BIOL313 or equivalent third-year ecology unit*  
 Assessment: *Internal assessment/examination ratio: 1 : 0*

### BIOL562-15C (BLK) – Marine and Estuarine Ecology

15 Points

This paper focuses on a variety of contemporary issues in marine ecology and biological oceanography including: fisheries biology and management, recruitment, ecology of disturbances, benthic-pelagic coupling, aquaculture and primary production.

Convenor(s): *Associate Professor Conrad Pilditch*  
 Prerequisite(s): *BSc, BIOL314 or equivalent*  
 Restriction(s): *BIOL514*  
 Assessment: *Internal assessment/examination ratio: 3 : 7*

### BIOL563-15B (HAM) – Aquatic Field Methods

15 Points

This paper focuses on sampling methods, as well as experimental design and data analyses related to biological field studies in marine and freshwater sciences.

Convenor(s): *Associate Professor Ian Hogg*  
 Prerequisite(s): *BSc, BIOL313 or BIOL314 or equivalent*  
 Corequisite(s): *BIOL560 or BIOL562*  
 Assessment: *Internal assessment/examination ratio: 1 : 1*

# BIOLOGICAL SCIENCES PAPERS

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## **BIOL564-15B (HAM) – Restoration Ecology**

*15 Points*

Aspects of health, vitality, resilience and restoration of ecosystems. Topics covered include restoration principles, theory and practice; lake restoration; river and stream restoration; wetland restoration; and forest restoration.

*Convenor(s):* Dr Daniel Laughlin  
*Prerequisite(s):* BSc, BIOL312 or BIOL325 or equivalent  
*Corequisite(s):* BIOL570  
*Restriction(s):* BIOL515  
*Assessment:* Internal assessment/examination ratio: 1 : 1

## **BIOL565-15A (HAM) – Molecular Ecology**

*15 Points*

This paper is open to students interested in molecular ecology, systematics, and environmental molecular biology. Topics covered include DNA barcoding, conservation and evolutionary genetics, and phylogenetics.

*Convenor(s):* Professor Craig Cary  
*Prerequisite(s):* BSc, at least one of the following papers: BIOL310, BIOL312, BIOL313, BIOL326, BIOL338, BIOL341 or equivalent  
*Restriction(s):* BIOL522  
*Assessment:* Internal assessment/examination ratio: 3 : 7

## **BIOL570-15A (HAM) – Plant Ecology**

*15 Points*

Contemporary and advanced topics in plant ecology, including the structure and functioning of plant communities, species and community distribution theory, vegetation dynamics, vegetation surveying and data analysis.

*Convenor(s):* Dr Daniel Laughlin  
*Prerequisite(s):* BSc, BIOL312, BIOL313 or BIOL325 or equivalent  
*Corequisite(s):* BIOL571  
*Restriction(s):* BIOL521  
*Assessment:* Internal assessment/examination ratio: 1 : 1

## **BIOL571-15B (HAM) – Plant Function**

*15 Points*

Contemporary topics in plant environmental physiology, with an emphasis on the functioning of plants at the physiological, whole plant and ecological level. Topics will include the acquisition of carbon and water by plants and limitations to plant productivity in natural and managed environments.

*Convenor(s):* Dr Mike Clearwater  
*Prerequisite(s):* BSc, BIOL312 or BIOL325 or equivalent  
*Corequisite(s):* BIOL570  
*Restriction(s):* BIOL521  
*Assessment:* Internal assessment/examination ratio: 1 : 1

**BIOL572-15B (HAM) – Animal Behaviour***15 Points*

The purpose of this paper is to provide students with an understanding of contemporary approaches to the study of animal behaviour, exploring recent literature on (1) the function of behaviour, (2) the evolutionary history of behaviour, (3) the development of behaviour, and (4) the mechanisms of behaviour. Special attention will be devoted to developing an appreciation of experimental design and fostering an ability to think critically about ethological research questions.

*Convenor(s):* Professor Joseph Waas  
*Prerequisite(s):* BSc, BIOL333 or equivalent  
*Restriction(s):* BIOL533  
*Assessment:* Internal assessment/examination ratio: 1 : 1

**BIOL573-15A (HAM) – Conservation Biology***15 Points*

The purpose of this paper is to explore the general principles of conservation biology, with special reference to threatened species, aquatic animals and plants.

*Convenor(s):* Professor Joseph Waas  
*Prerequisite(s):* BSc and BIOL312, BIOL333, BIOL338 or equivalent  
*Restriction(s):* BIOL533  
*Assessment:* Internal assessment/examination ratio: 1 : 1

**BIOL574-15A (HAM) – Mammalian Physiology***15 Points*

This paper examines selected topics in the physiology of humans and other mammals. Students will develop an understanding of physiological control systems and the integration of structure and function. We will discuss issues related to health and disease in the context of molecular, systems and behavioural physiology.

*Convenor(s):* Dr Pawel Olszewski  
*Prerequisite(s):* BSc, BIOL335 (or external equivalent)  
*Restriction(s):* BIOL535  
*Assessment:* Internal assessment/examination ratio: 2 : 3

**BIOL575-15B (HAM) – Applied Topics in Physiology***15 Points*

This paper examines selected topics in animal physiology with particular emphasis on applicability of physiology research in the biomedical and agricultural setting. University, hospital and industry-based lecturers contribute to this class, helping students to develop an understanding of the application of physiological knowledge and principles to commercial and medical technologies.

