THE UNIVERSITY OF AUCKLAND

FACULTY OF SCIENCE

Contact

Department of Mathematics

The University of Auckland

Private Bag 92019

Auckland

New Zealand

Phone: +64 9 373 7599 ext 86622 or 85886

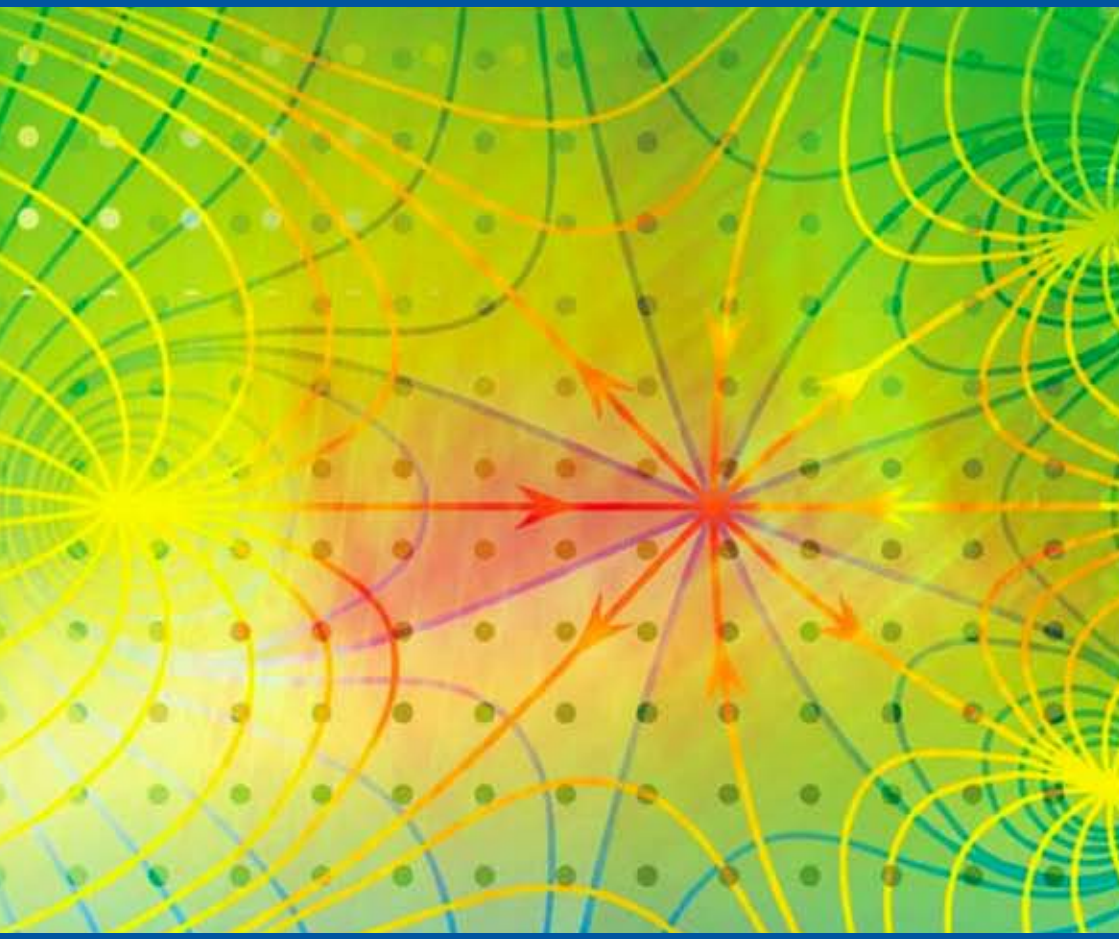
Fax: +64 9 373 7457

Email: pgadvice@auckland.ac.nz

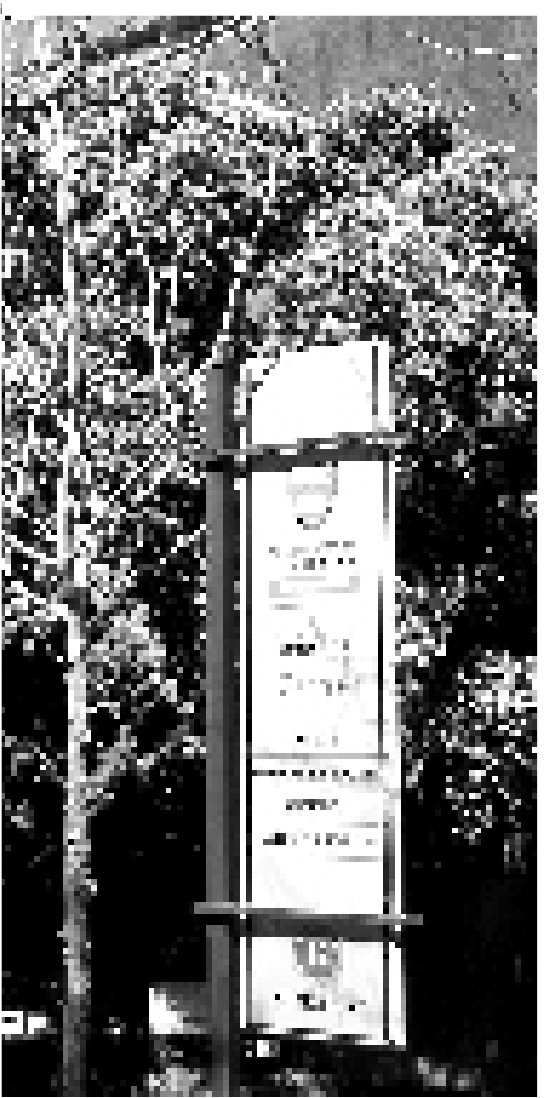
www.math.auckland.ac.nz

THE UNIVERSITY OF AUCKLAND
FACULTY OF SCIENCE

Department of Mathematics
Postgraduate Handbook
2009



Welcome



We would like to extend a warm invitation to all qualified students to consider studying for a postgraduate degree or diploma in Mathematics at the University of Auckland.

The Department of Mathematics is one of the largest and most diverse departments within the University of Auckland. It is also the strongest mathematics department amongst the New Zealand universities, and it has a strong international reputation. It offers degrees and diplomas that enjoy widespread recognition with employers in New Zealand and internationally.

If you enjoyed your experience as an undergraduate student in mathematics, if you would like to enhance your skills and get a taste of leadin edge research, you should consider pursuing graduate studies.

Postgraduate students in Mathematics can specialise in their area of choice and pursue their studies in depth. The Department offers four postgraduate programmes – the Postgraduate Diploma in Science, the Bachelor of Science (or Arts) Honours, the Masters degree (Master of Science, Master of Arts or Master of Education) and the PhD. There are also graduate-level diplomas, which are designed with special audiences in mind, in particular the Graduate Diploma in Science and the Secondary Teaching Diploma in Mathematics Education.

A postgraduate qualification in mathematics will open up a wide range of career opportunities and provide you with knowledge and skills in demand in many areas of endeavour. Graduates from the department take up positions in business, government, industry, research teams, planning and environmental organisations, and a wide range of other areas.

We will be pleased to welcome you as a graduate student in our department.

Bill Barton, Head of Department, Mathematics
Tom ter Elst, PhD Advisor
Steve Taylor, Postgraduate Advisor

Contact and enquiries

Please contact one of the following staff members for information about graduate study and research programmes in Mathematics at the University of Auckland.

