

School of Mathematics & Statistics

Head of School Professor E F Robertson

Degree Programmes

Graduate Diploma: Mathematics
Statistics

M.Sc.: Mathematics
Statistics

Programme Requirements

Mathematics

Graduate Diploma: A total of 120 credits from MT and CS modules at 3000 and 4000 level, including at least 60 credits at 4000 level, the course of study to be approved by the Head of School.

M.Sc.: 120 credits as for Graduate Diploma together with a dissertation comprising three months' full-time study, which will carry 60 credits

Statistics

Graduate Diploma: A total of 120 credits from MT and CS modules at 3000 and 4000 level, including at least 60 credits at 4000 level, the course of study to be approved by the Head of School.

M.Sc.: 120 credits as for Graduate Diploma together with a dissertation comprising three months' full-time study, which will carry 60 credits

Modules

The anti-requisite for each module is the corresponding 3000 module.

MT4611 Advanced Symbolic Computation

Credits: 20.0 Semester: 2

Availability: 2000-01

Prerequisite: MT2001 or MT2101

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This module aims to enable students to use Maple as a tool in their other modules and to turn naturally to such a package when solving mathematical problems. The module aims to illustrate the following points: a symbolic computation package allows one to conduct mathematical experiments; a symbolic computation package allows one to collect data about a problem being studied. This is similar to the way other scientists work. It is easier to try several different approaches to a problem and see which works. The machine is stupid. Intelligence comes from the user. The user thinks, the user interprets, the computer calculates. Students will undertake a more substantial project than that required for MT3611.

Class Hour: 9.00 am

Teaching: Two lectures, one tutorial

Assessment: Project = 45%, 2 Hour Examination = 55%

Mathematics & Statistics - 4000 Level modules

MT4612 Advanced Computing in Mathematics

Credits:	20.0	Semester:	2
Availability:	2001-02		
Prerequisites:	(MT2001 or MT2101), MT2003		
Programme(s):	Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.		
Description:	This module consists of MT3612 with the addition of directed study on more advanced topics not covered in MT3612, for example, the use of NAG libraries and graphics packages plus aspects of Fortran 90 like dynamic allocatable arrays. In addition, the computing project will be more demanding than the project for MT3612. The syllabus includes: an introduction to good programming style through examples; the construction of a well documented Fortran program that implements a numerical algorithm; use of the advanced features of Fortran to, for example, (i) manipulate matrices, (ii) read and write to data files, (iii) implement library routines and (iv) use graphics packages. The students will also complete an advanced project that contributes up to 35% of the final marks for the module.		
Class Hour:	9.00 am		
Teaching:	Two lectures and one tutorial.		
Assessment:	Project = 35%, 2 Hour Examination = 65%		

MT4701 Advanced Statistical Inference

Credits:	20.0	Semester:	1
Prerequisites:	(MT2001 or MT2101), MT2004		
Programme(s):	Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.		
Description:	This module consists of MT3701 with the addition of directed reading on more advanced aspects of the subject and a requirement to write a review essay on an aspect of the subject. The syllabus will include: distribution theory – negative binomial, multinomial, gamma, beta, t and F distributions; point estimation – Mean square error; unbiasedness; sufficiency; the efficient score; Fisher Information; the Cramér-Rao lower bound; exponential families; attainment of the Cramér-Rao lower bound; multi-dimensional Cramér-Rao inequality; maximum likelihood estimation; consistency and asymptotic efficiency; hypothesis testing – Neyman-Pearson Lemma; uniformly most powerful tests; likelihood ratio tests; confidence sets – Pivotal quantities; Bayesian Inference – Bayes Theorem; highest posterior density intervals; Bayes estimators; prior distributions and subjective probability; conjugate priors.		
Class Hour:	11.00 am		
Teaching:	Two lectures and one tutorial.		
Assessment:	Project = 25%, 2 Hour Examination = 75%		

