IMPORTANT DATES

1 DECEMBER 2006

Deadline for new students to submit Application for Admission if 2007 programme **includes Summer School courses.** Application for Admission also closes 1 December for all students applying to **Sport and Exercise Science and Optometry.**

8 DECEMBER 2006

Deadline for new students to submit Application for Admission if 2007 programme **includes Semester 1 and Semester 2 courses only.**

If you are a new student, only one Application for Admission is required. This form is due on either 1 December or 8 December, depending on whether you want to take Summer School courses as well. Applications received after these dates may be accepted if there are places available.

SUMMER SCHOOL – 2007

Orientation Day	3 January
Lectures Begin	4 January
Auckland Anniversary Day	29 January
Deadline to withdraw from summer school courses	1 week before the end of lectures
Waitangi (NZ) Day	6 February
Lectures End	8 February
Exams*	12 February - 14 February
Semester ends	14 February

SEMESTER 1 – 2007

Semester 1 Begins	26 February
Mid Semester/Easter Break	6 April - 21 April
Anzac Day	25 April
Graduation	3 May - 11 May
Deadline to withdraw from first semester courses	3 weeks before the end of lectures
Queen's Birthday	4 June
Lectures End	2 June
Study Break/Exams*	2 June – 25 June
Semester 1 ends	25 June
Inter Semester Break	26 June – 14 July

SEMESTER 2 – 2007

Semester 2 Begins	16 July
Mid Semester Break	27 August – 8 September
Graduation	25 September - 27 September
Deadline to withdraw from second semester courses	3 weeks before the end of lectures
Labour Day	22 October
Lectures End	21 October
Study Break/Exams*	20 October - 12 November
Semester 2 ends	12 November

SEMESTER 1 – 2008

Semester 1 Begins	3 March 2008 (Provisional)

*** Aegrotat and Compassionate Applications must be submitted within 1 week of the date that the examination affected took place. Deadline for withdrawal from double semester courses is three weeks before the end of lectures in the second semester.**

WELCOME TO THE DEPARTMENT OF MATHEMATICS

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 then you should consider seriously the option of further study, which may also give you the opportunity of involvement in leading edge research.

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

To those who have accepted our invitation and are commencing graduate study we would like to wish you all the best. We will do everything to ensure your satisfaction and success, and if we can help in any way please do not hesitate to ask.

Bill Barton, Head of Department, Mathematics
Tom ter Elst, PhD Advisor
Hannah Bartholomew, Postgraduate Advisor

CONTACT AND ENQUIRIES

Please contact one of the following staff members if any further information about graduate study and research programmes in Mathematics at the University of Auckland. Enquiries are welcome.

Postgraduate advisor

Dr Hannah Bartholomew
Room 308 – Mathematics Department
Extension 84239
Email h.bartholomew@math.auckland.ac.nz

Further contact details

PhD Advisor:

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

Undergraduate Advisor:

Dr Jamie Sneddon
Room 305 – Mathematics Department
Ext 82121
Email: j.sneddon@auckland,ac.nz

Head of Mathematics Education Unit:

A/Prof Mike Thomas
Room 327 – Mathematics Department
Ext 88791
Email: m.thomas@math.auckland.ac.nz

Liaison Officer for Maori and Pasifika Students:

Dr Sina Greenwood
Room 404 – Mathematics Department
Ext 88776
Email: greenwood@math.auckland.ac.nz

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

Departmental Manager:

Ms Daniela Rovere
Room 336
Ext 88063
Email: rovere@math.auckland.ac.nz

Department Address:

Please see the back cover

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 strength across the spectrum of mathematics: algebra, combinatorics, complex analysis, differential equations and mathematical modelling, 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 it 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 full range of courses at all levels for students in several Faculties. It comprises over 50 permanent and temporary academic staff, based on the City campus and Tamaki campus.

Within the Department are two units, which operate with a certain degree of autonomy: the Applied Mathematics Unit and Mathematics Education Unit. Pure Mathematics represents another strong component of teaching and research. Some staff is equally actively involved in the recently established 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 Mathematics/Physics building, on the corner of Princes St and Wellesley St, and adjacent to Albert Park. The Department maintains and operates its own computing equipment, including laboratories of networked Macintosh computers and individual Macintosh, Sun and SGI workstations for staff and postgraduate students. The Department's network is connected to University-wide services, including libraries, electronic mail and full access to the internet/world wide web.

WHY GRADUATE STUDY IN MATHEMATICS?

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 can place 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.

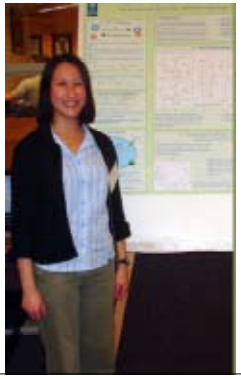
The idealists among us would hope that preparation for employment is not the sole reason for graduate study. There is always a pride in being accomplished in one's profession, and in keeping up with the latest developments. Graduate-level courses in Mathematics bring you to the cutting edge of the subject, 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, applied and industrial 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 way before graduation, through awarded research scholarships, but are strongly encouraged to give a research dimension to their graduate studies, through reading courses, projects and dissertations. Furthermore, since 2006, it became a Faculty of Science requirement that the BSc(Hon) degree comprises a 30-point worth research dimension.

In the fields of **applied and industrial mathematics**, the research areas students are welcome to explore along with our staff are 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.

In 2006 our students took topics as modelling functions or mechanisms of the human body or modelling distribution of volcanic ashes; they proposed mathematical techniques in



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 chose to study in Auckland.

Having recently attended the Gordon Research Conference on TheoreticalBiology 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 neuroscience or 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.

The **Mathematics Education Unit** (MEU) is responsible for foundation and undergraduate courses in mathematics and mathematics education within the mathematics schedule. It offers a suite of graduate courses that can be taken either as part of an MSc, MA or MEd programme. Members of the MEU have research interests in mathematics education and attend conferences in this field. All have an active publication record, and the MEU has attracted research funding from government and private sources. There is 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 or Technology issues.

In 2006 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 like teaching geometry via origami folding. Mathematics education papers and research are credited under the Pure Mathematics major offered by the Department.

Students planning to take research 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 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.

Some of the 2006 students studied or graduated with papers on tractor calculus, small volume 4-manifolds or Runge-Kutta-Nystrōm numerical methods. Pure mathematics summer scholarships projects included, amongst other subjects, the degree-diameter problem in graphs, comparative probability orderings in sets and geometric models in string theory.

STUDYING IN AUCKLAND

New Zealand is an independent country located in the South Pacific, just to the west of the international date line and about 2000 km east of Australia, and geographically similar in size to Britain and Japan. It has a population of 4.2 million, mostly of European descent, with about 12% indigenous (Maori) and increasing numbers of people from other backgrounds including Pacific and south-eastern Asian nations.

Auckland is the largest city in New Zealand, with a population of just over one million, and extending 60 km from north to south across an isthmus between the Tasman Sea and the Pacific Ocean. Antipodal to Malaga in Spain (and similar in latitude to Athens and Monterey) but moderated by its oceanic position, Auckland's climate can be described as sub-tropical: warm in summer and mild in winter (with the temperature rarely falling below freezing point).

The city is a comfortable place to live, with many open spaces and easy access to sea, bush, forest and farmland, but at the same time cosmopolitan in outlook. It has a rich ethnic mix and all that implies in terms of restaurants, sports and entertainment and other cultural facilities.

THE UNIVERSITY OF AUCKLAND

The University dates from 1883 and has grown most spectacularly in recent years to its current enrolment of approximately 30,000 students. The University has large faculties of arts, science, and commerce, and specialist schools of architecture, engineering, fine arts, law, music and medicine.

The University's city campus is situated on a rise overlooking the harbour, only five minutes' walk from the central business district. In 1991 the University opened a satellite campus on a spacious site in the suburb of Tamaki, about 8 km east of the city centre. This campus, fully integrated with the city campus, is planned to expand to provide teaching and research facilities in core and specialist programmes (some complementary to those on the city campus) for over 3000 students. All parts of the University are easily accessible - most staff lives within twenty minutes drive of work.

FINANCIAL SUPPORT FOR STUDENTS

Whilst the Department of Mathematics endeavours to support its postgraduate students, there is still a big competition for scholarships. The Department offers alternative financing paths. Please browse through this section for further details.