*Convenor(s):* Dr Pawel Olszewski  
*Prerequisite(s):* BSc, BIOL335 (or external equivalent)  
*Restriction(s):* BIOL535  
*Assessment:* Internal assessment/examination ratio: 2 : 3

## BIOLOGICAL SCIENCES PAPERS

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### BIOL576-15A (HAM) – Animal Ecophysiology

15 Points

This paper provides an introduction to specified topics in animal environmental physiology. Critical evaluation of selected readings from the scientific literature will provide a theoretical framework for the specified topics and an introduction to recent research in those fields. Students will develop an understanding of how animals are challenged by and adapt to challenging or extreme environments.

Convenor(s):	Associate Professor Nicholas Ling
Prerequisite(s):	BSc, BIOL335 or BIOL338 (or external equivalent)
Restriction(s):	BIOL538
Assessment:	Internal assessment/examination ratio: 2 : 3

### BIOL577-15B (BLK) – Aquatic Toxicology

15 Points

This paper provides an introduction to specified topics in aquatic toxicology including toxicology analysis and bioaccumulation. Critical evaluation of selected readings from the scientific literature will provide a theoretical framework for the specified topics and an introduction to recent research in those fields. Students will develop an understanding of ecological impacts of water-borne contaminants and methods for the bioassay of toxicant effects.

Convenor(s):	Associate Professor Nicholas Ling
Prerequisite(s):	BSc
Restriction(s):	BIOL538
Assessment:	Internal assessment/examination ratio: 1 : 1

### BIOL580-15A (HAM) – Human and Applied Microbiology

15 Points

Microbial biology associated with human health and extreme environments.

Convenor(s):	To be advised
Prerequisite(s):	BSc, BIOL341 or equivalent
Restriction(s):	BIOL541
Assessment:	Internal assessment/examination ratio: 1 : 0

### BIOL581-15B (HAM) – Microbial Ecology

15 Points

Molecular microbial ecology, stable isotopes in microbial ecology, metagenomics, biogeography, and other current topics in microbial ecology.

Convenor(s):	Associate Professor Ian McDonald
Prerequisite(s):	BSc, BIOL341 or equivalent
Restriction(s):	BIOL541
Assessment:	Internal assessment/examination ratio: 1 : 0

### BIOL582-15A (HAM) – Biomolecular Structure and Function

15 Points

An in-depth examination of biomolecular structure and function using selected examples from the biochemistry literature.

Convenor(s):	Professor Vic Arcus
Prerequisite(s):	BSc, BIOL351, CHEM301 or equivalent
Restriction(s):	BIOL551
Assessment:	Internal assessment/examination ratio: 1 : 4

**BIOL583-15B (HAM) – Molecular Biochemistry and Metabolism***15 Points*

An in-depth examination of molecular biochemistry and metabolism using selected examples from biochemistry literature.

*Convenor(s):* Dr Ryan Martinus  
*Prerequisite(s):* BSc, BIOL351, CHEM301 or equivalent  
*Restriction(s):* BIOL551  
*Assessment:* Internal assessment/examination ratio: 1 : 4

**BIOL584-15A(HAM) – Molecular Genetics***15 Points*

This paper explores how molecular biology and bioinformatic research contribute to our understanding of molecular genetics. Subjects covered in this course will include molecular technologies, comparative genomics and evolution, epigenetics, genetic diversity, genetic diseases, pharmacogenomics and personalised medicine.

*Convenor(s):* Dr Ray Cursons  
*Prerequisite(s):* BSc, BIOL310 or equivalent  
*Restriction(s):* BIOL510  
*Assessment:* Internal assessment/examination ratio: 2 : 3

**BIOL585-15B (HAM) – Human Genetics***15 Points*

This paper explores the genetics of human evolution, adaptation and disease. The topics will extend from classical population genetics into contemporary areas of molecular biology and bioinformatics. Particular attention will be paid to key genetic changes that occurred during hominid evolution, polymorphic variations and disease susceptibility in humans and the role of somatic mutations in cancer.

*Convenor(s):* Dr Ray Cursons  
*Prerequisite(s):* BSc, BIOL310 or equivalent  
*Restriction(s):* BIOL510  
*Assessment:* Internal assessment/examination ratio: 2 : 3

**BIOL588-15A/B (HAM) – Special Topic***15 Points*

Guided individual study on an aspect of Biological Sciences. By arrangement, and with the approval of the Graduate Convenor.

*Convenor(s):* Associate Professor Ian Hogg  
*Prerequisite(s):* BSc or equivalent  
*Restriction(s):* BIOL555  
*Assessment:* Internal assessment/examination ratio: 1 : 0

# BIOLOGICAL SCIENCES PAPERS

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## BIOL590-15C/D (HAM) – Directed Study

30 Points

May involve a literature review, the preparation of a proposal or a preliminary investigation. Generally a research paper will be required, but there will be no formal examination.

Convenor(s): *To be advised*

Assessment: *Internal assessment/examination ratio: 1 : 0*

## COMP555-15B (HAM) – Bioinformatics

15 Points

For a full description, see the *Faculty of Computing & Mathematical Sciences Handbook*.

## SCIE501-15B (HAM) – Research Methods in the Sciences

15 Points

This paper will enable students to develop the necessary communication skills and familiarity with research methods to allow them to progress to the thesis component of a masters degree in the sciences, or to extend communication and research skills in those not taking a full research degree.