MT4702 Advanced Generalized Linear Models and Data Analysis

Credits:	20.0	Semester:	1
Prerequisite:	MT2004		
Co-requisite:	MT3501		
Anti-requisite:	MT3702		
Programme(s):	Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.		
Description:	This module aims to demonstrate the power and elegance of unifying a large number of simple statistical models within the framework of the generalized linear model. It will train students in the interpretation, analysis and reporting of data, when a single response measurement is interpreted in terms of one or a number of other variables. As well as studying the material covered in MT3702, students will undertake a substantial piece of project work.		
Class Hour:	11.00 am		
Teaching:	2 lectures, 1 tutorial, practical classes and project related tutorials.		
Assessment:	Project = 40%, 2 Hour Examination = 60%		

Mathematics & Statistics - 4000 Level modules

MT4704 Advanced Sampling Theory

Credits: 20.0 Semester: 2

Availability: 2000-01

Prerequisite: MT1004

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This module comprises MT3704 but with a more advanced project which will require some or all of the following: supplementary reading, a literature review, a critique of a survey, questionnaire and survey design, survey implementation, and data analysis. The primary goal of the advanced project will be to have students investigate in greater depth one or more specific topics encountered in MT3704.

Class Hour: 12.00 noon

Teaching: Two lectures, one tutorial and practical classes.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4705 Advanced Multivariate Analysis

Credits: 20.0 Semester: 1

Availability: 2000-01

Prerequisites: MT2004, (MT2001 or MT3501)

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This module consists of MT3705 with the addition of directed reading on more advanced aspects of the subject and the requirement for students to analyse a data set. The syllabus includes: properties of the multivariate normal distribution; checking multivariate normality; hypothesis testing; the likelihood ratio and union-intersection principles; one-sample and two-sample Hotelling T^2 tests; tests on covariance matrices; tests of independence; discriminant analysis; principal components analysis; canonical correlation; analysis of data using a computer package.

Class Hour: 9.00 am

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4803 Advanced Interpolation and Approximation

Credits: 20.0 Semester: 2

Availability: 2001-02

Prerequisite: MT2001 or MT2101

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module covers the material of MT3803, with the addition of topics, covered by directed reading and/or additional lectures, requiring a much more mature understanding of analysis. The syllabus includes: piecewise polynomials; splines of arbitrary degree; a basis involving truncated powers for the linear space of splines of fixed degree; B-splines; relation between B-splines and truncated powers; Marsden's identity; uniform B-splines; applications of quadratic and cubic splines; Weierstrass' theorem; Bernstein's proof; properties of Bernstein polynomials; Bernstein's proof of the Weierstrass theorem; Korovkin's theorem; rate of convergence of the Bernstein polynomials; Voronovsky's theorem; approximation by interpolation: Féjer's proof of the Weierstrass theorem; Peano kernel theory and applications.

Class Hour: 10.00 am

Teaching: Two lectures and one tutorial.

Assessment: Two-and-a-half Hour Examination = 100%

Mathematics & Statistics - 4000 Level modules

MT4804 Advanced - The Sun

Credits: 20.0 Semester: 1

Prerequisites: MT2003 or MT3601

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module consists of MT3804 with the addition of directed reading on more advanced aspects of the subject and a requirement for students to carry out a detailed analytical investigation of a particular system or a detailed literature survey of a specific area. The syllabus includes: observations of the Sun and its magnetic phenomena; the equations of magnetohydrodynamics, their properties and application to solar magnetism; convection and diffusion of magnetic field; magnetic equilibria, force-free fields, magnetic flux tubes; MHD waves; waves in magnetic flux tubes, intense tubes, sunspots, coronal loops; coronal heating; prominences; Solar wind; helioseismology.

Class Hour: 11.00 am

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4805 Advanced Electromagnetism

Credits: 20.0 Semester: 2

Availability: 2000-01

Prerequisite: MT3601

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module is an extension of MT3805 to include (i) the application of particle orbit theory to plasmas, (ii) the propagation of waves in plasmas. The syllabus also includes: electric and magnetic fields and polarisation; Maxwell's equations; wave equation for fields, properties of plane waves and Fresnel's relations; Poynting's theorem and energy flow; scalar and vector potential and the inhomogeneous wave equation; Green's function solution and retarded potentials; radiation from dipole and half wave antennas, and arrays of antennas; wave guides; motion of charged particles, adiabatic invariants and guiding centre drifts; particle orbit theory and its use in plasma physics; wave propagation in plasmas, cold plasma dispersion relation, cut-offs and resonances, CMA diagram, warm plasma modifications of cold plasma theory.