Postgraduate advisor
Dr Steve Taylor
Room 306 – Mathematics Department
Extension 86622
Email pgadvice@math.auckland.ac.nz

PhD Advisor:
Dr Tom ter Elst
Room 404 – Mathematics Department
Ext 86901
Email: phdadvice@math.auckland.ac.nz

Head of the Algebra and Combinatorics Group:
Professor Eamonn O'Brien
Room 309 – Mathematics Department
Ext
Email: obrien@math.auckland.ac.nz

Head of the Analysis, Geometry and Topology Unit:
Dr. Warren Moors
Room 332 – Mathematics Department
Ext 84746
Email: moors@math.auckland.ac.nz

Head of the Applied Mathematics Unit:
Dr. Vivien Kirk
Room – Mathematics Department
Ext
Email: kirk@math.auckland.ac.nz

Head of Mathematics Education Unit:
Dr. Hannah Bartholomew
Room 309 – Mathematics Department
Ext 84239
Email: hannahb@math.auckland.ac.nz

Head of the Department:
Associate Professor Bill Barton
Room 301 – Mathematics Department
Ext 88779
Email: b.barton@auckland.ac.nz

Department Address:
Department of Mathematics
University of Auckland
38 Princes Street Auckland CBD or
Private Bag 92019 Auckland 1142, NEW ZEALAND Phone: +64 9 373 7599, Ext 88586

Important Dates

Summer Semester - 2009	
Summer Semester begins	Tuesday January 6 2009
Semester One - 2009	
Semester One begins	Monday 2 March 2009
Semester Two - 2009	
Semester Two begins	Monday 20 July 2009

The Department of Mathematics

Our Department is the largest university Mathematics department in New Zealand and one of the best in Australasia. The Department teaches a full range of courses at the undergraduate and graduate levels, and has particular research strengths across the spectrum of mathematics: algebra, combinatorics, complex analysis, differential geometry, differential equations and mathematical modelling, differential geometry, functional analysis and operator theory, history of mathematics, numerical analysis, topology and mathematics education.

Many of our staff members are leading figures in their area, with strong international reputations for their research. Most publish in top journals and regularly speak and participate in conferences and workshops both locally and overseas. The award of prizes and fellowships of professional or scientific societies, and major research grants have honoured some for their work.

Although a large department, we are still able to teach graduate students in small classes, and provide individual attention and access to experts in many fields. The Department employs most graduate students, in some capacity, so that students and staff feel that they are members of the same team. In some universities, graduate classes are huge, or one or two well-known staff members are overloaded with research students, with negative effects, but such is not the case at Auckland. We have an excellent reputation and our honours graduates are sought after by some of the best-known universities in North America and Europe. We equally have many international visitors and close links with other disciplines.

In short, we provide postgraduate students with a rich, friendly and rewarding environment.

The Mathematics Department offers a wide range of courses at all levels for students in several Faculties. It comprises over 50 permanent and temporary academic staff, and hosts around 25 PhD students and around 40 postgraduate students every semester.

Within the Department there are two units which operate with a certain degree of autonomy: the Applied Mathematics Unit and Mathematics Education Unit, and two research groups. Pure Mathematics represents a strong component of teaching and research, where research is conducted within two generic groups, Algebra and Combinatorics, on one side, and Analysis and Geometry, on the other. Some staff are equally actively involved in the Centre for Discrete Mathematics and Theoretical Computer Science (a joint venture involving the Computer Science and Mathematics Departments of the Universities of Auckland and Waikato).

The Department is housed in the Building 303 the Mathematics/Physics building, on the corner of Princes St and Wellesley St, and adjacent to Albert Park

Why Study Mathematics at the University of Auckland?

The idealists among us would hope that preparation for employment is not the sole reason for graduate study. There is always a pride in being accomplished in one's profession, and in keeping up with the latest developments. Graduate-level courses in Mathematics bring you to the cutting edge of the subject, taught by highly qualified staff who are active in research and keen to communicate the background of their specialist field.

Reading courses, projects and theses provide a research "apprenticeship", helping you gain valuable skills as well as bringing you to the frontiers of knowledge, and the thrill of discovery or the satisfaction of seeing mathematics at work.

The Department has particular strengths in pure and applied mathematics, as well as in mathematics education and offers world-class degrees programmes at both undergraduate and postgraduate levels, including BSc, MSc and PhD.

Students in our department have the opportunity to take research projects, through awarded research scholarships, and all are strongly encouraged to give a research dimension to their graduate studies, through projects and dissertations. Moreover, since 2006, it became a Faculty of Science requirement that the BSc(Hon) degree includes a 30-point research based component.

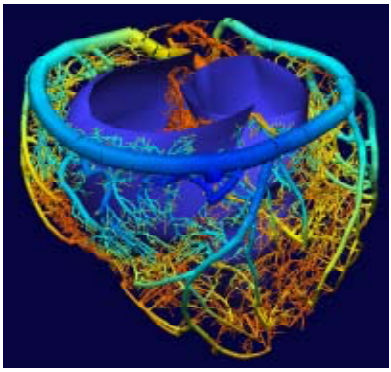


Figure. Interdisciplinary mathematics: Application of finite element analysis, boundary element and collocation techniques to modelling of the human heart and other organs

Graduate study in Mathematics opens up a world of possibilities. It can enable you to indulge your academic enthusiasm or satisfy your intellectual curiosity, at the same time providing you with advanced knowledge and problem-solving skills applicable in any number of fields. In this information age a postgraduate qualification in the mathematical sciences places you well for a career in commerce, education, industry or science. Attractive opportunities exist in biotechnology, computing, finance, meteorology, systems analysis, school and university teaching, and many other fields; and Mathematics graduates with honours are particularly sought after.

Applied Mathematics

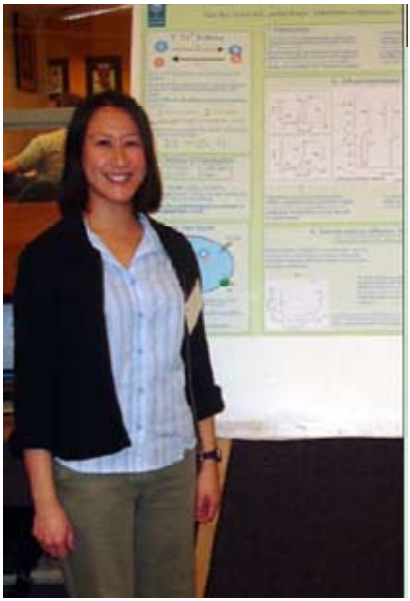
In the fields of applied and industrial mathematics, students are welcome to join our staff in exploring topics of the following research areas: non-linear dynamics, sea-ice in Antarctica, numerical methods, radio-carbon dating, cellular physiology, building acoustics, the solar system, medical imaging, control theory or circuit theory.

Over the last year, applied mathematics students investigated topics as modelling functions or mechanisms of the human body or modelling distribution of volcanic ashes; they proposed mathematical techniques in applied neuroscience, generalisations of social laws (eg. Dodgson's rule), or applications of graph theory to genealogy. They would often attend international workshops and some of their work would be published in well-quoted international journals.

Elan Gin - Applied Mathematics PhD student

Elan Gin is constructing a mathematical model of the mechanisms underlying saliva secretion as she studies for her PhD. Her research supervisor is Professor James Sneyd, a leading mathematical physiologist and a key reason why Elan cho se to study in Auckland.

Having recently attended the Gordon Research Conference on Theoretical Biology in New Hampshire, USA, Elan rates meeting like-minded people and the opportunities she's had to travel while studying as highlights of her time at The University of Auckland. "A key element of a science degree is being able to communicate your field of study to non-experts. I feel my MSc helped develop my ability to explain my research at a more accessible level."



Applied Mathematics Unit Staff

A/Prof David Bryant

David Bryant is an Associate Professor of Mathematical Biology. Dr Bryant works on computational, statistical and mathematical aspects of evolutionary biology.

As a mathematician, develops and applies tools from many diverse areas of mathematics and statistics. As an evolutionary biologist, he works developing tools for genetic analysis, reconstruction of evolutionary history, and evolutionary ecology. He is co-author of the SplitsTree package, software used for visualising of evolutionary patterns in genetic data.

David Bryant obtained a Ph.D. under Prof. Mike Steel, University of Canterbury, in 1997. After 3-4 years postdoc work in France, Germany and Canada, he took up a position at McGill University, Montreal, Canada, joint between the school of computer science and the department of mathematics and statistics. He was awarded tenure in 2005, and took up his position at University of Auckland in July of that year.

Dr Bryant is an associate member of the Canadian Institute for Advanced Research and the Allan Wilson Centre for Molecular Ecology and Evolution. His current research interest is in developing tools for studying rapid speciation and adaptions of organisms in response to climate and environmental changes.

