

# Prescriptions and Schedule of Papers for 2007

## Mode of Delivery

*	= Not available in 2007
B1, B2, B3	= Available as a block course
E, E1, E2	= Available extramurally
F1	= Face to face teaching
I, I1, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, I15, I16, I17, I18, I19, I20, I21, I22, I23, I24, I25, I26, I27, I28, I29, I30, I31, I32, I33, I34, I35, I36, I37, I38, I39, I40, I41, I42, I43, I44, I45, I46, I47	= Available internally

## Semesters

S1	Semester One
S2	Semester Two
S3	Summer School
S12	Double Semester

## Locations

AG	Auckland Geographic Area
AL	Massey Albany
CG	Christchurch Geographic Area
CH	Christchurch
EM	Employers and Manufacturers Assc
HK	Hokowhitu Campus
HW	Hawkes Bay
MA	Military Stds Inst. Auckland
NT	Email/Internet
PG	Papua New Guinea Geographic Area
PN	Massey Palmerston North
RU	Ruawhoro Campus
SP	Singapore Aviation Academy
TH	Thailand Aviation Academy
TN	Tonga Geographic Area
WG	Wellington Geographic Area
WL	Massey Wellington

Paper No./Title	Credits	Sem	Mode	Loc
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## Mathematics

<b>160.001</b>	24 credits	S1	I	AL
<b>Foundation Studies in Mathematics</b>		S1	I	PN
A paper designed to increase the confidence of students in handling mathematical concepts and skills. Content includes algebraic skills, functions and graphs, and an introduction to calculus. A laboratory course using appropriate mathematical software.		S1	I	WL
		S2	I	PN
<b>160.101</b>	15 credits	S1	I	AL
<b>Calculus I</b>		S1	I	PN
Functions of one real variable and their graphs. Differentiation, integration and differential equations with applications to mathematical models. Introduction to complex numbers, power series, numerical methods and partial differentiation.		S1	I	WL
		S12	E	PN
		S12	I2	PN
		S2	E	PN
		S2	I	AL
<b>160.102</b>	15 credits	S1	E	PN
<b>Linear Mathematics</b>		S1	I	PN
Linear equations, lines and planes in two and three dimensions. Linear transformations, vectors, matrices and determinants in two and three dimensions, eigenvectors and eigenvalues. An introduction to linear programming.		S1	I2	PN
		S2	I	AL
<b>160.103</b>	15 credits	S1	E	PN
<b>Methods of Mathematics</b>		S1	I	PN
A paper designed to increase the confidence of students in handling mathematical concepts and skills. Content includes algebraic skills, functions and graphs, and an introduction to matrices and calculus.		S3	E	PN
<b>160.131</b>	15 credits	S1	I	AL
<b>Mathematics for Business I</b>		S2	E	PN
Development of algebraic skills. An introduction to linear equations and matrices, including graphical linear programming. Graphs. An introduction to calculus. Use of spreadsheets and/or other mathematical software.		S2	I	PN
		S2	I	WL
		S3	E	PN
<b>160.203</b>	15 credits	S1	E	PN
<b>Calculus II</b>		S1	I	AL
The techniques of 100-level calculus are applied and extended in the study of infinite series, vector-valued functions and functions of two or more variables. Topics include Fourier series, convergence of power series, partial derivatives, double		S1	I	PN

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and triple integrals with applications to surface area and volumes, line and surface integrals.