Convenor(s): *Professor David Lowe*

Restriction(s): *A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (eg BIOL501, ERT501)*

Assessment: *Internal assessment/examination ratio: 1 : 0*

## Dissertations and Theses for MSc, MSc(Research) and MSc(Tech)

POINTS	CODE	TITLE
30	BIOL591-15C (HAM)	Dissertation
60	BIOL592-15C (HAM)	Dissertation
90	BIOL593-15C (HAM)	Biological Sciences Thesis
120	BIOL594-15C (HAM)	Biological Sciences Thesis
150	BIOL595-15C (HAM)	Biological Sciences Thesis

## CHEMISTRY PAPERS

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All 500 Level papers are delivered subject to demand and staff availability.

### CHEM511-15A (HAM) – Advanced Organic Chemistry (Structural Characterisation)

15 Points

Use of NMR spectroscopy and mass spectrometry for structural characterisation of organic molecules. This course will have a practical section using instrumentation.

Convenor(s): Associate Professor Marilyn Manley-Harris  
 Prerequisite(s): CHEM301  
 Restriction(s): CHEM501  
 Assessment: Internal assessment/examination ratio: 1 : 1

### CHEM512-15A (HAM) – Topics in Advanced Physical Chemistry

15 Points

An in-depth investigation of some topic in advanced physical chemistry.

Convenor(s): To be advised  
 Prerequisite(s): CHEM111 and CHEM112. CHEM202 and CHEM302 are recommended but not essential.  
 Assessment: Internal assessment/examination ratio: 1 : 0

### CHEM513-15A (HAM) – Organometallic Chemistry and Catalysis

15 Points

An advanced study of organometallic chemistry.

Convenor(s): Professor Bill Henderson  
 Prerequisite(s): CHEM303  
 Restriction(s): CHEM503  
 Assessment: Internal assessment/examination ratio: 0 : 1

### CHEM514-15A (HAM) – Special Topics in Chemistry A

15 Points

An advanced study of topics relating to staff members' areas of research expertise, which may include organic, inorganic, physical, analytical or environmental themes.

Convenor(s): Associate Professor Graham Saunders  
 Prerequisite(s): Normally any three of CHEM301, CHEM302, CHEM303 and CHEM306  
 Restriction(s): CHEM504  
 Assessment: Internal assessment/examination ratio: 0 : 1

### CHEM516-15A (HAM) – Isotope Geochemistry

15 Points

An advanced study of the theory, applications and practice of isotope geochemistry.

Convenor(s): Dr Adam Hartland  
 Restriction(s): CHEM561  
 Assessment: Internal assessment/examination ratio: 1 : 0



# CHEMISTRY PAPERS

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## CHEM517-15A (HAM) – Applied and Environmental Analytical Chemistry A

15 Points

With special reference to the commercial context, a critical examination of analytical methodologies for organic substances, eg pesticides.

Convenor(s): *Dr Michèle Prinsep*  
Prerequisite(s): *CHEM204, CHEM306*  
Restriction(s): *CHEM507*  
Assessment: *Internal assessment/examination ratio: 0 : 1*

## CHEM521-15B (HAM) – Advanced Organic Chemistry

15 Points

An advanced study of natural products chemistry and a study of structure and mechanism in carbohydrate chemistry.

Convenor(s): *Dr Michèle Prinsep*  
Prerequisite(s): *CHEM301*  
Restriction(s): *CHEM501*  
Assessment: *Internal assessment/examination ratio: 0 : 1*

## CHEM522-15B (HAM) – Computational Chemistry

15 Points

A practical introduction to computational chemistry and its increasing use in modern chemical research.

Convenor(s): *Dr Joseph Lane*  
Prerequisite(s): *CHEM111 and CHEM112. CHEM302 is recommended but not essential.*  
Restriction(s): *CHEM502*  
Assessment: *Internal assessment/examination ratio: 1 : 0*

## CHEM523-15B (HAM) – Inorganic Materials Chemistry

15 Points

A study of inorganic materials.

Convenor(s): *Professor Bill Henderson*  
Prerequisite(s): *CHEM303*  
Restriction(s): *CHEM503*  
Assessment: *Internal assessment/examination ratio: 0 : 1*

## CHEM524-15B (HAM) – Special Topics in Chemistry B

15 Points

An advanced study of topics relating to staff members' areas of research expertise, which may include organic, inorganic, physical, analytical or environmental themes.

Convenor(s): *Associate Professor Graham Saunders*  
Prerequisite(s): *Normally any 3 of CHEM301, CHEM302, CHEM303 and CHEM306*  
Restriction(s): *CHEM504*  
Assessment: *Internal assessment/examination ratio: 0 : 1*

**CHEM527 – Applied and Environmental Analytical Chemistry B***15 Points*

An advanced study of instrumental analytical techniques for organic and inorganic compounds and comparison of their efficacies.

*Convenor(s):* To be advised  
*Prerequisite(s):* CHEM204, CHEM306 or an equivalent course  
*Restriction(s):* CHEM507  
*Assessment:* Internal assessment/examination ratio: 0 : 1

**CHEM589-15A/B/C/S (HAM) – Directed Study***15 points*

May involve a literature review or the preparation of a proposal.

*Convenor(s):* Associate Professor Graham Saunders  
*Assessment:* Internal assessment/examination ratio: 1 : 0

**CHEM590-15C/D (HAM) – Directed Study***30 Points*

This paper allows an indepth study of a specific topic.

*Convenor(s):* Associate Professor Graham Saunders  
*Assessment:* Internal assessment/examination ratio: 1 : 0

**SCIE501-15B (HAM) – Research Methods in the Sciences***15 Points*

This paper will enable students to develop the necessary communication skills and familiarity with research methods to allow them to progress to the thesis component of a Masters degree in the sciences, or to extend communication and research skills in those not taking a full research degree.