Class Hour: 12.00 noon

Teaching: Two lectures and one tutorial.

Assessment: Two-and-a-half Hour Examination = 100%

MT4806 Advanced Numerical Solution of Partial Differential Equations

Credits: 20.0 Semester: 2

Availability: 2000-01

Prerequisites: MT3504 or MT3602

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module consists of MT3806 with the addition that students will be required to gain expertise in a programming language and undertake computational projects. The syllabus includes: convergence and stability of finite-difference approximations to initial value problems in one and two space dimensions; the investigation of dispersion and dissipation in the approximation of conservative laws.

Class Hour: 12.00 noon

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4807 Advanced Classical Mechanics

Credits: 20.0 Semester: 2

Availability: 2000-01

Prerequisite: MT2003

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: The module consists of MT3807 with the addition of directed reading on advanced topics. The students will be asked to complete extra tutorial sheets covering the advanced material. The following material will also be covered: Newton's laws of motion – dynamics of a particle; momentum and energy; conservative forces – energy conservation; central forces – angular momentum conservation – planetary orbits; non-inertial/accelerating frames of reference, principle of equivalence, coriolis and centrifugal forces; dynamics of a system of particles; mechanics of a rigid body, moments and products of inertia, principal axes, impulsive forces, Euler's equations; Lagrange's equations, principle of least action, generalised co-ordinates, Euler's angles, Hamilton's equations.

Class Hour: 10.00 am

Teaching: Two lectures and one tutorial.

Assessment: Two-and-a-half Hour Examination = 100%

MT4808 Advanced Dynamical Systems

Credits: 20.0 Semester: 2

Availability: 2001-02

Prerequisite: MT3504

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module consists of MT3808 with the addition of directed reading on more advanced or technical aspects of the subject and a requirement for students to carry out a detailed analytic and numerical investigation of a particular system. The syllabus includes: discrete and continuous dynamical systems; period doubling, intermittency, bifurcations and chaos in mappings and differential systems; homoclinic and heteroclinic points and orbits and their role in the development of chaos; the Smale horseshoe mapping and symbolic dynamics; the bifurcations of codimension one and the use of centre manifold theory; Melnikov's method; Strange attractors, dimension and Lyapunov exponents; Hamiltonian dynamics and the Kolmogorov-Arnold-Moser theorem.

Class Hour: 10.00 am

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4809 Advanced Fluid Dynamics

Credits: 20.0 Semester: 2

Availability: 2001-02

Prerequisite: MT3601

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module consists of MT3809 with the addition of directed reading on more advanced aspects of the subject. By the end of the module students are expected to understand the various physical properties of fluids; the workings of Pitot tubes and Venturi meters; the concepts of Froude and Reynolds number; gas bubbles oscillations; how to solve Laplace's equation for various velocity potential problems; the concept of a stream function; Navier-Stokes equations and their solution in simple situations; application of complex variable theory to fluid flows and its use in predicting lift and drag round rotating bodies; aerofoil theory; water wave theory; comprehensible fluid theories; Mach number and shock lines; Prandtl-Meyer expansions; Rankine-Hugoniot relationships.

Class Hour: 12.00 noon

Teaching: Two lectures and one tutorial.

Assessment: Two-and-a-half Hour Examination = 100%

MT4810 Advanced Geophysical Fluid Dynamics

Mathematics & Statistics - 4000 Level modules

Credits: 20.0 Semester: 2
Availability: 2000-01
Prerequisites: MT2003 and MT3601
Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.
Description: This module consists of MT3810 together with additional advanced project work on aspects of the course.
Class Hour: 10.00 am
Teaching: Two lectures and one tutorial.
Assessment: Projects = 25%, Two Hour Examination = 75%