Prof. Butcher's research interests are in numerical methods for ordinary differential equations. In particular he is a specialist in Runge-Kutta methods and general linear methods and his contributed widely to the theory of order conditions and of both linear and non-linear stability. His present projects include the derivation, analysis and practical implementation of methods possessing the "Inherent Runge-Kutta Stability" property.
He is on the editorial board of "Applied Numerical Mathematics" and "Numerical Algorithms". In addition to a PhD, he has a DSc degree for publications in numerical analysis; he is a Fellow of the Royal Society of New Zealand and of the New Zealand Mathematical Society. He is the recipient of the New Zealand Mathematical Society Research Award and the Hector Medal of the RSNZ. He is the author of two books on numerical methods for differential equations and more than 130 research papers.

A/Prof Bruce Calvert

has received his PhD from the University of Chicago and has been associated with the Department since 1971. Bruce Calvert is interested in nonlinear analysis and related issues. His recent work is on monotone and unicursal resistive networks. Other recent work is on the Downs-Thomson

effect in traffic flow, treated as a random process. Other work is on geometrical characterizations of Minkoski space and L_p spaces in terms of projections which have norm one. Earlier work is on various topics in nonlinear operators in Banach lattices in paticular, semigroups of nonlinear operators and T-monotone operators with examples of elliptic boundary value problems.

Dr Vivien Kirk

Vivien Kirk is a Senior Lecturer in the Department and currently Head of the Applied Mathematics Unit. Her research interests are in dynamical systems, being primarily concerned with understanding the qualitative behaviour of solutions to nonlinear differential equations. She is interested in applying dynamical systems techniques to mathematical models arising in a variety of physical and biological systems, with recent work being particularly in the area of mathematical models of cellular calcium dynamics.

Dr Mike Meylan

Michael Meylan is a Senior Lecturer. He completed his Ph.D. under Vernon Squire in 1993 which was concerned with modelling ice floes using linear wave theory. He has worked on various problem connected with linear water wave theory in the subsequent time.
He is currently interested in Linear Wave theory applied to water waves, wave propagation in ice infested seas. He runs a website concerning his research at http://www.wikiwaves.org.

Dr Philip Sharp

Philip Sharp is a senior lecturer ane the Associate Head of Department - Academic. He received his BSc(Hons) in Physics and Mathematics from Canterbury and completed a PhD in fluid dynamics at the same University. He joined the Department in 1993 after nice years where he held academic positions at the University of Toronto and Queen's University, Canada. Philip is an an Applied Mathematician who specialises in the development of numerical integrators for differential equations and the use of simulations to model the Solar System. He has a passion for Astronomy and gives courses on Astronomy through the Centre for Continuing Education at the University of Auckland.

Project courses and theses offered in numerical analysis and computational astronomy.

Dr Arkadii Slinko

Arkadii Slinko is a Senior Lecturer. He received his PhD and bSc degrees from the Sobolev Institute of Mathematics) and has joined the Department in 1993.
His current research interests are in

- Mathematical Economics and, in particular, Social Choice Theory, Decision Theory and mathematical theories of allocation of discrete resources (current)
- Cluster analysis and applications (current) • Design of experiments and random matrices (current)
- Mathematics education of gifted stu-

dents and mathematics competitions (current) .
Arkadii is a coordinator for the New Zealand Mathematics Olympiad.
Reading courses and projects offered

* Mathematics of Voting and Political Competition (Thesis Project)
* Combinatorial Problems in Decision Theory (Thesis Project)
* Mathematics of Simple Games (Thesis Project)

Prof James Sneyd

James Sneyd is the Professor of Applied Mathematics and is interested in body parts. His research is in the general area of mathematical physiology, with a particular focus on cell signalling and cell biology. For example, one current project is the study of asthma in airway smooth muscle, while another project involves the study of how saliva secretion works. Or doesn't. Mathematically, this involves the construction and numerical solution of reaction-diffusion equations. Put that way, it sounds really boring, but it isn't. It's actually a lot of fun, building up models and analysing them.
James works closely with a number of experimental laboratories in the US, which means that his students often get to travel to the US to see how things are done.
James has never performed any scientific experiments on students, and is even reluctant to kill mice.

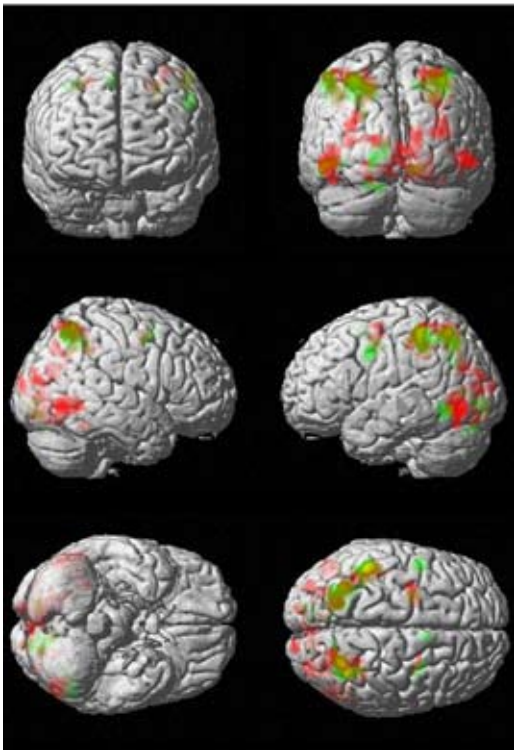


Figure: Brain areas activated by mathematical thinking

Pure Mathematics

Students planning to take researchs project or dissertations with pure mathematicians in the Department have a choice of supervisors amongst researchers at the top of their fields. Pure Mathematics is represented by two research units, Algebra and Combinatorics, on the one side and Analysis and Geometry, on the other side. Their main research topics are analysis, algebra, combinatorics, group theory, topology, geometry, and graph theory.

There are three seminar series run by these two: a weekly Algebra and Combinatorics seminar, an Analysis and Topology seminar, plus a weekly workshshop on Analysis and Geometry, which encourages students to present their latest reseacrh (or readings) in a friendly and relaxed atmosphere.

Recently, pure mathematics students were involved in projects on tractor calculus, small volume 4-manifolds, the degree-diameter problem in graphs, comparative probability ordering in sets, or geometric models in string theory.

The Algebra and Analysis groups attract every year a significant number of international visitors, amongst who are world-renowned figures like John Conway, Vaughan Jones, Marcus du Sautoy and Ian Stewart. Most of the visitors give seminars or colloquia talks, whilst some give public lectures or spend part of the semester lecturing a postgraduate special topic course.

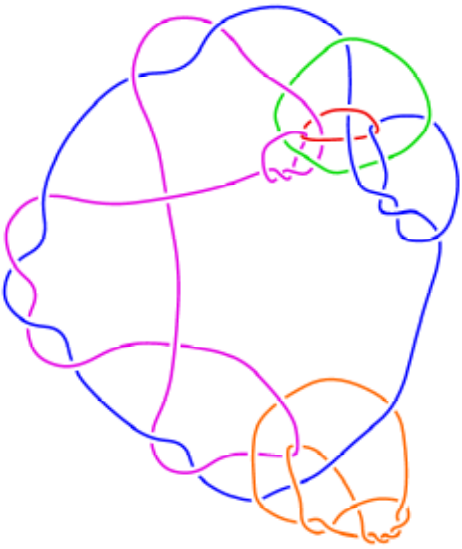


Figure: 5-component link with Jones polynomial $(t^{1/2} - t^{-1/2})^4$

Development and use of pure mathematical techniques for distinguishing knotted structures … are applied to molecular biology (RNA strands and protein folding) and theoretical physics.

Algebra and Combinatorics Staff

A/Prof Jianbei An has received his PhD from the University of Illinois. He has been associated with the Mathematics Department since 1992 and has been recently working on the Alperin weight conjecture, the Alperin-McKay conjecture, the Dade conjecture for some finite groups.

Prof Marston Conder

Marston Conder is Co-Director (with our Distinguished Alumni Professor Vaughan Jones) of the New Zealand Institute of Mathematics and its Applications (the NZIMA). He is especially interested in the fields of combinatorial group theory, graph theory, discrete computation, and the symmetries of maps and surfaces.