UNIVERSITY SCHOLARSHIPS

The scholarships page at http://www.auckland.ac.nz/scholarships on the University of Auckland website has information on many scholarships. This page is updated regularly. Unfortunately, a lot of these scholarships do not apply to Faculty of Science students. A list of scholarships that are more suitable for Science students is available at http://www2.auckland.ac.nz/science/scholarships-postgrads.ptml on the Faculty of Science website.
In addition, the Faculty of Science and the Department of Mathematics offer summer scholarships. The deadline for these scholarships is usually early September and early October respectively. You can apply to the Department of Mathematics for information about these.
Once you start your graduate degree, you should regularly check the postgraduate email list for announcements about scholarships.
Further information about scholarships is available at http://www.postgrad.auckland.ac.nz/postgraddegree/ProspectivePGStudent/PSScholarships.asp.

SCHOLARSHIPS FOR INTERNATIONAL STUDENTS

Information about scholarships available to international students can be found at http://www.auckland.ac.nz/uoa/for/prospective/welcomes/internationalstudents/costs/scholarships/scholarships_home.cfm.

PART-TIME EMPLOYMENT

The main types of paid employment within in the Department of Mathematics 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 Jamie Sneddon at j.sneddon@auckland.ac.nz for further information.

Computer Lab Demonstrating:
The Department has two 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 Jamie Sneddon at j.sneddon@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 Bill Barton at b.barton@auckland.ac.nz for further information.

Assistant Lectureships:
These are available to 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.

STUDENT ALLOWANCES

Student Allowances are administered by the New Zealand Department of Social Development. Information booklets and application forms are available from StudyLink at www.studylink.govt.nz or by phoning freephone 0800 88 99 00 or freefax 0800 88 33 88.
The University of Auckland is not involved in the administration of the allowances scheme.

FEES

There are two levels of fees: local and international. Citizens and permanent residents of New Zealand and Australia, together with French and German citizens pay local fees. For further information, please see http://www.auckland.ac.nz/fees.

All other students pay international fees. More information about fees for international students can be found at http://www.auckland.ac.nz:80/uoa/for/prospective/welcomes/internationalstudents/costs/tuition/intltuition_pg.cfm#postgrad_fees.

PhD fees for international students have recently changed. The New Zealand Government has now confirmed policy changes that will make it easier for new international PhD students to study and work in New Zealand. Since 1 January 2006, new international PhD students are being accorded domestic status for the purposes of tuition fees. A new international PhD student is defined as a foreign student enrolled for the first time after 19 April 2005 in a Doctor of Philosophy programme at a New Zealand university. Email enquiries about this should be directed to postgraduate@auckland.ac.nz.

ENROLMENT PROCEDURES
Enrolment at the University of Auckland is a three steps process. Any student seeking to begin a new programme, undergraduate or postgraduate, must firstly apply on-line on nDeva. This is the first step. For help with admission to postgraduate programmes, go to http://www.postgrad.auckland.ac.nz/postgraddegree/ProspectivePGStudent/PSHowtoApply.asp.
In the Department of Mathematics, all postgraduate programmes need to be approved by the Postgraduate Advisor, Philip Sharp. Prospective students need to contact him after admission and before enrolment. This is the second step.
The third step occurs once departmental approval has been given. Students need to return to nDeva to enrol in the courses of their choice, on-line.
Prospective PhD students should contact the PhD Advisor in the Department of Mathematics directly to discuss the possibility of admission. Email: enquiries@math.auckland.ac.nz.

International students should first contact the
International Office.
Tel. +64 9 373 7513
Fax. +64 9 373 7405
Email: int-questions@auckland.ac.nz
Web: www.auckland.ac.nz/international

Students who have already completed part of a programme and who plan to enrol in further courses in that programme, need only go to nDeva to enrol themselves.

POSTGRADUATE DEGREE PROGRAMMES

GRADUATE DEGREES

There are four possible graduate programmes you can enrol in after getting your BSc in Mathematics or Applied Mathematics (excluding the PhD). A major for each of the graduate degrees is 75 points or more in the subject (Mathematics or Applied Mathematics).

The graduate advisor for the department of Mathematics must approve any enrolment in a graduate degree.

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

If you require further information, please contact

Hannah Bartholomew
Ext 84239
Graduate Advisor for all graduate programmes (except PhD)
Room 308 - Mathematics Department
h.bartholomew@math.auckland.ac.nz

ENTRY REQUIREMENTS FOR POSTGRADUATE PROGRAMMES

The information below summarizes the pre-requisites and requirements for the three degrees. These regulations 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 2007, which contains the official regulations and course requirements approved by the University. It 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.

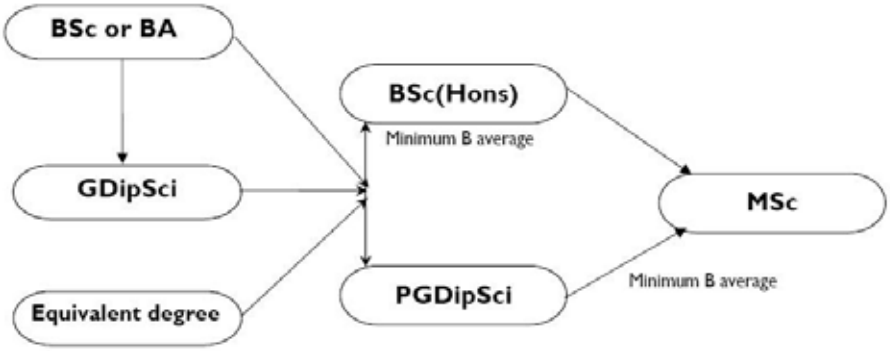
If you are doing the degree in Applied Mathematics, you must pass MATHS 361 and either MATHS 362 or MATHS 363 before enrolling in the degree.

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

BACHELOR OF SCIENCE (HONOURS) (BSc(HONS))

To be awarded a BSc(Hon) you need to pass 120 points of 700-level courses, with at least 75 points in the subject.

To be admitted into the BSc(Hons) programme, you must have a major in Mathematics including either MATHS 320 or MATHS 332 and at least B in at least 90 points worth courses at Stage III. These courses



need not all be in Mathematics or Applied 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.

You can do an honours' degree either full-time over one year or part-time over two years.

GRADUATE DIPLOMA IN SCIENCE (GradDipSci)

This diploma is at a lower level than a postgraduate diploma in science. 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.

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.

MASTER OF SCIENCE (MSc)

Under the 2007 regulations, you can no longer be admitted into an MSc after being awarded a BSc. You must first get a PGDipSci or a BSc(Hons) with a B- average over at least 90 points, of which at least 75 points must be in 700-level courses. The emphasis in an MSc is on original research.

To get an MSc, 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. 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.

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.

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

Transitional regulations

If you started your graduate degree in 2005 or before, your enrolment in 2007 will be covered by transitional regulations. Please contact the postgraduate adviser for the Department of Mathematics if you have any questions about these regulations.

POSTGRADUATE PROGRAMMES WITH MATHEMATICS MAJORS

DEGREE	SPECIALISATION				
	Mathematics	Applied Mathematics	Industrial Mathematics	Logic and Computation	Bioinformatics
BSc(Hons)	*	*		*	*
GradDipSci	*	*			
PGDipSci	*	*		*	
MA	*				
MSc	*	*		*	*
PhD	*	*			

GRADUATE-LEVEL COURSES IN MATHEMATICS

KEY
MATHS = Mathematics courses
SS = Summer School
S1 = Semester 1
S2 = Semester 2
C = City Campus
T = Tamaki Campus
600 - 799 = Stage IV courses

Here is a description of the graduate-level courses the Department is expecting to offer.

Please contact the lecturer(s) involved or a Graduate Students Coordinator 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 681
PG TOPIC IN MATHEMATICS 1

15 points

MATHS 681 deals with some topic(s) from pure mathematics, applied mathematics, or mathematics education.

MATHS 682
PG TOPIC IN MATHEMATICS 2

30 points

MATHS 682 deals with some topic(s) from pure mathematics, applied mathematics, or mathematics education

MATHS 690
GRADUATE DIPLOMA DISSERTATION (MATHEMATICS)

30 points

Students can enrol in MATHS 690 (worth 30 points) or in MATHS 690A and 690B (each worth 15 points).

MATHS 691
POSTGRADUATE DIPLOMA DISSERTATION (MATHEMATICS)

30 points

Students can enrol in MATHS 691 (worth 30 points) or in MATHS 691A and 691B (each worth 15 points).