MT4811 Advanced Asymptotic Analysis and Perturbation Theory

Credits: 20.0 Semester: 2
Availability: 2000-01
Prerequisites: MT3503, MT3504
Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.
Description: This module consists of MT3811 with the addition of directed reading on more advanced topics in both Asymptotic Analysis and Perturbation Theory. The advanced topics may include, for example, the method of steepest descents, advanced boundary layer methods and the Langer transformation for two turning point problems in WKB theory. Students will be asked to complete more demanding tutorial sheets and carry out detailed calculations using these more advanced techniques.
Class Hour: 11.00 am
Teaching: Two lectures and one tutorial.
Assessment: Two-and-a-half Hour Examination = 100%

MT4812 Advanced Partial Differential Equations

Credits: 20.0 Semester: 2
Availability: 2001-02
Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.
Description: The aim of this module is to give an insight into the role of nonlinear partial differential equations of the evolution type in modern applied mathematics. After an introduction to methods for linear equations the module will deal with techniques for the analysis of applications in such areas as compressible fluid flow and the formation of shock waves, travelling waves, spread of thin films, solitons, traffic flow and other areas of the physical and biological sciences. The particular focus of this module will be a description of the inverse scattering method for the solution of the Korteweg-de Vries equation.
Class Hour: 11.00 am
Teaching: Two lectures and one tutorial.
Assessment: Two-and-a-half Hour Examination = 100%

MT4813 Advanced Fractal Geometry

Mathematics & Statistics - 4000 Level modules

Credits: 20.0 Semester: 2
Availability: 2001-02
Prerequisites: MT2001 or MT2101

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module consists of MT3813 with the addition of tutorials and directed reading on extensions of the subject and more sophisticated mathematical analysis. The aim of this module is to introduce the mathematics used to describe and analyse fractals and to show how the theory may be applied to examples drawn from across mathematics and science. The module discusses the philosophy and scope of fractal geometry; and covers concepts such as dimension, representation of fractals by iterated function systems, fractals in other areas of mathematics such as dynamical systems and number theory, Julia sets and the Mandelbrot set.

Class Hour: 12.00 noon
Teaching: Two lectures and one tutorial.
Assessment: Two-and-a-half Hour Examination = 100%

MT4814 Advanced Graph Theory

Credits: 20.0 Semester: 2
Availability: 2000-01
Prerequisite: MT1002

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module includes and extends the contents of MT3814. Additional topics to be covered may include: applications of graphs to groups and other algebraic structures, automorphism groups, further algorithms, complexity of algorithms.

Class Hour: 10.00 am
Teaching: Two lectures and one tutorial.
Assessment: Project = 25%, 2 Hour Examination = 75%

MT4815 Advanced Functional Analysis

Credits: 20.0 Semester: 2
Availability: 2000-01
Prerequisite: MT2002

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module consists of MT3815 with additional advanced material leading to a project. The module will familiarise students with the basic notions of functional analysis, that is analysis on normed spaces and Hilbert space. The module will cover normed spaces, convergence and completeness, operators, Hilbert spaces and topics such as spectral theory and the Hahn-Banach theorem.

Class Hour: 12.00 noon
Teaching: Two lectures and one tutorial.
Assessment: Project = 25%, 2 Hour Examination = 75%

MT4816 Advanced Finite Mathematics

Mathematics & Statistics - 4000 Level modules

Credits: 20.0 Semester: 2

Availability: 2001-02

Prerequisite: MT1002

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module includes and extends the contents of MT3816. Additional topics to be covered may include: Boolean algebras, further combinatorial structures.

Class Hour: 12.00 noon

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4817 Advanced Rings and Fields

Credits: 20.0 Semester: 1

Availability: 2000-01

Prerequisite: MT2002

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module consists of MT3817 together with additional advanced material, which is designed to give students a deeper understanding of the structure of rings and fields and their applications. It may include topics from radical theory, semisimplicity, Galois theory and primary ideals and decompositions.

Class Hour: 11.00 am

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4818 Advanced Topics in Geometry

Credits: 20.0 Semester: 2

Availability: 2000-01

Prerequisite: MT2002

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module includes and extends the contents of MT3818. Additional topics to be covered may include: crystallographic and frieze groups and their classification, an introduction to algebraic topology.

Class Hour: 11.00 am

Teaching: Two lectures and one tutorial.