Marston has won a number of prestigious awards (including the Senior Mathematical Prize at Oxford, a Fellowship of the Alexander von Humboldt Foundation, and a Hood Fellowship), and was elected a Fellow of the Royal Society of New Zealand in 1998 and awarded a DSc degree by Oxford University the following year. He is currently also the President of the Academy of the Royal Society of New Zealand.

Projects offered:

Marston offer student supervision for projects related to:

* the determination of all chiral and reflexible regular maps on surfaces of genus up to 100 - leading to the discovery (and proof) that infinitely many surfaces carry no chiral map and no regular map without multiple edges,
* discovery of the first known examples of finite chiral 5-polytopes,
* finding presentations for the alternating and symmetric groups with fixed numbers of generators and relations, and
* construction of Cayley graphs with largest possible symmetry groups.

Prof Eamonn O'Brien

Eamonn O'Brien is a Professor of Mathematics. His primary research interests are algorithmic and computational aspects of group theory. He has published about 50 research papers in leading international journals, various conference papers, chapters in books, and is coauthor of a "Handbook for Computational Group Theory". Implementations of his algorithms are distributed world-wide with the leading computational algebra systems.

Eamonn received a BSc in 1983 from the National University of Ireland (Galway) and a PhD from the Australian National University in 1988.

He was a Research Fellow in Canberra from 1990-1995, a Humboldt Foundation Research Fellow in Germany from 1995-1997,and joined the Department in 1997.

Eamonn's research projects include aspects of finitely-presented groups, p-groups, and linear groups.

Reading courses and projects offered

* Automorphism groups of finite groups (Reading and/or Project)
* Computational aspects of group representation theory (Reading and/or Project)
* Finitely-presented groups (Reading and/or Project)

oo oo oo

Analysis and Geometry Staff

Prof David Gauld

My research interests are in set theoretic topology, especially applications to non-

metrisable manifolds, and topological properties of manifolds near the limit of metrisability. If you are interested in my collection of 100 topological properties equivalent to metrisability for a manifold go to **http://www.math.auckland.ac.nz/~gauld/research/metrisability.pdf**

I have had four students complete their PhD degrees under my supervision, currently have a fifth PhD student and expect a sixth to arrive in Auckland in the next couple of months or so.

Here are some results I have discovered very recently with coauthors from Auckland, India, Oman and Switzerland:

- A topological manifold is metrisable if and only if the space of real-valued functions with the compact-open topology is Volterra. Volterra spaces are something Zbiggie Piotrowski and I introduced in the 1990s and developed with Sina Greenwood. It is a generalisation of the Baire property. Of course a manifold is also metrisable if and only if the space of real-valued functions with the compact-open topology is Baire.
- Up to isotopy homeomorphisms of powers of the long ray and line behave just like homeomorphisms which permute the axes (and possibly reverse directions in the case of the line).

A/Prof Rod Gover

Rod Gover has received his MSc form Canterbury and his DPhil from Oxford.

He joined the Deparrtment in 1999 and has `supervised a PhD student who graduated in 2006. He presently advises 2 PhD and an MSc student. His research interests include differential geometry, twistor theory and mathematical physics. He is especially focussed on a class of differential geometries known as parabolic geometries. This class includes conformal geometries, CR geometries (which turn up in complex analysis), quaternionic geometries, projective differential geometries and many other structures.

Projects offered for supervision:

* Classical invariant theory (Reading)
* Riemannian geometry (Reading)
* Conformal or CR differential geom-

Dr Sina Greenwood

Sina Greenwood is a Senior ecturer. Her primary area of research is set theoretic topology and in particular nonmetrisable manifolds and discrete dynamical systems. She is currently addressing a question. which arises naturally from fixed point theorems in topology: if f is an arbitrary self-map on a set X and P is some topological property, under what conditions can one endow X with

a topology that satisfies P and with respect to which f is continuous? Her present focus is the case where P is connected compact Hausdorff.

She is also working on Brunnian links and her current goal in this area is to classify non-simple and also generalised Brunnian links. She is interested in how these links occur in protein molecules.

A second area of interest relates to the advancement of Maori (please add macron) and Pasifika students. She is involved in a research project tracking Northland Maori students through high school to find out what factors influence their decisions to pursue mathematics. Another project involves a collaboration with the National University of Samoa. The objectives are to investigate the way Samoan tertiary students relate to mathematics, and examine the cultural factors within an educational institution that affect their success in mathematics.

Dr Warren Moors

Warren Moors is a Senior Lecturer. He received his PhD from Newcastle in 1992. Warren works on problems that lie at the interface between Functional Analysis and General Topology. In particular he has interests in Banach space theory, Nonsmooth analysis and General Topology.
His broad research interests are reflected in his 60 research papers that are published in leading international journals.

Dr Tom ter Elst

After a successful lecturing and research career in the Netherlands, Tom ter Elst has joined the Department in 2006 and is currently a Senior Lecturer. Tom received his PhD from Eindhoven and - after a postdoctoral fellowship at the Australian National University - lectured in this city for 15 years. Tom's research interests are in the fields of harmonic analysis, operator theory, geometric analysis, PDE, subelliptic and degenerate operators. His research is reflected in his book **Analysis on Lie groups with polynomial growth** and in over 50 research papers.
Tom has supervised a number of students (including a PhD) and offers project supervision in the broad areas of analysis and geometry.
Moreover, Tom is the Mathematics PhD coordinator since 2007 and welcomes any PhD related enquiry (email phdadvice@math.auckland.ac.nz).

Dr. Shayne Waldron

If the one of the two cartesian coordinates of a battleship is lost, then its position can no longer be determined. It is possible to give three coordinates, so that its position can still be determined if one is lost. This is an example of what is called a finite tight frame. My recent work involves the theory and application of finite tight frames to areas such as signal analysis, quantum measurements and multivariate orthogonal polynomials.
Shayne holds a Honours degree from Canterbury (NZ) and PhD from the University of Wisconsin-Madison. He has joined the Department in 1997 and his research interests are in approximation theory.

Mathematics Education

The Mathematics Education Unit (MEU) offers a suite of graduate courses that can be taken either as part of an MSc, MA or MEd programme. The unit runs an active seminar programme, a graduate support network, regular outreach activity into schools and the New Zealand mathematics education community, and links with overseas institutions.

The Mathematics Education Unit offers research projects or dissertation topics in the following areas: Ethno-mathematics, Statistics and Probability, Methodologies and Technology issues.

During the last year, mathematics education students were involved in research concerning the connections between technology and the mathematics curricula; the way students perceive equations; in studies of the way mentoring maths teachers would raise their own students achievements; in developing new tools for teaching mathematics (eg. teaching geometry via origami folding). Mathematics education papers and research are credited under the (Pure) Mathematics major offered by the Department.

In 2008 the MEU hosts - besides its regular staff, students and international guests - a Teaching Fellow, two Royal Society fellows and two Master scholars - all New Zealand secondary teachers on sabbatical study or research leave.

Mathematics Education Unit Staff

The Mathematics Education Unit Postgraduate Handbook will provide you with further information on staff profiles, courses and research opportunities.

Financial support for students

Our students and staff are strongly encouraged to apply for the appropriate scholarships and make the most of the various funding rounds that take place every year. This means that most of our senior postgraduate students will benefit from some type of funding.

Within the Department of Mathematics, the main types of paid employment for graduate students are assignment marking and lab demonstrating. In addition, students are employed to run first-year tutorials and to help in the first-year assistance room.
Application forms can be obtained from the Department of Mathematics.

Assignment Marking:
There is a large amount of assignment marking (for undergraduate courses) each year. The Department pays Stage III and graduate students to do marking, and this employment is open to anybody with good grades in first and second year Mathematics courses. Each semester we employ about 30 markers.
Contact Alastair McNaughton at a.mcnaughton@auckland.ac.nz for further information.

Computer Lab Demonstrating:
The Department has two undergraduate computer labs it shares with the Department of Statistics. Each year, the Department employs about 20 students to work in the labs as demonstrators. Naturally, these students must have a good working knowledge of the computers and software used in the labs.
Contact Allison Heard at heard@auckland.ac.nz for further information.

Temporary Tutorships:
These are available to PhD students and to a small number of Masters students who have ability or experience in teaching or lecturing. The duties vary but usually involve teaching and marking.
Contact Alastair McNaughton at a.mcnaughton@auckland.ac.nzfor further information.