<b>160.204</b>	15 credits	S1	I	AL
<b>Differential Equations I</b>		S2	E	PN
Exact solution methods for ordinary differential equations including the use of the Laplace transform. Systems of differential equations, matrix methods, phase plane techniques. Numerical methods for integrals, derivatives and differential equations.		S2	I	PN
<b>160.211</b>	15 credits	S2	E	PN
<b>Applied Linear Algebra</b>		S2	I	AL
Vector spaces, linear transformation, matrix representation, inner product spaces, isometries, least squares, generalised inverse, eigen theory, quadratic forms, norms, numerical methods.		S2	I	PN
<b>160.212</b>	15 credits	S1	E	PN
<b>Discrete Mathematics</b>		S1	I	PN
Sets, logic, mathematical induction, functions and equivalence relations. Partial orderings, algebraic structures and morphisms. Error correcting codes and public key cryptography. Graph theory.		S1	I	WL
		S2	I	AL
<b>160.232</b>	15 credits	S2	E	PN
<b>Mathematics for Business II</b>				
Mathematical techniques used in finance, economics and business. Topics include matrices, inverse and generalised inverse, solution of systems of equations, eigenvalues and eigenvectors, linear programming and sensitivity analysis, simulation, constrained and unconstrained multivariate analysis, techniques of integration, simple differential equations. Appropriate computer packages will be used as required.				
<b>160.301</b>	15 credits	S2	I	AL
<b>Analysis</b>		S2	I	PN
Real analysis: inequalities, the continuum property, induction, sequences, functions and limits, continuity, contraction mappings and fixed points, differentiation, mean value theorems and Taylor's theorem. Complex analysis: geometry in the complex plane, limits and continuity, holomorphic functions, line integrals, Cauchy's theorem and some elementary consequences, singularities and Laurent's theorem, the calculus of residues and some applications.				
<b>160.302</b>	15 credits	S1	E	PN
<b>Algebra</b>		S1	I	AL
Group theory – basic properties, permutation groups, finite Abelian groups, cosets, normal subgroups, homomorphism		S1	I	PN

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theorems, representation. Ring theory – integral domains and fields, ideals, homomorphism theorems, factorisation, extension fields.				
<b>160.314</b> <b>Combinatorics</b>	15 credits	S1	E	PN
Combinations and permutations, the inclusion-exclusion principle, recurrence relations, generating functions, partitions, applications to coding theory, chromatic polynomials, block designs.				
<b>160.316</b> <b>Geometry</b>	15 credits	*	*	*
Transformation geometry and symmetry – isometries, frieze groups, wallpaper groups. Axiomatic geometry – axiom systems, models and independence, Euclidean geometry, Euclid's parallel postulate and non-Euclidean geometry.				
<b>160.317</b> <b>Methods of Mathematical Physics</b>	15 credits	S2	E	PN
An introduction to the mathematics of physical theories. Vector and tensor calculus. Curvilinear coordinate systems. Integral theorems. Introduction to differential forms. Group theoretic ideas in physics. Illustrations from physics and engineering.		S2	I	PN
<b>160.318</b> <b>Differential Equations II</b>	15 credits	S1	I	AL
Ordinary differential equations: series solutions, special functions, Sturm-Liouville problems, Green's functions. Partial differential equations: method of characteristics, classification of second order equations, separation of variables, numerical methods, Fourier transforms.		S1	I	PN
<b>160.319</b> <b>Mathematical Modelling</b>	15 credits	S2	I	AL
The mathematical modelling process and methodologies examined through a variety of case studies. Application of analytical techniques, numerical methods and computer software packages to the solution of differential equations, difference equations and linear and nonlinear systems.		S2	I	PN
<b>160.320</b> <b>Mathematics in Education</b>	15 credits	S2	E	PN
A discussion of some fundamental question in mathematics education: What is mathematics? Why teach mathematics? How do people learn mathematics? The nature of mathematical concepts and the difficulties associated with learning them. Issues in mathematics education: Culture and mathematics, creativity and mathematics, etc.				
<b>160.325</b> <b>History of Mathematics</b>	15 credits	S1	E	PN
A general survey of the history of mathematics up to the end of the eighteenth century, with specific reference to important mathematical works and contributions of major mathematicians.				
<b>160.380</b> <b>Project</b>	15 credits	S2	I	PN
<b>160.700</b> <b>Research Methods</b>	15 credits	*	*	*
The nature of research in mathematics and its applications. The history and structure of the international mathematics research community. Ethical issues in research. The mathematics research literature. Writing mathematics. Funding and project management.				
<b>160.702</b> <b>Advanced Algebra</b>	15 credits	S1	I	PN
A selection of topics in advanced algebra which may include the following: isomorphism theorems, series of groups, Sylow theorems, classification of finitely generated abelian groups, free groups, group representations, matrix representations and characters of groups; extension fields, Galois correspondence, solvability of polynomial equations; semigroups, Green's equivalence, regular semigroups, inverse semigroups.		S2	I	AL
		S2	I	PN