Assessment: Two-and-a-half Hour Examination = 100%

MT4819 Advanced Number Theory

Credits: 20.0 Semester: 2

Availability: 2000-01

Prerequisite: MT2002

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module includes and extends the contents of MT3819. Additional topics to be covered may include: quadratic reciprocity, quadratic forms, arithmetic functions, further Diophantine equations.

Class Hour: 10.00 am

Teaching: Two lectures and one tutorial.

Assessment: Two-and-a-half Hour Examination = 100%

MT4820 Advanced Linear Algebra

Mathematics & Statistics - 4000 Level modules

Credits: 20.0 Semester: 1
Availability: 2001-02
Prerequisite: MT2001

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module consists of MT3820 with the addition of more advanced material. The syllabus includes bases, the dimension theorem, eigenvalues and eigenvectors, the Caley-Hamilton theorem, minimum polynomials, sums and direct sums of subspaces, the primary decomposition theorem, diagonalisation, similarity, various canonical forms.

Class Hour: 11.00 am

Teaching: Two lectures and one tutorial.

Assessment: Two-and-a-half Hour Examination = 100%

MT4821 Advanced Modules and Categories

Credits: 20.0 Semester: 2
Availability: 2001-02
Prerequisites: MT3820 or MT4820

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This module consists of MT3821 with the addition of more advanced material. The basic idea of a category and the fundamental notions of functor and natural transformation are introduced with particular reference to the abelian category of modules. Universal constructions are used throughout. The syllabus includes morphisms, exact sequences, quotient modules, isomorphism theorems, free modules, products and coproducts, kernels and cokernels, binormal categories, groups of morphisms, additive categories, abelian categories, equivalent categories, adjoint functors.

Class Hour: 10.00 am

Teaching: Two lectures and one tutorial.

Assessment: Two-and-a-half Hour Examination = 100%

MT4822 Advanced Metric and Topological Spaces

Credits: 20.0 Semester: 2
Availability: 2001-02
Prerequisite: MT2002

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module consists of MT3822 with additional advanced material leading to a project. This module extends ideas of convergence and continuity to very general settings. Topics include metric spaces, completeness and the contraction mapping theorem, compactness, topological spaces axiomatized via open sets, compactness and connectedness.

Class Hour: 11.00 am

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4823 Advanced Semigroups

Mathematics & Statistics - 4000 Level modules

Credits: 20.0 Semester: 2

Availability: 2000-01

Prerequisite: MT2002

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study must be approved by the Head of School.

Description: This module will consist of MT3823, together with additional advanced material, designed to take students to the frontiers of current research in semigroup theory. It may contain topics from: semigroup presentations, decidability problems, finiteness conditions, amalgamation, matrix semigroups and semigroup varieties.

Class Hour: 12.00 noon

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4824 Advanced Topics in Groups

Credits: 20.0 Semester: 2

Availability: 2001-02

Prerequisite: MT3603

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This module will consist of MT3824 together with additional advanced material, in which the results from the basic part of the module will be used to obtain deeper information about finite groups of small orders, simple groups, solubility problems for finitely presented groups and Burnside type problems. This additional part of the module will be designed so as to give students a taste of the current research in group theory.

Class Hour: 10.00 am

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4825 Advanced Topics in Modern Analysis

Credits: 20.0 Semester: 2

Availability: 2001-02

Prerequisite: MT3604

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This module consists of MT3825 with additional advanced material leading to a project. This module introduces some of the powerful techniques and ideas of modern mathematical analysis that are important both in analysis in its own right and in its many applications in mathematics and science. The module will include topics such as: measure theory, the ergodic theorem, martingale theory, Fuchsian groups. Analysis is one of the active research areas at the school, and the choice of topics will reflect this.

Class Hour: 11.00 am

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4828 Advanced Classification

Credits: 20.0 Semester: 2

Mathematics & Statistics - 4000 Level modules

Availability: 2000-01

Prerequisite: MT2001 or MT3501

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This module consists of MT3828 with the addition of directed reading on more advanced or technical aspects of the subject and a requirement for students to apply the methodology in a detailed examination of data. The syllabus includes: types of data and classifications; construction of dissimilarity measures; partitioning algorithms; hierarchical classifications; principal co-ordinates analysis; non-metric multidimensional scaling; stages in numerical classification; analysis of data using the CLUSTAN package.