Assistant Lectureships:
These are available to selected PhD students only. The duties vary from lectureship to lectureship, but usually involve examination, marking and teaching.

Contact Bill Barton at b.barton@auckland.ac.nz for further information.

Note: There is a trade-off between studying and (part-time) work. If you work too many hours a week, your studies will suffer. For example, if you are doing an MSc thesis full-time and you work 15 hours a week, your thesis will typically take several more months to complete than if you had no paid employment.

Postgraduate Degree Programmes

Graduate Degrees in Mathematics

There are four possible graduate programmes you can enrol in after getting your BSc or BA in Mathematics or Applied Mathematics.

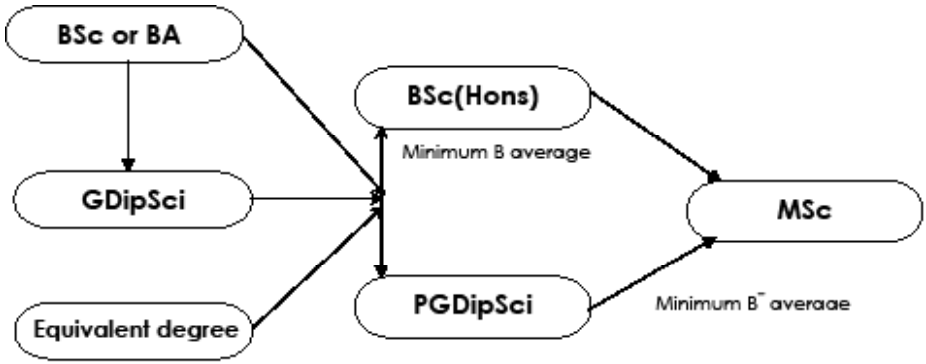
At the University of Auckland, students can start a degree (or a diploma) either in the first or the second semester of a given academic year.

The graduate advisor for the Department of Mathematics guides students in their choice of a programme that is most appropriate for their needs and qualifications.

The Mathematics graduate advisor establishes the elligibility of a student to enrol in a graduate degree or diploma and - once the student is admitted by the University - approves their enrolment in th epostgraduate courses of their choice.

The information below summarises the regulations for the various degrees. In the next section you will find a list of graduate courses that are planned to be offered next year.

For further help, you are welcome to contact
Dr Steve Taylor
Ext 86622
Graduate Advisor for all graduate programmes
(except PhD)
Room 306 - Mathematics Department
pgadvice@math.auckland.ac.nz



Entry requirements for postgraduate degrees

The information below summarizes the pre-requisites and requirements for the four postgraduate degrees and diplomas in matthematics, available at the University of Auckland.

A degree (or diploma) is obtained after having passed 120 points worth of post-graduate courses. A regular course is usually 15 points, while some research-based projects may be worth 30, 45 or 60 points. A Major for each of the graduate degrees is 75 points or more in the respective subject (Mathematics or Applied Mathematics).

The regulations below are not hard and fast and exceptions are possible, although very few exceptions are made to the requirements for the degrees. These guidelines should be read in conjunction with the University of Auckland Calendar, which contains the official regulations and course requirements approved by the University. The Calendar is available at http://www.auckland.ac.nz/calendar.

Postgraduate Diploma in Science (PGDipSci)

This is the most popular graduate programme, possibly because you can take up to four years to complete it.

You need to pass eight 15-point courses at either the 600- or 700-level, with at least 75 points in the Major (Mathematics or Applied Mathematics).

If you are doing the degree in Applied Mathematics, you must pass MATHS 361 (Partial Differential Equations) and either MATHS 362 (Methods in Applied Mathematics) or MATHS 363 (Advanced Modelling and Computation) before enrolling in the degree.

If your average marks for the courses of your PGDipSci are sufficiently high, you will be awarded the degree with distinction or merit.

If you failed your PGDipSci (too many failed courses, discontinued the Diploma without seeking an interruption), you will not be able to take another Postgraduate Diploma, at the University of Auckland.

Bachelor of Science (Honours) (BSc(Hons)) in Mathematics or Applied Mathematics
Bachelor of Arts (Honours) (BA(Hons)) In Mathematics

To be awarded a BSc(Hon) (or a BA(Hons) you need to pass 120 points of 700-level courses, with at least 75 points in Mathematics (or Applied Mathematics).

To be admitted into the BSc(Hons)/ BA(Hons) in Mathematics programme, you must have a major in Mathematics including either MATHS 320 (Albegraic Structures) or MATHS 332 (Real and Complex Analysis) and at least B in at least 90 points of courses at Stage III. These courses need not all be in Mathematics.

If you are doing a BSc(Hons) in Applied Mathematics, you must pass MATHS 361 and either MATHS 362 or MATHS 363 before enrolling in the degree.

For BSc(Hon), you will have to write an honours disertation, under the supervision of a member of the Mathematics department. You will need

to be enrolled in MATHS 776 (Honours dissertation in Mathematics or Applied Mathematics) for doing this.

You can do an honours' degree either full-time over one year or part-time over two years. At graduation, your actual class of honours will depend on the average mark for the courses you attempt for your BSc(Hons), computed over all the papers attempted (passed or failed). An average greater than A- leads to first class honours, an average between B and B+ leads to 2nd class honours (1st division), an average of B- leads to 2nd class honours (2nd division). An average between C- and C+ will secure you a Postgraduate Diploma in Science, and not a BSC(Hon).

Graduate Diploma in Science (GradDipSci)

This diploma is at a lower level than a postgraduate diploma in science. Students who enrol in this diploma are often transferring from other universities. If you have any questions about the programme, you should contact the graduate advisor.

To get a GradDipSci, you must pass 120 points at Stage II and above, with at least 75 points (of the 120) Stage III or above.

You can do a GradDipSci in Mathematics or Applied Mathematics. Before you can enrol in a GradDipSci you must have a BSc or an equivalent degree in the required major. A GradDipSci can be done part-time over four years.

Master of Science (MSc) Master of ARTS (MA)

Before being admitted into an MSc programme, you will need to get the approval of the Department of Mathematics, then find a supervisor for your thesis and have him or her complete a simple thesis proposal form.

The emphasis in an MSc is on original research.

To get an MSc/MA, you must either do a 120 point thesis or a 90 point thesis and 30 points of other courses. You can do an MSc in Mathematics, Applied Mathematics, Bioinformatics or Logic and Computation.

Before you can enrol in an MSc you must have a BSc(Hons) or PGDipSci with sufficiently high marks in the required major. Under the 2008 regulations, you must hold a PGDipSci or a BSc(Hons) (BA(Hons)) in mathematics or Applied Mathematics, to be admitted in an MSc/MA degree .

If you obtained your PGDipSci or BSc(Hons) degree from Auckland, you will need a B- average over at least 90 points of your courses, of which at least 75 points must be in 700-level (graduate level) courses.

An MSc can be done part-time over two years.

If your average mark for your MSc is sufficiently high you will be awarded the degree with honours.

If you require more information about doing an MSc, please contact the graduate advisor.

Postgraduate Courses at the Department of Mathematics

Overview of 2009 Postgraduate Courses

2009 Postgraduate Courses			
MATHS	Title	Point value	Prerequisites or Recommended preparation
Summer Semester			
705	Research Skills in Mathematics Education	15	Department approval
Semester 1			
705	Social Issues in Mathematics Education	15	Department approval
706	Technology and Mathematics Education	15	Department approval
715	Graph Theory and Combinatorics	15	MATHS 326 or 320
720	Group Theory	15	MATHS 320
730	Measure Theory and Integration	15	MATHS 332
740	Complex Analysis	15	MATHS 332
745	Chaos, Fractals and Bifurcation	15	Department approval
750	Topology	15	MATHS 332 or 353
763	Advanced Partial Differential Equations	15	MATHS 340 and 361
770	Advanced Numerical Analysis	15	MATHS 270 and one of MATHS 340, 361, 363
Semester 2			
712	Mathematics and Learning	15	Department approval
707	Mathematical Processes (Special Topic in Mathematics Education 1)	15	Department approval
713	Logic and Set Theory	15	MATHS 315 or PHIL 305
714	Number Theory	15	B+ in MATHS 328 or 320
721	Representations and Structure of Algebras and Groups	15	MATHS 320
731	Functional Analysis	15	MATHS 332 and MATHS 333
761	Dynamical Systems	15	MATHS 340 and 361
769	Applied Differential Equations	15	MATHS 340 and 361
783	Advanced Topic(s) in Mathematics 3 (Lie Groups and Algebras)	15	Recommended: MATHS 320 and 332
789	Advanced topics in Applied Mathematics 4 (Non-linear PDEs)	*15*	Recommended: MATH 340 and MATH 361
	Various special topics and advanced topics courses, in Mathematics, Applied Mathematica and Mathematics Education are also available	15 or 30	Require a supervisor and Department approval

This section lists the graduate-level courses the Department is expecting to offer.