MATHS 692
GRADUATE DIPLOMA DISSERTATION (APPLIED MATHEMATICS)

30 points

Students can enrol in MATHS 692 (worth 30 points) or in MATHS 692A and 621B (each worth 15 points).

MATHS 693
POSTGRADUATE DIPLOMA DISSERTATION (APPLIED MATHEMATICS)

30 points

Students can enrol in MATHS 693 (worth 30 points) or in MATHS 693A and 693B (each worth 15 points).

MATHS 694
POSTGRADUATE DIPLOMA PROJECT 1

15 points

MATHS 694 involves participation in a research project or investigation in a topic from pure mathematics, applied mathematics or mathematics education under the supervision of one or more staff members, and a presentation by the student of the results in a written report and seminar.

MATHS 695
POSTGRADUATE DIPLOMA PROJECT 2

15 points

MATHS 695 involves participation in a research project or investigation in a topic from pure mathematics, applied mathematics or mathematics education under the supervision of one or more staff members, and a presentation by the student of the results in a written report and seminar

MATHS 701
RESEARCH ISSUES IN MATHEMATICS EDUCATION
15 points
SS C
Recommended Preparation: MATHS 302 and one of MATHS 702-MATHS 709
Research methodology for mathematics and statistics education, designed to meet the needs of students embarking on MasterÕs level studies or planning a disertation or thesis in Mathematics Education.
Main lecturer: Assoc Prof Bill Barton

MATHS 702
MATHEMATICS CURRICULUM
15 points
2008, S2
The historical development, current trends, theories and practice of the mathematic and statistics curricula and assessment.
The interconnections between curriculum development, assessment and other mathematics education issues.
Main lecturers: Dr Hannah Bartholomew, Dr Maxine Pfannkuch

MATHS 703
THEORETICAL ISSUES IN MATHEMATICS EDUCATION
15 points
2008, S1
Recommended Preparation: MATHS 302
A critical examination of theories and recent writings on the assessment of mathematics in New Zealand schools and overseas
A selection of key learning theories are introduced. Social and psychological perspectives are discussed, including their applications in research and their implications for mathematics education teaching and learning.
Main lecturers: Dr Hannah Bartholomew, Assoc. Prof. Mike Thomas

MATHS 705
SOCIAL ISSUES IN MATHEMATICS EDUCATION
2007 and 2009, S2
15 points
Recommended Preparation: MATHS 302
A selection of topics from cultural identity, social and language issues arising in mathematic education. Critical examination of theories and current literature will be made, within a case-study approach.

MATHS 706
TECHNOLOGY AND MATHEMATICS EDUCATION
15 points
2007 and 2009, S1
The use of computers and calculators in mathematics education, with a focus on both theoretical and practical aspects of their use in the mathematics classroom. The pedagogical implications of techology for the present and future will be discussed.

MATHS 707-710
SPECIAL TOPICS IN MATHEMATICS EDUCATION 1-4
15 points
By arrangement

These are special topic 15-point papers that are also 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
2007, 2009, S2; 2008 S1
15 points
An examination of a mathematical topic up to undergraduate level in the light of current research. The focus will be on investigating how that topic may be effectively learned at senior levels. The topics will be 2007 Calculus, 2008 Algebra and 2009 Calculus).

STATS 708
TOPICS IN STATISTICAL EDUCATION
2007 and 2009, First semester
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 C
Recommended Preparation: MATHS 315
A study of the foundations of pure mathematics, formalising the notions of "mathematical proof" and "mathematical structure" through Predicate Calculus and Model Theory. Includes an exploration of the limits of these formalisations (including Godel's incompleteness theorems), and a study of Axiomatic Set Theory (including a discussion of consistency and independence).

MATHS 714
NUMBER THEORY
15 points
S2 C
Recommended Preparation: MATHS 320
A broad introduction to aspects of elementary, analytical and computational number theory, including some or all of the following: primitive roots, quadratic residues, Diophantine equations, primality testing (and applications to cryptology), the two- and four-squares theorems, arithmetical functions, Diophantine approximation, distribution of primes. Prerequisites: B+ in either MATHS 328 or MATHS 320.

MATHS 715
GRAPH THEORY AND COMBINATORICS
15 points
S2 C
Recommended Preparation: MATHS 320
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
Recommend Preparation: MATHS 320

Fundamentals of group theory, including direct products, group actions on sets, Sylow's theorems, p-groups, free groups, group presentation, solubility, nilpotent groups, extensions and semi-direct products, plus other topics as time permits. Prerequisites: MATHS 320.

MATHS 721
RINGS, MODULES, ALGEBRAS AND REPRESENTATIONS
15 points
S2 C
Recommended Preparation: MATHS 320

A sequel to the course MATHS 320, investigating the properties, extensions and applications of further algebraic structures (such as modules and other algebras), and the representation of algebras in terms of matrices. Prerequisites: MATHS 320.

MATHS 730
MEASURE THEORY AND INTEGRATION
15 points
S1 C
Recommended Preparation: MATHS 332 or 333

Measures on sigma-algebras (with emphasis on the Lebesgue and Lebesgue-Stieltjes measures), the Lebesgue integral, measure spaces, the Fubini theorems, signed and complex measures, the Lebesgue-Radon-Nikodym theorem, the Vitali system, absolutely continuous functions, and the Fundamental Theorem of Calculus.

MATHS 731
FUNCTIONAL ANALYSIS
15 points
S2 C
Recommended Preparation: MATHS 332 or 333
Normed linear spaces, Banach spaces and Hilbert spaces, and some of the main developments in these areas. Highlights include the Hahn-Banach theorem, the Banach-Steinhaus theorem, the Riesz Representation theorem, Fourier series, and the Spectral theorem.

MATHS 735
ANALYSIS ON MANIFOLDS AND DIFFERENTIAL GEOMETRY
15 points
S2 C - Not offered in 2007
An introduction to differential geometry via the study of differentiable manifolds, tangent spaces and vector fields, differential forms, Stokes theorem, Frenet formulae, quadratic forms on surfaces, and the Gauss-Bonet theorems.

MATHS 740
COMPLEX ANALYSIS
15 points
S1 C
Recommended Preparation: MATHS 332 or 333
Analytic and harmonic functions, complex integration, hyperbolic geometry, conformal mappings, normal families, the Riemann mapping theorem, Mittag-Leffler and Weierstrass Theorems.

MATHS 745
CHAOS, FRACTALS AND BIFURCATIONS
S1 C
Chaos, fractals and bifurcation, and their commercial, medical and scientific application. Discrete iterations, including the Julia and Mandelbrot sets, iterated function systems and higher-dimensional strange attractors. Quantum chaos and complexity theory are also discussed.

MATHS 750
TOPOLOGY
15 points
S1 C
Recommend Preparation: MATHS 332, 333 or 353
Aspects of point-set and algebraic topology: properties and construction of topological spaces, continuous mappings, axioms of separation, countability, connectivity and compactness, metrisation, some euclidean space topology, covering spaces, the fundamental group, homology groups, fixed-point theorems, and applications.

MATHS 761
ORDINARY DIFFERENTIAL EQUATIONS & DYNAMICAL SYSTEMS 15 points
S2 C
Recommended Preparation: MATHS 361 and either MATHS 362 or 363
Analytical and numerical techniques for determining the qualitative properties of solutions to nonlinear differential equations. Topics covered include: recurrent dynamics, asymptotic stability, structural stability, the Smale horseshoe and chaos, local and global bifurcations. This paper is also offered for graduate students in Physics.

MATHS 763
PARTIAL DIFFERENTIAL EQUATIONS
15 points
S1 C
Recommended Preparation: MATHS 361 and MATHS 362
A study of partial differential equations frequently arising in applications. This course studies Hilbert space and approximate methods for analytic and numerical solutions of PDE. Analytic methods include Green's functions, boundary integral equations and variational formulations. Numerical methods include the Boundary Element Method and in some years the Finite Element Method.

MATHS 769
ADVANCED MATHEMATICAL MODELLING
15 points
S1 C
Recommended Preparation: MATHS 361 and MATHS 362
In this course we model systems taken from a variety of areas such as financial mathematics, fluid mechanics and population dynamics. Most f the systems studied are modelled with partial differential equations or stochastic differential equations and this makes the course a good application-based setting for learning about PDEs and DSEs.

MATHS 770
ADVANCED NUMERICAL ANALYSIS
15 points
S1 C
Recommended Preparation: MATHS 270 and one of MATHS 361, MATHS 362 or MATHS 363
Advanced techniques in numerical linear algebra, numerical ordinary and partial differential equations and numerical quadrature. The construction and analysis of algorithms for the solution of numerical problems.