*Convenor(s):* Professor David Lowe  
*Restriction(s):* A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (eg BIOL501, EARTH501)  
*Assessment:* Internal assessment/examination ratio: 1 : 0

**Dissertations and Theses for MSc, MSc(Research) and MSc(Tech)**

POINTS	CODE	TITLE
30	CHEM591-15C (HAM)	Dissertation
60	CHEM592-15C (HAM)	Dissertation
90	CHEM593-15C (HAM)	Chemistry Thesis
120	CHEM594-15C (HAM)	Chemistry Thesis
150	CHEM595-15C (HAM)	Chemistry Thesis

# EARTH SCIENCES PAPERS

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All 500 Level papers are delivered subject to demand and staff availability.

## ENV524-15A (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*

## ERTH512-15A/B/C (HAM) – Special Topic

15 Points

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

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

## ERTH513-15A/B/C (HAM) – Special Topic

15 Points

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

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

## ERTH524-15A (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*

## ERTH525-15B (HAM) – Hydrothermal Mineral and Energy Systems in New Zealand

15 Points

A study of geochemical approaches and methods to solve various problems in the Earth sciences including volcanic environments, with particular attention to hydrothermal systems, geothermal energy, and the formation of hydrothermal ore deposits.

Convenor(s): *Dr Shaun Barker and guest lecturers*  
Prerequisite(s): *Either ERTH321 or ERTH322*  
Restriction(s): *ERTH521*  
Assessment: *Internal assessment/examination ratio: 1 : 0*

**ERTH526-15C (HAM) – Field Analysis of Sedimentary Basins***15 Points*

A paper teaching the application of field methods in the analysis of sedimentary successions and basins. This paper includes a compulsory field trip in the week after B Semester exams in November (week 46). There is an essay due before the field trip and a report due Monday 14 December 2015. Subject co-ordinator approval required.

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

**ERTH527-15A (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):* Dr Beth Fox  
*Prerequisite(s):* ERTH322  
*Restriction(s):* ERTH522  
*Assessment:* Internal assessment/examination ratio: 3 : 2

**ERTH528-15A (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. The paper usually includes a two-day workshop in mid May, held at the GNS Science National Isotope Centre.

*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

**ERTH533-15B (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):* Professor Louis Schipper  
*Prerequisite(s):* ERTH334  
*Restriction(s):* ERTH531  
*Assessment:* Internal assessment/examination ratio: 3 : 2

**ERTH535-15A (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  
*Required Book(s):* I.H. Lynn et al. *Land Use Capability Survey Handbook 3rd ed* (AgResearch, Landcare Research, GNS Science)  
*Assessment:* Internal assessment/examination ratio: 3 : 2

## EARTH SCIENCES PAPERS

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### ERTH547-15B (HAM) – Introduction to Hydrological Modelling

15 Points

Optimal use of water resources is an essential part of national economic development. Hydrological science is overviewed, 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

### ERTH548-15A (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 hydrology, soil science, ecology, and climate science.

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

### ERTH552-15B (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

### ERTH562-15A (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

### ERTH563-15A (HAM) – Coastal and Estuarine Processes

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

**ERTH564-15B (HAM) – Coastal and Freshwater Modelling: Physical Approaches***15 Points*

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

*Convenor(s): Dr Julia Mullarney and Dr Willem de Lange**Prerequisite(s): ERTH344**Restriction(s): ERTH543 and ERTH546**Assessment: Internal assessment/examination ratio: 1 : 0***ERTH565-15B (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): Associate Professor Karin Bryan**Prerequisite(s): Any of ERTH344, ERTH343, ERTH345, ERTH346, ERTH384 and a basic knowledge of first-year statistics.**Assessment: Internal assessment/examination ratio: 3 : 2***ERTH590-15A/B/Y (HAM) – Directed Study***30 Points*

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

*Convenor(s): Professor David Lowe**Assessment: Internal assessment/examination ratio: 1 : 0***SCIE501-15B (HAM) – Research Methods in the Sciences***15 Points*

This paper will enable students to develop the necessary communication skills and familiarity with research methods to allow them to progress to the thesis component of a Masters degree in the sciences, or to extend communication and research skills in those not taking a full research degree.

*Convenor(s): Professor David Lowe**Restriction(s): A student cannot take SCIE501 if they have already completed the equivalent version within a specific subject (eg BIOL501, ERTH501)**Assessment: Internal assessment/examination ratio: 1 : 0***Dissertations and Theses for MSc, MSc(Research) and MSc(Tech)**

POINTS	CODE	TITLE
30	ERTH591-15C (HAM)	Dissertation
60	ERTH592-15C (HAM)	Dissertation
90	ERTH593-15C (HAM)	Earth Sciences Thesis
120	ERTH594-15C (HAM)	Earth Sciences Thesis

## ELECTRONICS PAPERS

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### ENEL501-15A/B/Y (HAM) – Special Topics in Electronics

30 Points

This paper involves directed reading, project work and paper presentation in a defined area of electronics.

Convenor(s): Associate Professor Rainer Künnemeyer  
 Assessment: Internal assessment/examination ratio: 1 : 0

### ENEL504-15B (HAM) – Analog Filter Design

15 Points

This paper introduces the student to the design of electronic filters to process analog signals.