Please contact the lecturer(s) involved or a Graduate Students Coordinator (email pgadvice@math.auckland.ac.nz) if you would like to find out more details. In addition to these, several reading courses and research projects are offered - see the next section.

MATHS 701
Research Skills in Mathematics Education
15 points
SS 2010
Recommended Preparation: MATHS 302 and one of MATHS 702-MATHS 709
Prepares students for postgraduate study in mathematics and statistics education. Its emphasis is on workshops in the key research skills required by students working at this level. It will cover a range of research issues and techniques.

MATHS 702
MATHEMATICS CURRICULUM
15 points
S1 C 2010, S2 2011
Considers such issues as the historical development of mathematics and statistics curricula, current New Zealand and international trends, the relationship between curriculum and assessment, and the politics of curriculum development.
Main lecturers: Dr Hannah Bartholomew, Dr Maxine Pfannkuch

MATHS 703
THEORETICAL ISSUES IN MATHEMATICS EDUCATION
15 points
S2 2010
Recommended Preparation: MATHS 302
An analysis of theoretical perspectives that inform research in mathematics education, with a focus on learning theories, both social and psychological, and their implications for teaching and learning in mathematics.
Main lecturers: Dr Hannah Bartholomew, Assoc. Prof. Mike Thomas

MATHS 705
SOCIAL ISSUES IN MATHEMATICS EDUCATION
S1 2009
15 points
Recommended Preparation:
MATHS 302
An examination of cultural, social, and language issues that arise in mathematics and statistics education. It will cover literature and theory on topics including language and learning, gender and equity issues, and cultural aspects of mathematics and statistics learning..

MATHS 706
TECHNOLOGY AND MATHEMATICS EDUCATION
15 points
S1 2009, S2 2010, S1 2011
The use of computers and calculators in mathematics education, with a focus on both theoretical and practical aspects of the use of computers in the mathematics classroom. The pedagogical implications of computers for the present and the future of mathematics education are discussed

MATHS 707
MATHEMATICAL PROCESSES (SPECIAL TOPICS IN MATHEMATICS EDUCATION 1)
15 points
S1 2009
This course will consider the mathematical processes of problem-solving, modelling, conjecturing, argumentation and proving in the context of senior secondary and undergraduate mathematics

MATHS 708-710
SPECIAL TOPICS IN MATHEMATICS EDUCATION 3-4
15 points
By arrangement

A special topic15-point paper that is available for personal study in a particular area of interest in mathematics education. You will have a supervisor for your topic.

These courses require that students do individual study in a particular area of interest in mathematics education. They are offered in every semester, including Summer School. Please consult the Department of Mathematics before enrolment.

MATHS 711 A & B
SPECIAL TOPICS IN MATHEMATICS EDUCATION 5
30 points
By arrangement
This is a special topic 30-point paper. This course allows students to do individual study in a particular area of interest in mathematics education. It can be taken as MATHS 711 (30 points) in Summer School or as MATHS 711A and 711B (each worth 15 points) over Semesters 1 and 2. A supervisor is required for this course. Please consult the Department of Mathematics before enrolment.

MATHS 712
MATHEMATICS AND LEARNING
S2 2009, S1 2010, S2 2011
15 points
Recent theoretical perspectives on the teaching and learning of school and university mathematics are linked to the learning of either calculus or algebra. The focus is on the mathematics content, applications, and effective learning at school and university. The topics will be 2007 Calculus, 2008 Algebra and 2009 Calculus).

STATS 708
TOPICS IN STATISTICAL EDUCATION
S1 C 2009 and 2011
15 points
Covers a wide range of research in statistics education at the school and tertiary level. An examination of the issues involved in statistics education in the curriculum, teaching, learning, technology and assessment areas.

MATHS 713
LOGIC AND SET THEORY
15 points
S2 2009
A study of the foundations of pure mathematics, formalising the notions of a "mathematical proof" and "mathematical structure" through predicate calculus and model theory. Explores the limits of these formalisations such as those posed by Gōdel's Incompleteness theorems, and it includes a study of axiomatic set theory.
Prerequisite: MATHS 315 or PHIL 305

MATHS 714
NUMBER THEORY
15 points
S2 C
A broad introduction to various aspects of elementary, algebraic and computational number theory and its applications, including primality testing and cryptography.
Prerequisites: B+ in either MATHS 328 or MATHS 320.

MATHS 715
GRAPH THEORY AND COMBINATORICS
15 points
S1 C
Theory and applications of combinatorial graphs (networks), block designs, and error-correcting codes. Topics include graph connectivity, trees, colourings, embeddings, digraphs, matchings, incidence matrices, eigenvalue methods, Steiner systems, perfect

and linear codes. Prerequisites: MATHS 326 or 320.

MATHS 720
GROUP THEORY
15 points
S1 C
A study of groups focusing on basic structural properties, presentations, automorphisms and actions on sets, illustrating their fundamental role in the study of symmetry (for example in crystal structures in chemistry and physics), topological spaces, and manifolds.
Prerequisites: MATHS 320.

MATHS 721
REPRESENTATIONS AND STRUCTURE OF ALGEBRAS AND GROUPS
15 points
S2 C
Representation theory studies properties of abstract groups and algebras by representing their elements as linear transformations of vector spaces or matrices, thus reducing many problems about the structures to linear algebra, a well-understood theory.
Prerequisites: MATHS 320.

MATHS 730
MEASURE THEORY AND INTEGRATION
15 points
S1
Presenting the modern elegant theory of integration as developed by Riemann and Lebesgue, it includes powerful theorems for the interchange of integrals and limits so allowing very general functions to be integrated, and illustrates how the subject is both an essential tool for analysis and a critical foundation for the theory of probability.
Prerequisite: MATHS 332
Recommended preparation: Strongly recommended: MATHS 333

MATHS 731
FUNCTIONAL ANALYSIS
15 points
S2 C
Provides the mathematical foundations behind some of the techniques used in applied mathematics and mathematical physics; it explores how many phenomena in physics can be described by the solution of a partial differential equation (for example the heat equation, the wave equation and Schrōdinger's equation).
Prerequisite: MATHS 332 and MATHS 333
Recommended preparation: MATHS 730 and MATHS 750

MATHS 735
ANALYSIS ON MANIFOLDS AND DIFFERENTIAL GEOMETRY
15 points
S2 C 2010
Studies surfaces and their generalisations, smooth manifolds, and the interaction between geometry, analysis and topology; it is a central tool in many areas of mathematics, physics and engineering. Topics include Stokes' theorem on manifolds and the celebrated Gauss Bonnet theorem.
Prerequisite: MATHS 332
Strongly recommended: MATHS 333 and 340.

MATHS 740
COMPLEX ANALYSIS
15 points
S1 C
Studies analytic functions and their properties, which often reflect the topology of the region on which the functions are defined. This relationship yields powerful conceptual and computational tools and results, including the uniformisation theorem of Riemann which is a

cornerstone in conformal geometry. The concepts and objects have applications in many branches of mathematics, physics, and engineering.
Prerequisite: MATHS 332
Recommended preparation: Strongly recommended: MATHS 333 and MATHS 340

MATHS 745
CHAOS, FRACTALS AND BIFURCATIONS
S1 2009
Presents the classical fractals of computer science and art such as Julia and Mandelbrot sets, iterated function systems and higher-dimensional strange attractors, and illustrates applications of chaos, fractals and bifurcation to areas including commerce, medicine, biological and physical sciences.