MATHS 775
MATHEMATICAL SOFTWARE
Not currently offered
S2 C
Discrete and continuous simulations are used to teach the effective use of mathematical software. The simulations include examples of games and traffic models, together with examples from economics, chemistry and astronomy.

MATHS 781
ADVANCED TOPIC(S) IN MATHEMATICS 1
15 points
S1 C
MATHS 782
ADVANCED TOPIC(S) IN MATHEMATICS 2
15 points
S1 C
MATHS 783
ADVANCED TOPIC(S) IN MATHEMATICS 3
15 points
S2 C
MATHS 784
ADVANCED TOPIC(S) IN MATHEMATICS 4
15 points
S2 C
Each of the courses "Advanced Topic in Mathematics" deals with some special topic in from pure mathematics. See the Postgraduate Advisor in the Department of Mathematics for more information.

MATHS 786
ADVANCED TOPIC(S) IN APPLIED

MATHEMATICS 1
15 points
S1 C
This course can be taken as either
a) a special topic project course (It is necessary to find a supervisor and get the approval of the Postgraduate Advisor before enrolling; or
b) "Applied Functional Analysis", a course taught by Prof. Boris Pavlov that builds on the content of Maths 332, 333 and362, introducing modern methods of solving partial differential equations: or
c) "Mathematical Biology", a course taught by Prof. James Sneyd on mathematical physiology and bioinformatics.
Please contact either Prof. Pavlov or Prof. Sneyd to confirm the lecture times.

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
This course involved mathematical modelling, mainly with partial differential equations. Driven by applications, it offers an interesting way to learn about PDEs and stochastic differential equations. The course is usually taught at Tamaki and lecture hours are chosen at the beginning of semester to suit all students enrolled. Please contact Dr. Steve Taylor (taylor@math.auckland.ac.nz) if you are taking this course. Topics are drawn from the following: 1. First order PDEs, conservation laws and shocks. Applications to traffic flow and gas dynamics. 2. Financial mathematics including a study of stochastic differential equations and the Black-Scholes PDE for the value of financial assets. 3. An introduction to fluid mechanics.

MATHS 789
ADVANCED TOPIC(S) IN APPLIED MATHEMATICS 4
15 points
S2 C
Each of the courses "Advanced Topic(s) in Applied Mathematics deals with some special topic from applied and computational mathematics. See the Postgraduate Advisor in the Department of Mathematics for more information.

MATHS 791
HONOURS DISSERTATION IN MATHEMATICS/APPLIED MATHEMATICS
15 points

MATHS 792
PROJECT IN MATHEMATICS 1
30 points
S1 C
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 799A&B
MSC IN MATHEMATICS/APPLIED MATHEMATICS (PART-TIME)
30 points

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.

Furthermore, 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 profile in the next sections before choosing your supervisor.

2007 POSTGRADUATE COURSES OVERVIEW

MATHS	TITLE	POINT VALUE	PREREQUISITES (P) OR RECOMMENDED PREPARATION
SUMMER SCHOOL			
707 #	Special Topic in Mathematics Education 1	15	
708 #	Special Topic in Mathematics Education 2	15	
709 #	Special Topic in Mathematics Education 3	15	
710 #	Special Topic in Mathematics Education 4	15	
711 #	Special Topic in Mathematics Education 5	30	
784 #	Advanced Topic in Mathematics 4	15	
SEMESTER 1			
681 #	Postgraduate Topic in Mathematics 1	15	
694 #	Postgraduate Diploma Project 1	15	
705	Socio-Political Issues in Mathematics Education	15	MATHS 302
712	Mathematics and Learning	15	MATHS 302
715	Graph Theory and Combinatorics	15	P: MATHS 326 or 320
720	Groups, Fields and Galois Theor	15	MATHS 320
730	Measure Theory and Integration	15	MATHS 332
740	Complex Analysis	15	MATHS 333
750	Topology	15	MATHS 332
745	Chaos, Fractals and Bifurcations	15	MATHS 253
763	Partial Differential Equations	15	MATHS 361/362
770	Advanced Numerical Analysis	15	MATHS 270
781 #	Advanced Topic in Mathematics 1	15	
782 #	Advanced Topic in Mathematics 2	15	
786 #	Advanced Topic in Applied Mathematics 1	15	
788 #	Advanced Topic in Applied Mathematics 2	15	
791 #	Honours Dissertation in Mathematics	15	
792 #	Project in Mathematics 2	30	
SEMESTER 2			
682 #	Postgraduate Topic in Mathematics 2	15	
695 #	Postgraduate Diploma Project 2	15	
701	Research Issues in Mathematics Education	15	MATHS 302
706	Technology in Mathematics Education	15	MATHS 302
707 #	Special Topic in Mathematics Education 1	15	
708 #	Special Topic in Mathematics Education 2	15	
709 #	Special Topic in Mathematics Education 3	15	
710 #	Special Topic in Mathematics Education 4	15	
713	Logic and Set Theory	15	
714	Number Theory	15	P: B+ in MATHS 328 or 320
721	Rings, Modules, Algebras and Representations	15	MATHS 320
731	Functional Analysis	15	MATHS 332
761	Ordinary Differential Equations & Dynamic Systems	15	MATHS 361/362
769	Advanced Mathematical Modelling	15	MATHS 361
783 #	Advanced Topic in Mathematics 3	15	
784 #	Advanced Topic in Mathematics 4	15	
787 #	Advanced Topic in Applied Mathematics 2	15	
789 #	Advanced Topic in Applied Mathematics 4	15	
793 #	Project in Mathematics 3	15	
794 #	Project in Mathematics 4	30	
BOTH SEMESTERS*			
690 #	Graduate Diploma Dissertation (Mathematics)	30	
691 #	Postgraduate Diploma Dissertation (Mathematics)	30	
692 #	Graduate Diploma Dissertation (Applied Mathematics)	30	
693 #	Postgraduate Diploma Dissertation (Applied Mathematics)	30	
711 #	Special Topic in Mathematics Education 5	30	
790 #	Part-time Research Portfolio (transition students only)	120	
795 #	MSc Thesis in Applied Mathematics	120	
796 #	MSC Thesis in Mathematics	120	
798 #	Research Portfolio in Mathematics	90	
799 #	Part-time MSc Thesis in Mathematics	120	

A FEW STAFF RESEARCH PROFILES

A/Prof. Jianbei An (Algebra and Combinatorics group) 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.

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Dr. Hannah Bartholomew (Mathematics Education Unit) graduated with a BSc (Hons) in mathematics, an MSc in pure mathematics and a PhD in mathematics education, and has been involved in a range of research projects in mathematics education. Her research interests are broadly sociological, and include gender issues in mathematics education; the formation of students' identities as learners of mathematics; the impact of grouping students by ability; and the ways in which these issues intersect with the types of understandings that students develop in and about mathematics.

Projects:

Mathematics Enhancement Project. Hannah has been concerned with engaging teachers from low-decile schools in research, as a means of professional development. She has become particularly interested in the role that emotions play in shaping teachers' professional identities.

Pangarau AIM (Achieving in Mathematics). This longitudinal study will follow the progress and feelings about maths of a group of Maori students as they move through High School. The students were all doing well at maths at intermediate school, and the project will investigate the social, emotional and educational factors which have an impact on their choices regarding mathematics.

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A/Prof. Bill Barton (Head of Department, Mathematics Education Unit)

Bill Barton graduated with an MSc in mathematics, an MPhil in Education and a PhD in mathematics education with a dissertation on Ethnomathematics. He has taught mathematics in Africa, and in NZ secondary schools, including bilingual (Maori/English) teaching. In the early 1980s he made two series of television programmes on mathematics. His research interests are in the connections between mathematics and culture (especially language). He has written extensively in this area of culture and mathematics, is Associate Editor of Educational Studies in Mathematics, and is Vice-President of the Executive of the International Commission on Mathematical Instruction.

Projects:

Language and Mathematics: Is mathematics the same when it is undertaken in different languages? A Marsden-funded project addressing this question in research mathematics is in its final stages, and a book on investigations using indigenous languages is in press. A joint project with University of Sao Paulo and University of British Columbia with indigenous mathematics teachers is in process.

Mathematics Enhancement Project: A multi-faceted project in low-decile schools in Manukau with the aim of enhancing achievement and participation in mathematics for senior students. The current focus of this project (and subject of joint work with Oxford University and University of Michigan) is mathematical knowledge for teaching.