**Note(s):** This paper will only be offered with sufficient student interest.

Convenor(s): Professor Jonathan Scott  
 Prerequisite(s): ENEL205, ENEL312 and (ENGG285 or MATH251)  
 Assessment: Internal assessment/examination ratio: 1 : 0

### ENEL505-15A (HAM) – Rechargeable Batteries and their Management

15 Points

This paper presents the essential characteristics of rechargeable batteries including techniques and semiconductor components used for managing batteries for optimal run time and cycle life.

Convenor(s): Nihal Kularatna  
 Prerequisite(s): ENEL205  
 Assessment: Internal assessment/examination ratio: 1 : 0

### ENEL506-15B (HAM) – Surge Protection of Electronic Systems

15 Points

This course presents the fundamentals and techniques for protecting electronic systems against transients and surges, the statistical nature of the surge occurrence, and the international standards applicable.

Convenor(s): Nihal Kularatna  
 Prerequisite(s): ENEL205  
 Assessment: Internal assessment/examination ratio: 1 : 0

### ENEL517-15A (HAM) – Mechatronics

30 Points

This paper covers embedded micro-programming, feedback control, interface to electro-mechanical systems involving gears, motors, belt drivers, actuators, and sensors: the enabling technologies of robotics. A series of projects require students to integrate software, control, mechanical and electromotive skills to achieve practical goals.

**Note(s):** This paper will only be offered with sufficient student interest.

Convenor(s): Professor Jonathan Scott  
 Prerequisite(s): ENEL317  
 Assessment: Internal assessment/examination ratio: 1 : 0

**ENEL522-15B (HAM) – Electro-optical Instrumentation***30 Points*

Theoretical and practical aspects of advanced electro-optical instrumentation will be discussed and applied in practical sessions. Topics include telemeters, interferometers for velocity or vibration detection, optical gyroscopes, optical fibre sensors, and others.

**Note(s):** *This paper will only be offered with sufficient student interest. A minimum mark of 40% is required to receive a passing grade. Laboratories are compulsory.*

Convenor(s): Associate Professor Rainer Künnemeyer  
 Prerequisite(s): ENEL324  
 Restriction(s): ENEL322 and ENEL423  
 Required Book(s): To be advised  
 Assessment: Internal assessment/examination ratio: 1 : 1

**ENEL585-15B (HAM) – Power Electronics***30 Points*

This paper covers the theory and practice of power semiconductors, power converters, power management, protection, and variable speed drives.

Convenor(s): Nihal Kularatna  
 Prerequisite(s): ENEL205  
 Restriction(s): ENEL385 and ENEL485  
 Required Book(s): To be advised  
 Recommended Book(s): Kularatna *DC Power Supplies, Power Management and Surge Protection for Power Electronic Systems* (CRC Press) 2012  
 Assessment: Internal assessment/examination ratio: 1 : 1

**ENEL590-15C/D (HAM) – Directed Study***30 Points*

Students have the opportunity to pursue a topic of their own interest under the guidance of academic staff.

Assessment: Internal assessment/examination ratio: 1 : 0

**Dissertations and Theses for MSc, MSc(Research) and MSc(Tech)**

POINTS	CODE	TITLE
30	ENEL591-15C (HAM)	Dissertation
60	ENEL592-15C (HAM)	Dissertation
90	ENEL593-15C (HAM)	Electronics Thesis
120	ENEL594-15C (HAM)	Electronics Thesis
150	ENEL595-15C (HAM)	Electronics Thesis



# ENGINEERING PAPERS

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## ENGG501-15A(HAM) – Control Theory and Image Processing

30 points

This paper deals with PID feedback control of linear systems using classical as well as state spacemethods. It is highly computer and project based.

Convenor(s): Associate Professor Howell Round

Prerequisite(s): One of ENEL317 or ENME352

Restriction(s): ENGG401

Required Book(s): Franklin et al. **Feedback Control of Dynamic Systems** 5th ed (Prentice Hall)

Assessment: Internal assessment/examination ratio: 1 : 0

## ENME540-15A (HAM) – Finite Element Analysis and Application

30 Points

This paper explains a general computational strategy to determine the response of a physical system to loads or other stimuli, in which the system is first divided into a large number of small finite elements of regular shape whose behaviour can be numerically modelled by solving the equations governed by the relevant laws of physics. Applications include finding the stresses and displacements due to loading in a structure, or the temperature distribution in a heat exchanger due to heat input. Practical application of the theory includes computer laboratory exercises where students will develop their own computer programs for simple problems and the use of commercial software to solve more complicated problems.

**Note(s):** This paper will only be offered with sufficient student interest.

Convenor(s): Professor Ilanko

Prerequisite(s): ENGG285 or MATH251, and ENGG284 or MATH255, and ENMP313

Restriction(s): ENME440

Assessment: Internal assessment/examination ratio: 1 : 0

## Theses for ME

POINTS	CODE	TITLE
90	ENGG593-15C (HAM)	Engineering Thesis
120	ENGG594-15C (HAM)	Engineering Thesis

## MATERIALS AND PROCESSING PAPERS

### ENMP502-15A/C (HAM) – Special Topics in Engineering 1

15 Points

This paper involves directed reading, project work and paper presentation in a defined topic area of technology or engineering.

Convenor(s): *Dr James Carson*

Assessment: *Internal assessment/examination ratio: 1 : 0*

### ENMP503-15A (HAM) – Special Topics in Engineering 2

15 Points

This paper involves directed reading, project work and paper presentation in a defined topic area of technology or engineering.

Convenor(s): *Dr James Carson*

Assessment: *Internal assessment/examination ratio: 1 : 0*

### ENMP504-15B/C (HAM) – Special Topics in Engineering 3

15 Points

This paper involves directed reading, project work and paper presentation in a defined topic area of technology or engineering.