MATHS 750
TOPOLOGY
15 points
S1 C
Unlike most geometries, topology models objects which may be stretched. Its ideas have applications in other branches of mathematics as well as physics, chemistry, economics and beyond. Its results give a general picture of what might happen rather than precise details of when and where. The course covers aspects of general and algebraic topology.
Prerequisite: MATHS 332 or MATHS 353
Recommended preparation: Strongly recommended: MATHS 333

MATHS 761
DYNAMICAL SYSTEMS 15 points
S2 C
Mathematical models of systems that change are frequently written in the form of nonlinear differential equations, but it is usually not possible to write down explicit solutions to these equations. This course covers analytical and numerical techniques that are useful for determining the qualitative properties of solutions to nonlinear differential equations.
Prerequisite: MATHS 340 and MATHS 361

MATHS 763
ADVANCED PARTIAL DIFFERENTIAL EQUATIONS
15 points
S1 C
A study of exact and approximate methods of solution for the linear partial differential equations that frequently arise in applications.
Prerequisite: MATHS 340 and MATHS 361

MATHS 764
MATHEMATICAL BIOLOGY
15 points
S1 C (not offered in 2008)
A course introducing central concepts in mathematical biology, with emphasis on modelling of physiological systems and gene dynamics.

MATHS 769
APPLIED DIFFERENTIAL EQUATIONS
15 points
S1 C
Systems taken from a variety of areas such as financial mathematics, fluid mechanics and population dynamics can be modelled with partial differential equations and stochastic differential equations. This course uses such applications as the context to learn about these two important classes of differential equations.
Prerequisite: MATHS 340 and MATHS 361

MATHS 770
ADVANCED NUMERICAL ANALYSIS
15 points
S1 C

Advanced Numerical Analysis
Covers the use, implementation and analysis of efficient and reliable numerical algorithms for solving several classes of mathematical problems. The course assumes students have done an undergraduate course in numerical methods and can use Matlab or other high-level computational language
Prerequisite: MATHS 270 and one of MATHS 361, MATHS 340, MATHS 363

MATHS 776
HONOURS DISSERTATION IN MATHEMATICS OR APPLIED MATHEMATICS
30 points
Restriction: MATHS 791

MATHS 777
PROJECT IN MATHEMATICS 1
15 points
Each of these projects or special topics courses involves participation in a research project or investigation in some topic from pure or applied mathematics, under the supervision of one or more staff members, and presentation, by the student, of the results in a seminar; further information may be obtained from the Department of Mathematics.
Restriction: MATHS 792

MATHS 781
ADVANCED TOPIC(S) IN MATHEMATICS 1
15 points
S1 C

MATHS 782
ADVANCED TOPIC(S) IN MATHEMATICS 2
15 points
S2 C

MATHS 783
ADVANCED TOPIC(S) IN MATHEMATICS 3
15 points
S2 C
This course can be taken as either
a) a special topic project (It is necessary to find a supervisor and get the approval of the Postgraduate Advisor before enrolling; or
b) a course on Lie Groups and Lie Algebras, given by Dr. Arkadii Slinko and Dr. Tom ter Elst. Prerequisite: Maths 320 and 332

MATHS 784
ADVANCED TOPIC(S) IN MATHEMATICS 4
15 points
S2 C
Each of these courses involves participation in a research project or investigation in some topic from pure or applied mathematics, under the supervision of one or more staff members, and presentation, by the student, of the results in a seminar; further information may be obtained from the Department of Mathematics.

MATHS 786
ADVANCED TOPIC(S) IN APPLIED MATHEMATICS 1
15 points
S1 C, S2 C
Each of these courses (781-784) involves participation in a research project or investigation in some topic from pure or applied mathematics, under the supervision of one or more staff members, and presentation, by the student, of the results in a seminar; further information may be obtained from the Department of Mathematics.

MATHS 787
ADVANCED TOPIC(S) IN APPLIED MATHEMATICS 2
15 points
S2 C

MATHS 788
ADVANCED TOPIC(S) IN APPLIED MATHEMATICS 3
15 points
S1 C

Each of the courses "Advanced Topic(s) in Applied Mathematics" deals with some special topic from applied and computational mathematics. Some of these courses are also alternatively offered as regular courses. Carefully read the course description.
See the Postgraduate Advisor in the Department of Mathematics for more information.

MATHS 789
ADVANCED TOPIC(S) IN APPLIED MATHEMATICS 4:
ADVANCED TOPIC IN NON-LINEAR PDES
15 points
S2 C
A study of exact and numerical methods for non-linear partial differential equations. The focus
will be on the kinds of phenomena which only occur for non-linear partial differential equations,
such as blow up, shock waves, solitons and special travelling wave solutions.

MATHS 793
PROJECT IN MATHEMATICS 2
15 points
S2 C

MATHS 794
PROJECT IN MATHEMATICS 3
30 points
S2 C
Each of the project courses involves participation in a research project or investigation in some topic from pure or applied mathematics, under the supervision of one or more staff members, and presentation by the student of the results in a seminar. See the Postgraduate Advisor in the Department of Mathematics for more information.

MATHS 795
MSC THESIS IN APPLIED MATHEMATICS
120 points
Students must enrol in MATHS 795A and 795B (60 points each) to complete this course. See the Postgraduate Advisor in the Department of Mathematics for more information.

MATHS 796
MSC THESIS IN MATHEMATICS
120 points
Students must enrol in MATHS 796A and 796B (60 points each) to complete this course. See the Postgraduate Advisor in the Department of Mathematics for more information.

MATHS 797
RESEARCH PORTFOLIO IN MATHEMATICS
120 points
Students must enrol in MATHS 797A and 797B (60 points each) to complete this course. See the Postgraduate Advisor in the Department of Mathematics for more information.

MATHS 798 A,B
RESEARCH PORTFOLIO IN MATHEMATICS (PART-TIME)
90 points
Students must enrol in MATHS 798A and 798B (45 points each) to complete this course. See the Postgraduate Advisor in the Department of Mathematics for more information.

MATHS 799A&B
MSC IN MATHEMATICS/APPLIED MATHEMATICS (PART-TIME)

READING COURSES AND PROJECTS

In addition to the courses listed above, there may be some special topic courses offered in Mathematics and Mathematics Education if the need or demand arises. Please contact the Graduate Students Coordinator if you have any requests or suggestions for additional courses or subjects.