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A/Prof. Paul Bonnington (Algebra and Combinatorics group) A/Prof C. Paul Bonnington

My research interests lie mainly in combinatorics, graph theory and discrete geometry. These subjects have direct applications

to computer science, bioinformatics, electrical engineering, and commerce. Many problems in combinatorics are easy to state, but often difficult to solve. For example, the famous Four-Colour problem, regarding 4-colouring regions of a map, motivated much of modern graph theory. This problem was eventually solved in 1976 with the aid of a supercomputer. While some of my current research looks at implementing similar innovative computer techniques to understand important combinatorial problems, I do tend to focus heavily on theoretical approaches: my first book was devoted to a purely theoretical analysis of the major area of Topological Graph Theory.

Projects:

* Topological graph theory (Reading)

* Combinatorial Proofs from 'The Book' (Reading)

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Dr. David Bryant (Applied Mathematics Unit) is a Senior Lecturer in 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.

Dr 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.

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Emeritus Prof. John Butcher

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.

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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.

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Prof.Marston Conder:
Combinatorial group theory, graph theory, discrete computation, symmetries of maps and surfaces
Marston 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:
a) 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,
b) discovery of the first known examples of finite chiral 5-polytopes,
c) finding presentations for the alternating and symmetric groups with fixed numbers of generators and relations, and
d) construction of Cayley graphs with largest possible symmetry groups.

TO BE CONTINUED

STAFF RESEARCH INTERESTS

Here are the research interests of members of the department, ordered by the 2000 Mathematics Subject Classification.
You are welcome to visit the personal homepages or the websites of the various research groups and seminars, for further information.

01: History and biography
Dr Garry Tee, Research Fellow
Numerical analysis, the history of science.

03: Mathematical logic and foundations
Dr Arkadii Slinko, Senior Lecturer Applied Algebra with particular interest in mathematics of voting and decision making

05: Combinatorics
A/Prof C. Paul Bonnington Associate Professor Topological graph theory, infinite graphs, computational graph theory.

Prof Marston Conder Professor Combinatorial group theory, graph theory, discrete computation, symmetries of maps and surfaces

Dr Paul Hafner Senior Lecturer Ordered fields, bilinear forms, computations with groups and graphs.

A/Prof Josef Sirán Associate Professor Algebraic graph theory. Combinatorics. Group theory.

Dr Arkadii Slinko Senior Lecturer Applied algebra and combinatorics with particular interest in mathematics of voting and decision making in general

Dr Jamie Sneddon Senior Tutor Planar digraphs; minors; tournaments.

06: Order, lattices, ordered algebraic structures
Dr Arkadii Slinko Senior Lecturer Applied algebra and combinatorics with particular interest in mathematics of voting and decision making in general

13: Commutative rings and algebras
Dr David Smith Senior Lecturer Commutative ring theory

15: Linear and multilinear algebra; matrix theory
Dr Arkadii Slinko Senior Lecturer Applied algebra and combinatorics with particular interest in mathematics of voting and decision making in general

17: Nonassociative rings and algebras
Dr Arkadii Slinko Senior Lecturer Applied algebra and combinatorics with particular interest in mathematics of voting and decision making in general

20: Group theory and generalizations
A/Prof Jianbei An Associate Professor Modular representation theory of finite groups

A/Prof C. Paul Bonnington Associate Professor Topological graph theory, infinite graphs, computational graph theory.

Dr Laura Ciobanu Post-Doctoral Fellow Computational, combinatorial and geometric group theory

Prof Marston Conder Professor Combinatorial group theory, graph theory, discrete computation, symmetries of maps and surfaces

Prof Eamonn O'Brien Professor Group theory, computational algebra.

22: Topological groups, Lie groups
Dr Tom ter Elst Lecturer Harmonic analysis, operator theory, geometric analysis, subelliptic and degenerate operators, PDE.

31: Potential theory
A/Prof Bruce Calvert Associate Professor Nonlinear functional analysis, networkflows.

32: Several complex variables and analytic spaces

A/Prof Rod Gover Associate Professor Differential geometry and its relationship to representation theory. Applications to analysis on manifolds, PDE theory and Mathematical Physics. Conformal, CR and related structures.

35: Partial differential equations
Dr Hyuck Chung Post-Doctoral Fellow Building acoustics. Linear wave theory. Partial differential equations

Dr Colin Fox Senior Lecturer Semi-analytic methods in scattering, Bayesian methods for inverse problems, Sound transmission in light timber-framed buildings

A/Prof Rod Gover Associate Professor Differential geometry and its relationship to representation theory. Applications to analysis on manifolds, PDE theory and Mathematical Physics. Conformal, CR and related structures.

Dr Mike Meylan Senior Lecturer Linear Wave theory applied to water waves, wave propagation in ice infested seas

Prof Boris Pavlov Professor Spectral problems of Mathematical Physics. Quantum theory. Solvable models in Quantum Mechanics. Resonance

Dr Stephen Taylor Senior Lecturer Partial differential equations, control theory for PDEs, quantum chemistry, industrial mathematics

Dr Tom ter Elst Lecturer Harmonic analysis, operator theory, geometric analysis, subelliptic and degenerate operators, PDE.

Dr Shixiao Wang Lecturer Nonlinear partial differential equation, fluid dynamics and industrial mathematics.

37: Dynamical systems and ergodic theory Dr Vivien Kirk Senior Lecturer Dynamical systems, particularly nonlinear ODEs; theory of local and global bifurcations; symmetry and bifurcations.

Prof James Sneyd Professor Mathematical physiology, nonlinear dynamical systems.

41: Approximations and expansions
Dr Shayne Waldron Senior Lecturer Approximation Theory, polynomial interpolation, numerical methods.

43: Abstract harmonic analysis
Dr Tom ter Elst Lecturer Harmonic analysis, operator theory, geometric analysis, subelliptic and degenerate operators, PDE.

46: Functional analysis
A/Prof Rod Gover Associate Professor Differential geometry and its relationship to representation theory. Applications to analysis on manifolds, PDE theory and Mathematical Physics. Conformal, CR and related structures.

Dr Warren Moors Senior Lecturer Functional Analysis

Dr Tom ter Elst Lecturer Harmonic analysis, operator theory, geometric analysis, subelliptic and degenerate operators, PDE.

Dr Shixiao Wang Lecturer Nonlinear partial differential equation, fluid dynamics and industrial mathematics.

47: Operator theory
A/Prof Bruce Calvert Associate Professor Non-linear functional analysis, networkflows.

A/Prof Rod Gover Associate Professor Differential geometry and its relationship to representation theory. Applications to analysis on manifolds, PDE theory and Mathematical Physics. Conformal, CR and related structures.

Prof Boris Pavlov Professor Spectral problems of Mathematical Physics. Quantum theory. Solvable models in Quantum Mechanics. Resonance

Dr Tom ter Elst Lecturer Harmonic analysis,

operator theory, geometric analysis, subelliptic and degenerate operators, PDE.

51: Geometry
Dr Arkadii Slinko Senior Lecturer Applied algebra and combinatorics with particular interest in mathematics of voting and decision making in general

53: Differential geometry
A/Prof Rod Gover Associate Professor Differential geometry and its relationship to representation theory. Applications to analysis on manifolds, PDE theory and Mathematical Physics. Conformal, CR and related structures.

Dr Paul-Andi Nagy Research Fellow differential geometry and mathematical physics

54: General topology
Prof David Gauld Professor Set-Theoretic topology, especially applications to topological manifolds. Volterra spaces.

Dr Sina Greenwood Lecturer Set theoretic topology, nonmetrisable manifolds and discrete dynamical systems.

57: Manifolds and cell complexes
A/Prof Paul Bonnington Associate Professor Topological graph theory, infinite graphs, computational graph theory.

Prof Marston Conder Professor Combinatorial group theory, graph theory, discrete computation, symmetries of maps and surfaces

Prof David Gauld Professor Set-Theoretic topology, especially applications to topological manifolds. Volterra spaces.

58: Global analysis, analysis on manifolds

A/Prof Rod Gover Associate Professor Differential geometry and its relationship to representation theory. Applications to analysis on manifolds, PDE theory and Mathematical Physics. Conformal, CR and related structures.

Dr Tom ter Elst Lecturer Harmonic analysis, operator theory, geometric analysis, subelliptic and degenerate operators, PDE.