Convenor(s): *Dr James Carson*

Assessment: *Internal assessment/examination ratio: 1 : 0*

### ENMP505-15B (HAM) – Special Topics in Engineering 4

15 Points

This paper involves directed reading, project work and paper presentation in a defined topic area of technology or engineering.

Convenor(s): *Dr James Carson*

Assessment: *Internal assessment/examination ratio: 1 : 0*

### ENMP513-15A (HAM) – Advanced Material Properties and Performance

15 Points

This paper builds on the materials science and engineering courses taught at undergraduate level and develops the following aspects of materials performance: microstructural/property relationships, fracture mechanics, performance modelling and other aspects of metals, polymers, ceramics and composites.

**Note(s):** *This paper will only be offered with sufficient student interest.*

Convenor(s): *Professor Kim Pickering*

Prerequisite(s): *ENMP211 or equivalent*

Restriction(s): *ENMP511*

Assessment: *Internal assessment/examination ratio: 1 : 4*

### ENMP514-15A (HAM) – Advanced Materials Processing

15 Points

This paper investigates the relationships between processing conditions and microstructure of different materials. Topics include: Solidification processing, powder metallurgy, ceramic processing and processing composites. This paper also examines how materials are processed into serviceable products.

Convenor(s): *To be advised*

Prerequisite(s): *ENMP211 or equivalent*

Restriction(s): *ENMP411, ENMP512*

Assessment: *Internal assessment/examination ratio: 1 : 4*

## MATERIALS AND PROCESSING PAPERS

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### ENMP515-15A (HAM) – CAD/CAM for Engineering

15 Points

This paper will cover the fundamental theories and basic concepts underlying today's technologies in computer-aided design (CAD) and computer-aided manufacturing (CAM). A thorough fundamental theoretical training and mastery of CAD/CAM software will make a student better equipped and more confident to solve difficult problems in design and manufacturing.

Convenor(s): *Dr Chi Kit Au*

Assessment: *Internal assessment/examination ratio: 1 : 4*

### ENMP516-15B (HAM) – Materials Characterisation

15 Points

This paper covers the use of advanced analytical techniques used in materials characterisation. These include optical microscopy, x-ray diffraction, transmission electron microscopy, scanning electron microscopy and differential thermal analysis. This paper explains the theory behind these techniques.

Convenor(s): *Professor Brian Gabbitas*

Prerequisite(s): *ENMP211 or equivalent*

Assessment: *Internal assessment/examination ratio: 1 : 4*

### ENMP542-15C (HAM) – Design for Energy and the Environment

30 Points

This interdisciplinary course focuses on the important aspects of science and technology related to new and existing energy resources and energy efficiency. Topics covered reflect the trend of current development in energy technology.

**Note(s):** *This paper will be taught subject to staff availability.*

Convenor(s): *Associate Professor Michael Walmsley*

Assessment: *Internal assessment/examination ratio: 1 : 0*

### ENMP543-15A (HAM) – Environmental Technology Water and Wastewater 1

15 Points

This is an inter-disciplinary course covering topics selected from water resources and their management, environmental chemistry, ground water hydrology, water and wastewater engineering, chemical and microbial aspects of water quality, water pollution, remediation, ecotoxicity and ecological engineering. This paper should preferably be taken with ENMP544.

Convenor(s): *Dr Mark Lay*

Prerequisite(s): *ENMP341 or equivalent*

Restriction(s): *ENMP541*

Assessment: *Internal assessment/examination ratio: 1 : 4*

### ENMP544-15B (HAM) – Environmental Technology Water and Wastewater 2

15 Points

This is an inter-disciplinary course covering topics selected from water resources and their management, environmental chemistry, ground water hydrology, water and wastewater engineering, chemical and microbial aspects of water quality, water pollution, remediation, ecotoxicity and ecological engineering. This paper should preferably be taken with ENMP543.

Convenor(s): *Dr Mark Lay*

Prerequisite(s): *ENMP341 or equivalent*

Restriction(s): *ENMP541*

Assessment: *Internal assessment/examination ratio: 1 : 4*

**ENMP561 – Bioprocessing 1***15 Points**This paper will not be offered in 2015.***ENMP562- 15A(HAM) – Bioprocessing 2***15 points*

Aspects of processing biological materials such as fermentation, membrane separations and large-scale processing.

*Convenor(s): To be advised**Restriction(s): ENMP523**Assessment: Internal assessment/examination ratio: 1 : 0***ENMP563- 15A (HAM) – Food Technology 1***15 Points*

This interdisciplinary course is tailored to the food technology interests of the students enrolled. It covers advanced aspects of food science, technology and engineering applications relevant to the food sector in New Zealand and/or selected countries.

*Convenor(s): Dr James Carson**Restriction(s): ENMP527**Assessment: Internal assessment/examination ratio: 1 : 0***ENMP564- 15B (HAM) – Food Technology 2***15 Points*

This interdisciplinary course is tailored to the food technology interests of the students involved. It covers advanced aspects of food science, technology and engineering applications relevant to the food sector in New Zealand and/or selected countries.

*Convenor(s): Dr James Carson**Prerequisite(s): Level 300 process engineering or biological science**Restriction(s): ENMP527**Assessment: Internal assessment/examination ratio: 1 : 0***ENMP568- 15B (HAM) – Engineering Applied Practice 1***15 Points*

An intensive practical training with some aspect of engineering or technology.