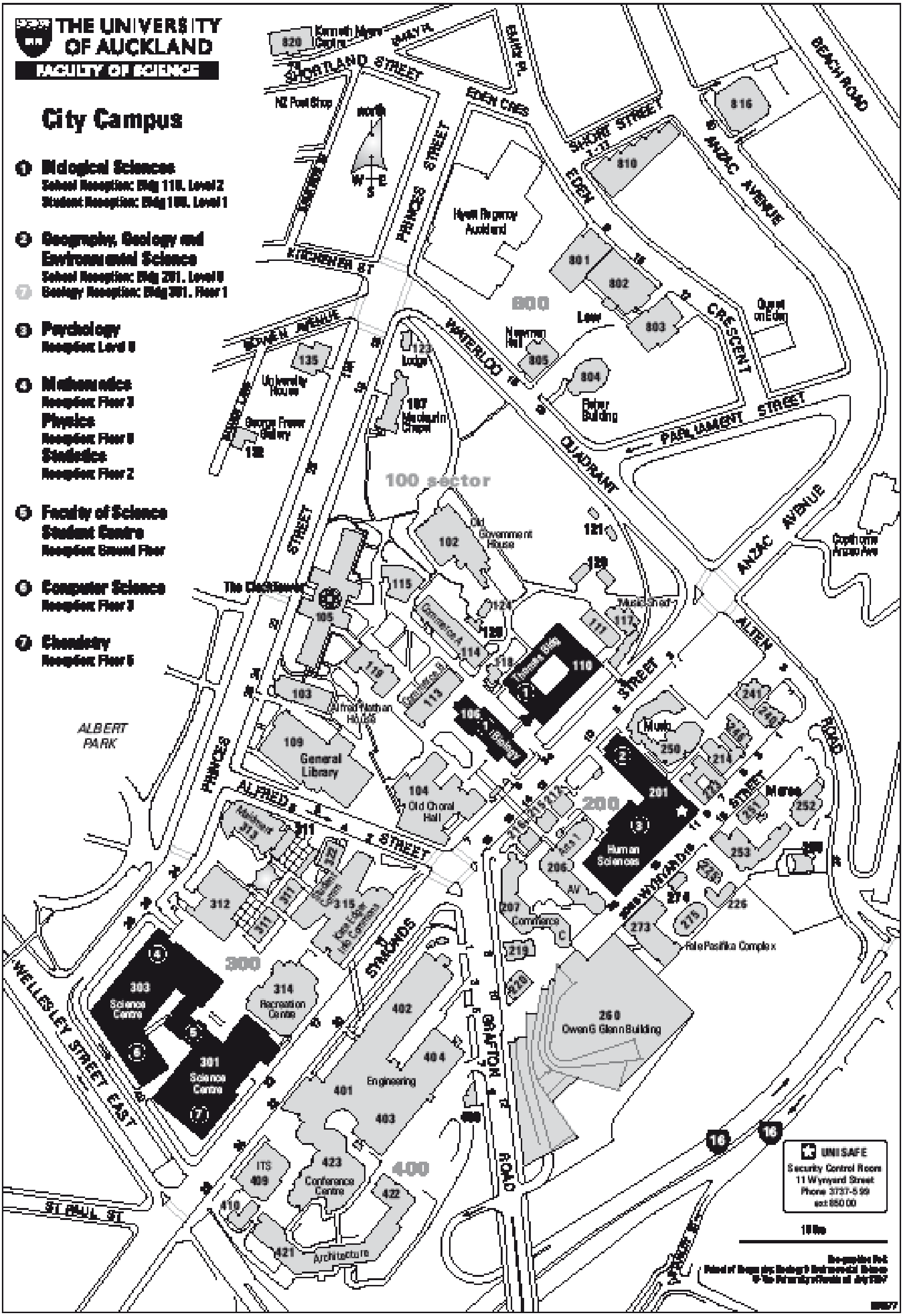
It is possible to do up two courses that are reading or project courses. These courses are supervised study in a topic in Mathematics or Applied Mathematics. In a reading course, you will usually be required to read research papers or chapters in a graduate textbook and show your understanding of the material. In a project course, you will be asked to work on a project.

For both reading and project courses, you will be required to write a report on what you did and to give a seminar.
Before you enrolment in a reading or project courses will be approved by the Department of Mathematics, you must first find a supervisor and have him or her complete a simple form summarizing what you will doing and how you will be assessed.

You can consult the staff research profiles in the present handbook or the Mathematics Education Unit handbook before choosing your supervisor.

Members of the Mathematics Department

Name	Ext	Room	Email
Academic Staff			
An, A/Prof Jianbei	88773	307	an@math.auckland.ac.nz
Bartholomew, Dr Hannah (Head Mathematics Education Unit)	84239	308	h.bartholomew@math.auckland.ac.nz
Barton, A/Prof Bill (Head of Department)	88779	301	b.barton@auckland.ac.nz
Bryant, A/Prof David	88763	402	d.bryant@math.auckland.ac.nz
Calvert, A/Prof Bruce	88780	314	calvert@math.auckland.ac.nz
Chan, Dr Robert	85212	312	chan@math.auckland.ac.nz
Conder, Prof Marston (NZIMA Co-director)	88879	319	conder@math.auckland.ac.nz
Galbraith, Dr Steven	tba	tba	steven.galbraith@rhul.ac.uk
Gauld, Prof David	88697	432	gauld@math.auckland.ac.nz
Gover, Prof A. Rod (Head Analysis, Geometry, Topology Unit)	88792	423	gover@math.auckland.ac.nz
Greenwood, Dr Sina	88776	404	sina@math.auckland.ac.nz
Heard, Dr Allison	88816	414	heard@math.auckland.ac.nz
Kaipio, Dr Jari	88818	412	king@math.auckland.ac.nz
King, Chris	88818	412	j.kaipio@math.auckland.ac.nz
Kirk, Dr Vivien (Head Applied Mathematics Unit)	88812	406	kirk@math.auckland.ac.nz
McKenzie, Helen (Tertiary Foundation Certificate)	88789	325	h.mckenzie@math.auckland.ac.nz
McNaughton, Dr Alastair (Tutors & Markers)	85244	330	a.mcnaughton@auckland.ac.nz
Meylan, Dr Mike	85865	407	meylan@math.auckland.ac.nz
Moors, Dr Warren	84746	332	moors@math.auckland.ac.nz
Nathan, Garry (Tuākana rooms)	84931	118	g.nathan@math.auckland.ac.nz
Oates, Greg	88605	322	oates@math.auckland.ac.nz
O'Brien, Prof Eamonn	88819	411	obrien@math.auckland.ac.nz
Parnell, Sheena (TFC)	85750	324	sheena@math.auckland.ac.nz
Paterson, Dr Judy	88605	322	paterson@math.auckland.ac.nz
Pfannkuch, Dr Maxine	88794	310	pfannkuc@math.auckland.ac.nz
Postleithwaite, Dr Claire	88817	414	c.postlethwaite@math.auckland.ac.nz
Sharp, Dr Philip (Associate Head - Academic)	88884	329	sharp@math.auckland.ac.nz
Slinko, Dr Arkadii	85749	409	slinko@math.auckland.ac.nz
Sneddon, Dr Jamie (Undergraduate Coordinator)	82121	305	j.sneddon@auckland.ac.nz
Sneyd, Prof James	87474	417	sneyd@math.auckland.ac.nz
Solomon, Dr Wiremu	88771	209	solomon@math.auckland.ac.nz
Statham, Moira (TFC)	85750	324	statham@math.auckland.ac.nz
Stratton, Wendy (MAX Coordinator)	85757	413	w.stratton@math.auckland.ac.nz
Taylor, Dr Stephen (Postgraduate Coordinator)	86622	306	s.taylor@auckland.ac.nz
ter Elst, Dr Tom (PhD Coordinator)	86901	404	terelst@math.auckland.ac.nz
Thomas, A/Prof Michael	88791	327	m.thomas@math.auckland.ac.nz
Waldron, Dr Shayne	85877	410	waldron@math.auckland.ac.nz
Wang, Dr Shixiao	86629	404	wang@math.auckland.ac.nz
Administrative Staff			
Lee, Min-Ah (Secretary/PA-HoD)	88777	303	enquiries@math.auckland.ac.nz
Moala, Olita (Financial Administrator)	88743	302	moala@math.auckland.ac.nz
Lynda Pitcaithly (Department Manager)	88063	336	l.pitcaithly@math.auckland.ac.nz
Nagy, Adina (Academic Administrator, Webmaster)	85886	303	adina@math.auckland.ac.nz
Subject Librarian			
Parkinson, Michael (Librarian)	85858	M113	m.parkinson@auckland.ac.nz
Student Resource Centre			
Venugopalan, Jaya (Manager)	85510	G16	jaya@math.auckland.ac.nz
Pan, Fei (Coordinator)	89378	G16	f.pan@math.auckland.ac.nz


THE UNIVERSITY OF AUCKLAND
FACULTY OF SCIENCE
City Campus
Psychology
Mathematics
Physics
Statistics
Faculty of Science Student Centre
Computer Science
Chemistry
ALBERT PARK
SHORTLAND STREET
PRINCES STREET
EDEN CRES
SHORT STREET
BEACH ROAD
ANZAC AVENUE
KITCHENER ST
BOWEN AVENUE
WATERLOO QUADRANT
EDEN CRESCENT
PARLIAMENT STREET
ALTEN ROAD
ALFRED STREET
SYMONDS STREET
GRAFTON ROAD
WELLESLEY STREET EAST
ST PAUL ST
Hyatt Regency Auckland
100 sector
800
200
300
400
Old Government House
The Clocktower
General Library
Alfred Nathan House
Old Choral Hall
Human Sciences
Owen G Glenn Building
Commerce
Science Centre
Recreation Centre
Engineering
Conference Centre
Architecture
Fale Pasifika Complex
UNISAFE
Security Control Room
11 Wynyard Street
Phone 3737-599
ext 85000