Paper No./Title	Credits	Sem	Mode	Loc
<b>160.703</b> <b>Advanced Analysis</b>	15 credits	S1	I	AL
A selection of advanced topics from real, complex, abstract and functional analysis, with applications, e.g. Fourier series, approximation theory.		S1	I	PN
		S2	I	PN
<b>160.704</b> <b>Studies in Theoretical Mathematics</b>	15 credits	S1	I	AL
Selected advanced topics from geometry, topology, number theory, analysis and combinatorics.		S1	I	PN
		S2	I	PN
<b>160.705</b> <b>Studies in Discrete Mathematics</b>	15 credits	S1	I	PN
An advanced investigation of some topics in discrete mathematics which may include graph theory, combinatorics and set theory.		S2	I	PN
<b>160.715</b> <b>Advanced Computational Methods</b>	15 credits	S1	I	AL
Advanced study of computational solution methods with topics selected from approximation theory, sparse linear systems, matrix eigenproblems, initial value problems and boundary value problems in ordinary differential equations and partial differential equations.		S1	I	PN
		S2	I	PN
<b>160.725</b> <b>General Relativity</b>	15 credits	S1	I	PN
Einstein's Theory of General Relativity is universally accepted as the best macroscopic theory of gravitation currently available. The foundations for the theory are provided and some applications are discussed in detail, e.g. planetary motion, black holes.		S2	I	PN
<b>160.733</b> <b>Methods of Applied Mathematics</b>	15 credits	S1	I	AL
A selection of topics which may include asymptotic analysis, the calculus of variations, integral equations and partial differential equations. Some applications to problems in engineering and physics will be discussed.		S1	I	PN
		S2	I	PN
<b>160.734</b> <b>Studies in Applied Differential Equations</b>	15 credits	S1	I	PN
Topics in the advanced study of ordinary and partial differential equations selected from dynamical systems, chaos, Lie symmetries, and applications to mathematical modelling, physics and engineering.		S2	I	AL
		S2	I	PN
<b>160.737</b> <b>Studies in Mathematical Physics</b>	15 credits	S1	I	PN
Studies of the mathematical formulation of the physical principles required for the development of modern theories in mathematical physics. A topic or topics will be selected from areas such as Lie groups and algebras, analytical mechanics, electrodynamics, quantum mechanics and kinetic theory, together with suitable applications.		S2	I	PN
<b>160.738</b> <b>Studies in Continuum Mechanics</b>	15 credits	S2	I	AL
The Continuum Hypothesis. Development of the equations of conservation of mass, momentum and energy for a continuum from first principles. Constitutive laws. Theory and applications for materials selected from liquids, gases, solids and porous media.				
<b>160.739</b> <b>Studies in Applied Mathematics</b>	15 credits	S2	I	AL
Systematic development of mathematical applications from, for example, physics and engineering, decision sciences, mathematical finance, environmental sciences, computational and/or information sciences.				
<b>160.774</b> <b>Philosophy of Mathematics</b>	15 credits	S2	E	PN
A general survey of the most important themes in the philosophy of mathematics from Plato to the present day, with an emphasis on recent views such as social constructivism and quasi-empiricism.				

Paper No./Title	Credits	Sem	Mode	Loc	Paper No./Title	Credits	Sem	Mode	Loc
<b>160.775</b>	15 credits	S1	E	PN					
<b>History of Mathematics</b>									
A general survey of the history of mathematics up to the end of the eighteenth century, with specific reference to important mathematical works and the contributions of major mathematicians. A study of selected topics in the history of 19th- and 20th-century mathematics.									
<b>160.783</b>	30 credits	S12	I	AL					
<b>Mathematics Project</b>		S12	I	PN					
<b>160.791</b>	15 credits	S1	I	AL					
<b>Special Topic</b>		S1	I	PN					
<b>160.792</b>	15 credits	S2	I	AL					
<b>Special Topic</b>		S2	I	PN					
<b>160.800</b>	120 credits	S12	I	AL					
<b>MPhil – Mathematics</b>		S12	I	PN					
<b>160.897</b>	60 credits	S1	I	AL					
<b>Thesis (Year 1)</b>		S1	I	PN					
		S12	E	PN					
		S12	I	AL					
<b>160.898</b>	60 credits	S1	I	AL					
<b>Thesis (Year 2)</b>		S1	I	PN					
		S12	E	PN					
		S12	I	AL					
<b>160.899</b>	120 credits	S12	E	PN					
<b>Thesis</b>		S12	I	AL					
		S12	I	PN					
<b>160.900</b>	120 credits	S12	I	AL					
<b>PhD Mathematics</b>		S12	I	PN					