60: Probability theory and stochastic processes
Dr David Bryant Senior Lecturer Evolutionary biology, bioinformatics, probabilistic models, algorithms

Dr Arkadii Slinko Senior Lecturer Applied algebra and combinatorics with particular interest in mathematics of voting and decision making in general

62: Statistics
Dr David Bryant Senior Lecturer Evolutionary biology, bioinformatics, probabilistic models, algorithms

Dr Colin Fox Senior Lecturer Semi-analytic methods in scattering, Bayesian methods for inverse problems, Sound transmission in light timber-framed buildings

65: Numerical analysis Prof John Butcher
Professor Numerical methods for ordinary differentialequations and other aspects of numerical analysis.

Dr Robert Peng Kong Chan Senior Lecturer Numerical methods for stiff ordinary differential equations, differential-algebraic equations and oscillatory Hamiltonian problems, scientific computation.

Dr Allison Heard Senior Tutor Numerical solution of ordinary differential equations, stability of numerical methods

Dr Philip Sharp Senior Lecturer Astronomical simulations, developing and testing numerical methods for initial value ordinary differential equations .

Dr Shayne Waldron Senior Lecturer Approximation Theory, polynomial interpolation, numerical methods.

68: Computer science
Dr Arkadii Slinko Senior Lecturer Applied algebra and combinatorics with particular interest in mathematics of voting and decision making in general

74: Mechanics of deformable solids
Dr Colin Fox Senior Lecturer Semi-analytic methods in scattering, Bayesian methods for inverse problems, Sound transmission in light timber-framed buildings

Dr Mike Meylan Senior Lecturer Linear Wave theory applied to water waves, wave propagation in ice infested seas

Dr Stephen Taylor Senior Lecturer Partial differential equations, control theory for PDEs, quantum chemistry, industrial mathematics

76: Fluid mechanics
Dr Mike Meylan Senior Lecturer Linear Wave theory applied to water waves, wave propagation in ice infested seas

Dr Shixiao Wang Lecturer Nonlinear partial differential equation, fluid dynamics and industrial mathematics.

81: Quantum theory
Prof Boris Pavlov Professor Spectral problems of Mathematical Physics. Quantum theory. Solvable models in Quantum Mechanics. Resonance

Dr Stephen Taylor Senior Lecturer Partial differential equations, control theory for PDEs, quantum chemistry, industrial mathematics

91: Game theory, economics, social and behavioral sciences
Dr Arkadii Slinko Senior Lecturer Applied algebra and combinatorics with particular interest in mathematics of voting and decision making in general

92: Biology and other natural sciences
Dr David Bryant Senior Lecturer Evolutionary biology, bioinformatics, probabilistic models, algorithms

Prof James Sneyd Professor Mathematical physiology, nonlinear dynamical systems.

93: Systems theory; control
Prof James Sneyd Professor Mathematical physiology, nonlinear dynamical systems.

Dr Stephen Taylor Senior Lecturer Partial differential equations, control theory for PDEs, quantum chemistry, industrial mathematics

94: Information and communication, circuits
A/Prof Bruce Calvert Associate Professor Non-linear functional analysis, networkflows.

97: Mathematics education
Dr Hannah Bartholomew Lecturer Gender issues in mathematics education, the formation of students' identities as learners of mathematics, ability grouping, undergraduate mathematics education.

A/Prof Bill Barton Associate Professor Language and mathematics, ethnomathematics, teacher development.

Dr Maxine Pfannkuch Senior Lecturer Assessment in Mathematics Education, statistical thinking.

Prof Ivan Reilly Professor General topology,curriculum development, gifted students, the secondary/tertiary interface, undergraduate mathematics education.

Dr Arkadii Slinko Senior Lecturer Applied algebra and combinatorics with particular interest in mathematics of voting and decision making in general

A/Prof Michael Thomas Associate Professor Technology in Mathematics Education, secondary school algebra and calculus, proof, problem-solving, mathematical thinking.

STUDENT SUPPORT NETWORKS AND SERVICES

CAREER CENTRE

A science degree from The University of Auckland will give you a foundation of knowledge and skills that can lead to a wide range of career opportunities. Our graduates begin their careers in research organisations, local government, central government, universities, commerce and industry, international and community organisations.

The University Careers Centre can assist you with your career planning and job search throughout the course of your studies. The Careers Centre provides assistance to science students through workshops, seminars and a drop-in service at the City Campus Science Centre and at Tamaki.

You will find the Careers Centre in Room 001 of The ClockTower, 22 Princes Street, and on the web at www.auckland.ac.nz/careers. Visit the Centre to discuss your career options, get your CV and cover letter reviewed, attend a workshop, have a practice interview or use the extensive resources.

The University Careers Centre also has a branch at Tamaki campus where you can discuss your career options with a careers consultant, have your CV and cover letter reviewed or have a practice interview. Visit our website www.auckland.ac.nz/careers for details of location and times.

The Careers Centre advertises job vacancies, employer presentations and careers fairs online at www.jobs4grads.net. It is recommended that students attend employer events for any organisations that they wish to apply to. Recruitment by key government departments and management consultancies occurs early in the year. In May each year a general Careers Fair is held. Attendance at this will help students gain more information about the wide range of career options available with their science degrees.

CHAPLAINCY

Chaplains at Maclaurin Chapel and Newman Hall are available to students for pastoral care and spiritual guidance. Both facilities provide facilities for worship, prayer, relaxation and study.

CHILDCARE

The University operates a number of childcare centres on the City, Grafton and Tamaki campuses. All deliver a healthy, safe and stimulating environment for children below age five.

FINANCIAL SERVICES

Student finance advisers can counsel students on major sources of funding available to them, and assist with budgeting and financial planning.

HEALTH SERVICE

A comprehensive medical service is available on the City, Tamaki, Grafton and Epsom campuses.

HARASSMENT

In the large and complex society of the University it is possible that students may encounter problems with the behaviour of staff or fellow students. If this behaviour is unwanted, unacceptable or offensive it may be harassment. University policy is that harassment on any grounds - including, but not restricted to sexual, racial, religious, and academic - is totally unacceptable. For informal and confidential assistance in dealing with harassment problems, students may approach any member of the Resolve Network (a list of their names can be found on posters displayed around campus) or the Mediator. For information and contact details, visit www.auckland.ac.nz/mdr .

STUDENT ADVOCACY NETWORK

Sometimes completing your degree can seem like an obstacle course. You're not just dealing with coursework and exams - there are lectures, classmates, flatmates, landlords, employers, family, student loans, university red

tape and all kinds of hassles which can crop up at the most inconvenient times!

If you're having trouble with any aspect of university life, often a fellow student can be the best person to help. We've had to negotiate our way through the same obstacle course - we understand your point of view.

The Student Advocacy Network is a group of students helping students. We are trained to provide prompt, confidential and quality support and advice to other students. Besides lending a sympathetic ear, we can offer advice about your rights, university procedures and other services you might find helpful. We can also help you resolve disputes by speaking on your behalf or by attending meetings with you for support.

The Student Advocacy Network operates a drop-in service every weekday during semester. We are located upstairs in the AUSA House, 3 Alfred Street. Student advocates can also be contacted through the Student Representation Coordinator on 309 0789 ext 238 or by email at wave@auckland.ac.nz.

Website: www.ausa.auckland.ac.nz/wave

IMPORTANT LOCATIONS

FACILITIES AND SUPPORT FOR ALL STUDENTS

Refer to the General University Prospectus or the University website www.auckland.ac.nz for a more extensive list of services in place for students.

MATHEMATICS DEPARTMENT OFFICE

The administrative offices for the Mathematics Department at City Campus are located in:

Room 303, Science Centre
Building 303, 38 Princes Street
Telephone: 373 7599 Ext 85886,
Email: enquiries@math.auckland,ac.nz
Website: www.math.auckland.ac.nz

At Tamaki campus the administration is handled through the office of the Division of Science and Technology located in Level 3 of Building 731.

THE UNIVERSITY LIBRARY

Te Tumu Herenga

The University Library is an essential resource for the successful undergraduate student. It has multiple libraries spread over the five campus sites: City, Tamaki, Epsom, Grafton and North Shore.

Over 1.9 million volumes of books and serials are available in the University Library system. The Library also has extensive electronic resources, maps, videotapes, DVDs, microforms, manuscripts, and newspapers. Your University ID card is your Library card, your photocopy card and your print card. You need to present your ID card when you want to borrow books and other library materials.