*Convenor(s): Dr Mark Lay and Dr Rob Torrens**Assessment: Internal assessment/examination ratio: 1 : 0***ENMP569- 15A (HAM) – Engineering Applied Practice 2***15 Points*

An intensive practical training with some aspect of engineering or technology.

*Convenor(s): Dr Mark Lay and Dr Rob Torrens**Assessment: Internal assessment/examination ratio: 1 : 0*

## MATERIALS AND PROCESSING PAPERS

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### ENMP585-15A (HAM) – Industrial Technology and Innovation 1

15 Points

An interdisciplinary course designed for MSc, MSc(Research) and MSc(Tech) students to develop their ability to use scientific, management and personal skills to plan and implement programmes that maximise competitive advantage in industry through technological innovation, entrepreneurship and application or new knowledge generated by research. Case studies, readings, individual and group presentations form an important part of this course. This paper should preferably be taken with ENMP586.

Convenor(s): *To be advised*  
 Prerequisite(s): *ENMP381 or equivalent*  
 Restriction(s): *ENMP581*  
 Assessment: *Internal assessment/examination ratio: 1 : 0*

### ENMP586-15B (HAM) – Industrial Technology and Innovation 2

15 Points

An interdisciplinary course designed for MSc, MSc(Research) and MSc(Tech) students to develop their ability to use scientific, management and personal skills to plan and implement programmes that maximise competitive advantage in industry through technological innovation, entrepreneurship and application or new knowledge generated by research. Case studies, readings, individual and group presentations form an important part of this course.

Convenor(s): *Dr Mark Lay*  
 Prerequisite(s): *ENMP381 or equivalent*  
 Restriction(s): *ENMP581*  
 Assessment: *Internal assessment/examination ratio: 1 : 0*

### ENMP590-15C/D (HAM) – Directed Study

30 Points

This paper allows in depth study and research of a specific technological or engineering topic.

Convenor(s): *Dr James Carson*  
 Assessment: *Internal assessment/examination ratio: 1 : 0*

## Dissertations and Theses for MSc, MSc(Research) and MSc(Tech)

POINTS	CODE	TITLE
30	ENMP591-15C (HAM)	Dissertation
60	ENMP592-15C (HAM)	Dissertation
90	ENMP593-15C (HAM)	Materials and Processing Thesis
120	ENMP594-15C (HAM)	Materials and Processing Thesis
150	ENMP595-15C (HAM)	Materials and Processing Thesis

## PHYSICS PAPERS

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### PHYS506 – Advanced Quantum Theory

30 Points

*This paper will not be offered in 2015.*

### PHYS511 – Particles and Fields

30 points

This paper covers relativistic kinematics and wave equations, Diracs equation and applications, elementary particles and symmetries, Langrangian field theory and quantum fields, models of strong, weak and electromagnetic interactions and the inclusion of gravity.

**Note(s):** This paper will only be offered with sufficient student interest.

**Convenor(s):** Dr Michael Cree

**Restriction(s):** MATH471, MATH571 and PHYS313

**Assessment:** Internal assessment/examination ratio: 1 : 2

### PHYS16-15A (HAM) – Computational Biophysics

30 Points

This is a lecture and computer-laboratory course on the computational methods used in neuroscience and biophysics. Topics covered include linear and non-linear differential equations, Euler and Runge-Kutta integration methods, limit cycles, action potential generation, hysteresis and memory in simple neural systems, stability, noise simulation, and root finding. The programming language used is MATLAB.

**Note(s):** *This paper will only be offered with sufficient student interest.*

**Convenor(s):** Associate Professor Alistair Steyn-Ross

**Prerequisite(s):** Any one of PHYS201, PHYS202, ENEL284 or ENEL285; and any two of MATH251, MATH253, MATH255, ENGG283, ENGG284, ENGG285, ENGG287, PHYS315

**Restriction(s):** PHYS315

**Assessment:** Internal assessment/examination ratio: 1 : 0

### PHYS551 – Methods in Theoretical Physics 1

15 points

This paper introduces common methods in theoretical physics, for example use of Fourier Transforms and other integral transforms, complex functions, and maximisation/minimisation methods.

**Note(s):** *This paper will only be offered with sufficient student interest.*

**Convenor(s):** Dr Marcus Wilson

**Prerequisite(s):** MATH251 and one of MATH252, MATH253, MATH255

**Assessment:** Internal assessment/examination ratio: 1 : 1

### PHYS552 - Methods in Theoretical Physics 2

15 Points

*This paper will not be offered in 2015.*

# PHYSICS PAPERS

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## PHYS560-15A/B/Y (HAM) – Special Topics in Physics 1

15 Points

This paper involves directed reading, project work and paper presentation in a defined topic area of physics.

Convenor(s): Professor Moira Steyn-Ross  
Prerequisite(s): Topic dependent  
Assessment: Internal assessment/examination ratio: 1 : 1

## PHYS561-15A/B/Y (HAM) – Special Topics in Physics 2

15 Points

This paper involves directed reading, project work and paper presentation in a defined topic area of physics.