Science Resources In The General Library

Ask at the Enquiry Desk on Level 1 for assistance. The Science Information Services Team is located on Level M. The printed periodical collections in biology, marine science, chemistry, computer science, food science, forensic science, geology, physics, mathematics, and statistics are located on Level M. Geography and psychology serials are shelved with the book collection.

Tamaki Library

Tamaki Library has resources in computer science, environmental sciences, marine science, mathematics, physics, psychology, sports and exercise sciences and statistics.

The Leigh Marine Research Laboratory Library

The Library at Leigh specialises in marine science resources.

Other Relevant Scientific Material

There are also relevant scientific resources in the Architecture, Engineering, Law, and Medical Libraries.

VOYAGER, the Library Catalogue

Voyager provides access to all books, periodicals, and other resources. You can also use Voyager to check your patron details, to renew and recall books and to see which books you have on loan or have recalled. http://voyager.auckland.ac.nz/

LEARN, the Library Electronic Academic Resources Network

The Library's electronic network is your gateway to a wide range of information resources, including the full text of many periodicals. These resources may be accessed from computers in The University of Auckland Library System, from the Information Commons, computer labs and offices on the Campus and from home.
www.library.auckland.ac.nz

LIBRARY SERVICES

Information skills' tutorials and workshops
A variety of tutorials and workshops are offered to enable students to fully utilise the Library's resources. These include:

- Orientation tours
- Voyager and LEARN tutorials
- An overview of electronic resources available

on LEARN
- Subject and course-related seminars
- Workshops on databases and the Internet
  Courses may be booked online from the LEARN homepage.

SHORT LOAN

There is a Short Loan Collection in the Information Commons where students may borrow prescribed and recommended material.

Other Library Services

1. Inter-Campus Library Delivery Service
   This will assist you in getting books and articles held at another campus or in Off-Campus Storage.

2. Interlibrary Loan and Document Delivery
   You need your lecturer's or tutor's signature to request an item which is not held **in any of the University of Auckland libraries.**

3. Photocopying
   Self-service photocopiers are available in all the libraries. The service is based on a PIN-protected account that is accessed using your student ID card.

4. Electronic Help Desk
   A NetID and password is required in order to access the Library's electronic resources. The IC Helpdesk, within the Information Commons, will guide you in accessing your Netlogin.

5. Ask a Librarian Service
   This service, available via LEARN, allows you to email requests for information to the library. For Further Information Contact enquiries@math.auckland.ac.nz

CHEATING AND PLAGARISM

POLICY ON CHEATING

Cheating is viewed as a serious offence by The University of Auckland. Penalties are administered by the Discipline Committee of the Senate, and may include suspension or expulsion from the University.

WHAT IS CHEATING?

Cheating, in the context of university coursework and examinations, is the act of attempting to gain an unfair advantage by violating the principle that lies behind all university work - that of intellectual and scholarly integrity.

To cheat is to be intellectually dishonest by passing off as your own, work that has been done by someone else. It is also unjust in that it devalues the grades and qualifications gained legitimately by other students. All staff and students have a responsibility to prevent, discourage and report cheating.

Mathematics students are encouraged to discuss problems with one another and to work together on assignments, but a student must not copy another person's assignment.

Examples of forms of cheating

- Copying from another student during a test or examination, whether or not there is collusion between the students involved;
- Using the work of other scholars or students when preparing coursework or writing an examination and pretending it is your own by not acknowledging where it came from. This is called plagiarism. Course coordinators, lecturers or tutors are the appropriate people with whom you should discuss how to appropriately use and acknowledge the work of others.
- Making up or fabricating data in research assignments, or the writing up of laboratory reports;
- Impersonating someone else in a test or examination, or arranging such impersonation.

- Submitting the same, or a substantially similar, assignment that you have done, for assessment in more than one course
- Misrepresenting disability, temporary illness/ injury, or exceptional circumstances beyond one's control, then claiming special conditions
- Using material obtained from commercial essay or assignment services, including web based sources.

GROUP WORK

On the whole, the University requires assessment of the work of individual students. On those rare occasions where the work of a group of students is assessed, group members need to make sure that the workload is shared equally. Course coordinators will determine their own procedures for dealing with cases where the final piece of work reflects unequal participation and effort.

Student support: 'getting help' versus cheating

Typically students cheat because they are having difficulty managing workloads, feel that the course content is too difficult or are experiencing difficulties with the language of the course. None of these reasons are justification for cheating. The University provides many services to help students receive assistance, do better or to make thoughtful decisions about whether to continue. Options of people to approach for assistance include:

- The course convenor/coordinator, lecturer, tutorial leader, lab demonstrator
- Head of Department
- Faculty-level official
- Health and Counselling services
- Student Learning Centre
- AUSA or other students' associations
- Chaplaincy services

The guidelines on Conduct of Coursework and cheating are set out in full on the Teaching and Learning website (www2.auckland.ac.nz/teachingandlearning/) and is located under 'Students' then 'Plagiarism and Cheating'.

The Mathematics Department has a number of ways of dealing with students caught cheating, for example:

- loss of all marks for the assignment
- loss of all coursework marks
- requesting that the student(s) involved withdraw from the course
- referral of the student(s) involved to the University Discipline Committee, followed possibly by a reprimand, fine or expulsion from the University.

Students in any doubt about the permissible degree of collaboration within a particular course should discuss it with a staff member involved in that course.

MEMBERS OF THE MATHS DEPARTMENT

NAME	EXT	ROOM	EMAIL
ACADEMIC STAFF			
An, A/Prof Jianbei	88773	307	an@math.auckland.ac.nz
Bartholomew, Dr Hannah	84239	308	h.bartholomew@math.auckland.ac.nz
Barton, A/Prof Bill (Head of Dept.)	88779	301	b.barton@auckland.ac.nz
Bonnington, Dr C. Paul	86623	311	p.bonnington@auckland.ac.nz
Bryant, Dr David	88763	402	d.bryant@math.auckland.ac.nz
Calvert, A/Prof Bruce	88780	314	calvert@math.auckland.ac.nz
Chan, Dr Robert (Tamaki)	85212	721, 330	chan@math.auckland.ac.nz
Conder, Prof Marston	88879	319	conder@math.auckland.ac.nz
Fox, Dr Colin	87316	408	fox@math.auckland.ac.nz
Gauld, Prof David	88697	432	gauld@math.auckland.ac.nz
Gover, A/Prof Rod	88792	423	gover@math.auckland.ac.nz
Greenwood, Dr Sina (Maori & Pacific)	88776	404	sina@math.auckland.ac.nz
Hafner, Dr Paul	85748	419	hafner@math.auckland.ac.nz
Heard, Dr Allison	88816	414	heard@math.auckland.ac.nz
Kensington-Miller, Barbara	88790	326	bmiller@math.auckland.ac.nz
King, Chris (Semester 1)	88818	412	king@math.auckland.ac.nz
Kirk, Dr Vivien	88812	406	kirk@math.auckland.ac.nz
McKenzie, Helen	88789	325	h.mckenzie@math.auckland.ac.nz
McNaughton, Dr Alastair (Tamaki)	85244	723, 330	a.mcnaughton@auckland.ac.nz
Meylan, Dr Mike	85865	407	meylan@math.auckland.ac.nz
Miller-Reilly, Barbara	88790	326	barbara@math.auckland.ac.nz
Moors, Dr Warren	84746	332	moors@math.auckland.ac.nz
Nathan, Garry	84931	118	g.nathan@math.auckland.ac.nz
Oates, Greg	88605	322	oates@math.auckland.ac.nz
O'Brien, A/Prof Eamonn	88819	411	obrien@math.auckland.ac.nz
Parnell, Sheena (TFC)	85750	324	sheena@math.auckland.ac.nz
Paterson, Judy	88605	322	paterson@math.auckland.ac.nz
Pavlov, Prof Boris	88783	313	pavlov@math.auckland.ac.nz
Pfannkuch, Dr Maxine	88794	310	pfannkuc@math.auckland.ac.nz
Reilly, Prof Ivan	88786	403	i.reilly@auckland.ac.nz
Schiff, Dr Joel (Semester 1)	88778	312	schiff@math.auckland.ac.nz
Sharp, Dr Philip	88884	329	sharp@math.auckland.ac.nz
Sirán, A/Prof Josef	89725	305	siran@math.auckland.ac.nz
Slinko, Dr Arkadii	85749	409	slinko@math.auckland.ac.nz
Smith, Dr David (Semester 2)	88778	312	smith@math.auckland.ac.nz
Sneddon, Dr Jamie	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	85757	413	w.stratton@math.auckland.ac.nz
Taylor, Dr Stephen (Tamaki)	86622	721, 330	s.taylor@auckland.ac.nz
ter Elst, Dr Tom	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
Thomson, David	88817	413	thomson@math.auckland.ac.nz
Wang, Dr Shixiao (Tamaki)	86629	723, 419	wang@math.auckland.ac.nz
Tamaki Staff room in City		330	
ADMINISTRATIVE STAFF			
Moala, Olita	88743	302	moala@math.auckland.ac.nz
Rovere, Daniela (Dept. Manager)	88063	336	rovere@math.auckland.ac.nz
Nagy, Adina	85886	303	adina@math.auckland.ac.nz
COMPUTING/TECHNICAL STAFF			
Brown, Nic	89568	328	nic.brown@auckland.ac.nz
Chung, Vincent (IT Manager)	85759	306	v.chung@auckland.ac.nz
Parkinson, Michael (Librarian)	85858	M113	m.parkinson@auckland.ac.nz
STUDENT RESOURCE CENTRE STAFF			
Lee, Min-Ah	85510	B01	mina.lee@math.auckland.ac.nz
Venugopalan, Jaya (Manager)	85510	B01	jaya@math.auckland.ac.nz