Convenor(s): Professor Moira Steyn-Ross  
Prerequisite(s): Topic dependent  
Assessment: Internal assessment/examination ratio: 1 : 1

## PHYS590-15A/B/Y (HAM) – Directed Study

30 Points

Convenor(s): Dr James Carson  
Assessment: Internal assessment/examination ratio: 1 : 0

## Dissertations and Theses for MSc, MSc(Research) and MSc(Tech)

POINTS	CODE	TITLE
30	PHYS591-15C (HAM)	Dissertation
60	PHYS592-15C (HAM)	Dissertation
90	PHYS593-15C (HAM)	Physics Thesis
120	PHYS594-15C (HAM)	Physics Thesis

## PSYCHOLOGY PAPERS

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**Note(s):** For full descriptions of these papers, please see the *Psychology Graduate Handbook*, available from the Psychology Office, or the *Faculty of Arts & Social Sciences Graduate Handbook*. Papers marked \* do not count towards a Psychology qualification in Science, but may be taken as papers outside the field of the degree.

PSYC511-15A (HAM) – Evaluation Research Design  
15 Points

PSYC513 -15B (BLK) – Evaluation Research Analysis  
30 Points

PSYC517 – The Social Psychology of Anti-Social Behaviour\*  
15 Points  
*This paper will not be offered in 2015 (alternates with PSYC518).*

PSYC518-15B (HAM) – Family Violence: Research and Interventions  
15 Points

PSYC538-15B (HAM) (NET) – Applications of Behaviour Analysis  
15 Points

PSYC539-15A (HAM) – Graduate Research Methods in Psychology  
15 Points

PSYC556-15A (HAM) – Advanced Topics in Abnormal Adult Psychology  
15 Points

PSYC559-15B (HAM) (NET) – Animal Behaviour and Welfare Research  
15 Points

PSYC560-15A (HAM) (NET) – Applied Behaviour Analysis: Theory and Issues  
15 Points

PSYC561-15A (HAM) (NET) – Behaviour Analysis Research and Theory  
15 Points

PSYC562-15B (HAM) – Theories of Psychotherapy  
15 Points

PSYC564-15B (HAM) – Developmental Psychopathology  
15 Points

PSYC568-15A (HAM) – Techniques in Applied Psychology  
15 Points

PSYC571-15B (HAM) – Psychology of Careers  
15 Points

PSYC572-15A (HAM) – Personnel Selection  
15 Points



## PSYCHOLOGY PAPERS

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PSYC573-15A (HAM) – Personnel Training and Development

*15 Points*

PSYC575-15A (HAM) – Psychological Applications and the Treaty of Waitangi\*

*15 Points*

PSYC577-15B (HAM) (NET) – Recent Research in Behaviour Analysis

*15 Points*

PSYC579-15B (HAM) – Advances in Organisational Psychology

*15 Points*

PSYC580-15B (HAM) – The Psychology of Criminal Conduct

*15 Points*

PSYC581-15A (HAM) – Psychological Assessment\*

*15 Points*

PSYC582-15B (BLK) – Community Health Psychology\*

*15 Points*

PSYC583-15A (BLK) – Foundations of Community Psychology\*

*15 Points*

PSYC585-15B (HAM) – Positive Organisation Development

*15 Points*

PSYC587-15Y (HAM) (NET) – Behaviour Analysis Practicum

*15 Points*

PSYC588-15A/B/S (HAM) – Directed Study

*15 Points*

PSYC589-15A/B/S (HAM) – Directed Study

*15 Points*

PSYC590-15A/B/S/Y (HAM) – Directed Study

*30 Points*

PSYC591-15Y (HAM) – Honours Dissertation

*30 Points*

### Dissertations and Theses for MSc, MSc(Research)

POINTS	CODE	TITLE
60	PSYC592-15C (HAM)	Dissertation
90	PSYC593-15C (HAM)	Psychology Thesis
120	PSYC594-15C (HAM)	Psychology Thesis

## COMPUTING & MATHEMATICAL SCIENCES PAPERS

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For details of the following papers please refer to the *Computing & Mathematical Sciences Handbook* or the *2015 University of Waikato Calendar*.

### Computer Science Papers

*Papers are worth 15 points unless specified.*

- » COMP501-15A – Topics in Operating Systems
- » COMP513-15A – Topics in Computer Networks
- » COMP514-15B – Carrier and ISP Networks
- » COMP521-15A – Machine Learning Algorithms
- » COMP535 – Image Processing<sup>†</sup>
- » COMP536-15B – Advanced Graphics and Computer Games
- » COMP537 – User Interfaces for Information Retrieval<sup>†</sup>
- » COMP538 – Topics in Human-Computer Interaction<sup>†</sup>
- » COMP539-15A – Usability Engineering
- » COMP542-15A – Web Search: Technical and Social Issues
- » COMP543-15B – Information Management
- » COMP552-15A – Model Checking
- » COMP553-15A – Extremely Parallel Programming
- » COMP554 – Specification Languages and Models<sup>†</sup>
- » COMP555-15B – Bioinformatics
- » COMP560-15A/C – Turing Topics in Computer Science

<sup>†</sup>*Not offered in 2015.*

### Mathematics Papers

- » MATH501 – Metric Spaces<sup>†</sup>
- » MATH505 – Topics in Analysis and Topology<sup>†</sup>
- » MATH509 – Number Theory<sup>†</sup>
- » MATH511-15A – Semigroups and Universal Algebra
- » MATH512-15B – Continuous Groups
- » MATH513 – Finite Groups<sup>†</sup>
- » MATH515-15A – Analytical Number Theory
- » MATH516 – Topics in Discrete Mathematics<sup>†</sup>
- » MATH541-15B – Classical Partial Differential Equations
- » MATH542-15B – Advanced Partial Differential Equations
- » MATH581-15A/B – Special Topic in Mathematics 1
- » MATH582-15A/B – Special Topic in Mathematics 2

<sup>†</sup>*Not offered in 2015.*