HEADING

THE UNIVERSITY OF AUCKLAND
CITY CAMPUS

Faculty of Science

Building 301

Faculty of Science Student Centre
Ground Floor
Chemistry
Enquiries - Floor 5
Geology
Enquiries - Floor 1

Building 303

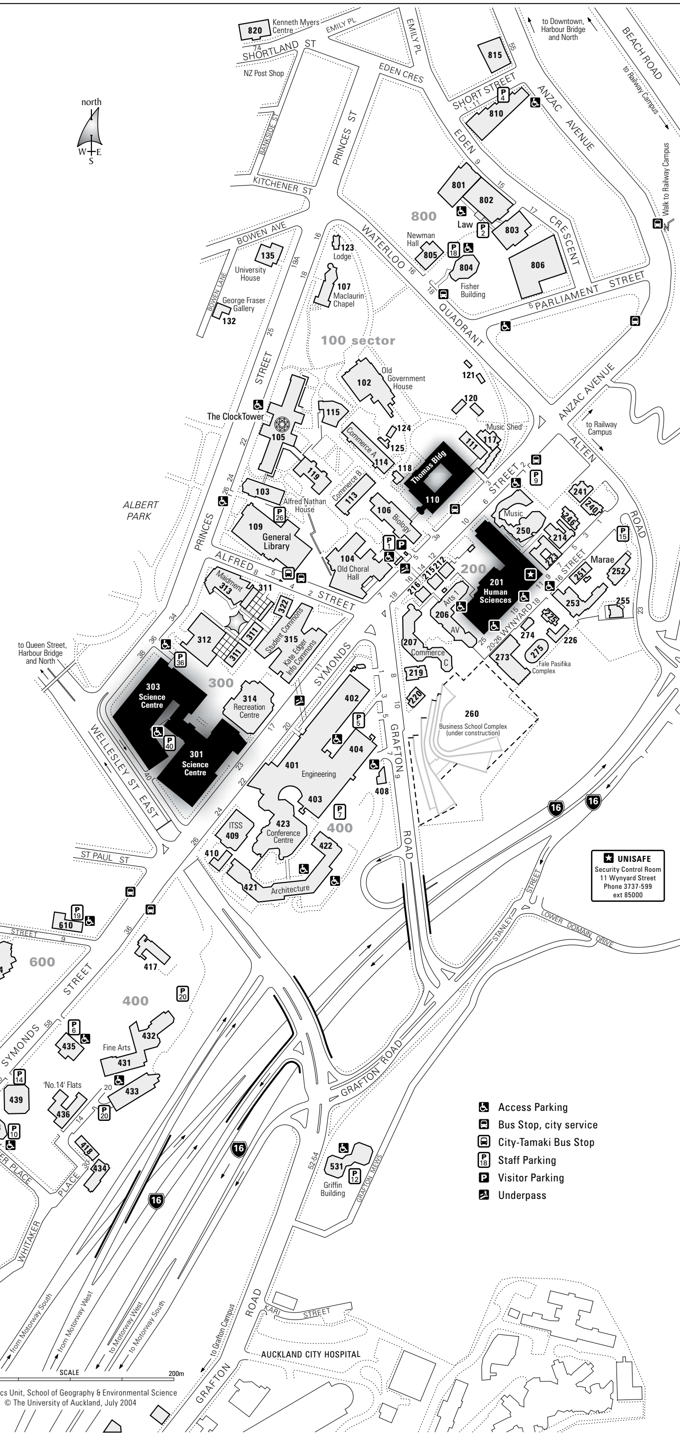
Physics
Enquiries - Floor 6
Mathematics
Enquiries - Floor 3
Statistics
Enquiries - Floor 2
Computer Science
Enquiries - Floor 3

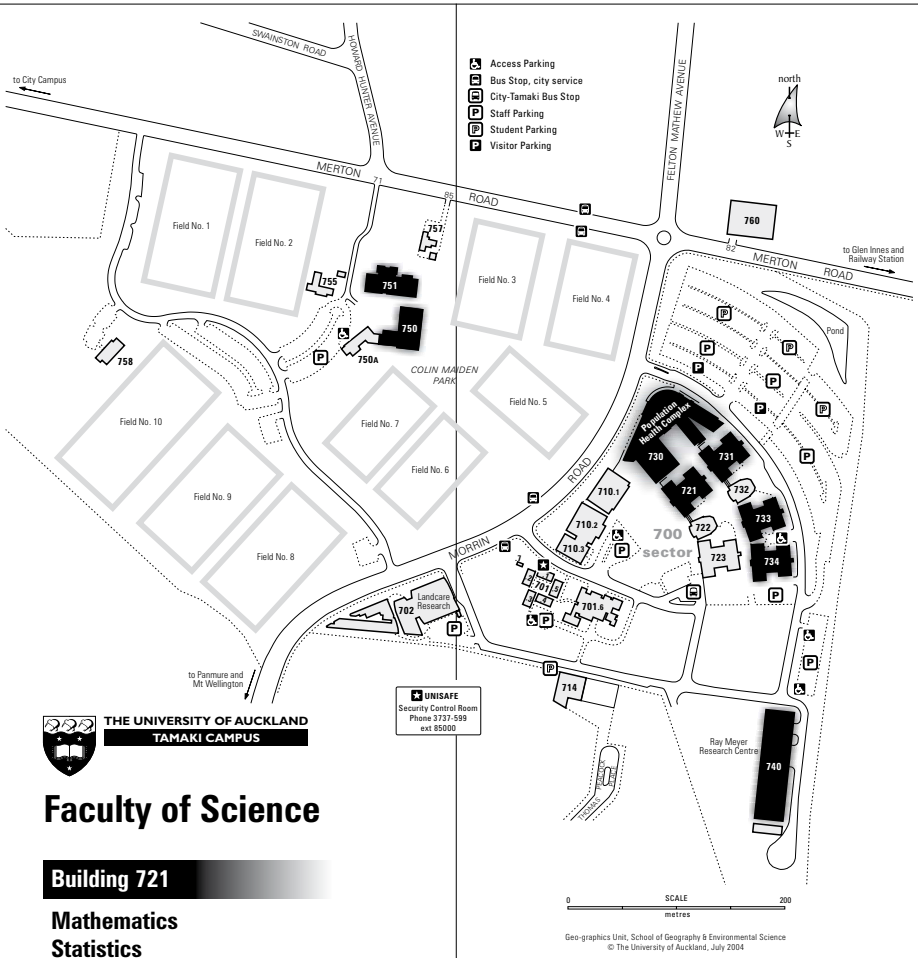
Building 201

Geography & Environmental Science
Enquiries - Level 6
Psychology
Enquiries - Level 6

Building 110

Biological Sciences
Enquiries - Level 4





THE UNIVERSITY OF AUCKLAND
TAMAKI CAMPUS

Faculty of Science

Building 721

Mathematics
Statistics

Building 730

Optometry Clinic
SLT Clinic

Building 731

Computer Science
Physics
Psychology Clinic
Speech Language Therapy

Building 733

Biological Sciences
Geography & Environmental Science

Building 734

Sport & Exercise Science
Psychology

Building 740

Wine Science

Building 750

Sport & Exercise Science Clinics

Building 751

UniSports

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