Class Hour: 11.00 am

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4831 Advanced Bayesian Inference

Credits: 20.0 Semester: 2

Availability: 2001-02

Prerequisite: MT3701

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This module consists of MT3813 with an additional project which will give consideration to some more advanced aspects of the theory or to the application of Bayesian techniques. This may involve either directed reading or the use of the computer for simulation or data-based analyses. Foundations include: Bayes theorem (discrete and continuous cases); summarising posterior distributions; prediction; sufficiency; non-informative priors. Inference based on the Normal distribution includes: inference and prediction for a Normal sample; inverse gamma and Normal-gamma distributions; univariate Normal linear regression; prediction of observations satisfying a fitted linear model. Statistical Decision Theory includes: Bayes actions and Bayes rules; sampling costs; initial determination of sample size; one-step-look-ahead rules; optimal bounded sequential procedures; unbounded decision problems; approximation of optimal procedures by bounded procedures; sequential Probability Ratio Test (SPRT).

Class Hour: 10.00 am

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4832 Advanced Mathematical Programming

Credits: 20.0 Semester: 2

Availability: 2001-02

Prerequisite: MT1001

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This module consists of MT3832 with the addition of directed reading on more advanced aspects of the subject and a requirement for students to carry out a project. The syllabus includes: formulation of linear programming problems; solution graphically and by use of the simplex algorithm; sensitivity analysis; the dual problem and its relation to the primal problem; the transportation problem and its solution using the North West Corner method and Vogel's rule; the assignment problem and its solution; transshipment; nonlinear programming; integer programming.

Class Hour: 12.00 noon

Assessment: Project = 25%, 2 Hour Examination = 75%

MT4834 Advanced Ecological Modelling

Credits: 20.0 Semester: 2

Mathematics & Statistics - 4000 Level modules

Availability: 2001-02
Prerequisite: MT2001 or MT2101
Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.
Description: This module consists of MT3834 with the addition of an advanced project, in the form of a literature review or a project on some aspect of modelling.
Class Hour: 10.00 am
Teaching: Two lectures and one laboratory.
Assessment: Essay = 10%, Advanced Project Report = 25%, 2 Hour Examination = 65%

MT4835 Advanced Wildlife Population Assessment

Credits: 20.0 Semester: 2
Availability: 2001-02
Prerequisite: MT2004
Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.
Description: This module consists of MT3835 with the addition of an advanced project, which might cover any aspect of the module.
Class Hour: 11.00 am
Teaching: Two lectures and one laboratory.
Assessment: Advanced Project Report = 45%, 2 Hour Examination = 55%

MT4838 Advanced Robust Statistical Methods

Credits: 20.0 Semester: 2
Availability: 2000-01
Prerequisite: MT2004
Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.
Description: This module consists of MT3838 with an addition of an advanced project, which might cover any aspect of the module.
Class Hour: 11.00 am
Teaching: Two lectures and one laboratory.
Assessment: Continuous Assessment = 20%, Advanced Project = 25%, 2 Hour Examination = 55%

MT4850 Advanced Lattice Theory

Credits: 20.0 Semester: 2

Mathematics & Statistics - 4000 Level modules

Availability: 2000-01

Prerequisite: MT2002

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This module consists of MT3850 with the addition of more advanced material. The aim of the module is to introduce students to the basic ideas of ordered sets and lattices, with particular emphasis on various types of distributive lattices. The syllabus includes: ordered sets and isotone mappings; infima and suprema; lattices and lattice morphisms; complete, modular, and distributive lattices and their Birkhoff characterisations; representation of a distributive lattice as a ring of sets; join-irreducible elements and finite duality; complementation and Boolean algebras; connection with boolean rings; the Lindenbaum-Tarski Theorem; congruences, principal congruences, the lattice of congruences; implicative and pseudo-complemented lattices; introduction to Ockham algebras.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Project = 25%, Two Hour Examination = 75%

MT4998 Advanced Project in Mathematics/Statistics

Credits: 30.0 Semester: Whole Year

Prerequisite: Entry to the MSci degree in Mathematics and Theoretical Physics

Anti-requisite: MT4999

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: The project will be chosen from an approved list of topics and the credit rating will reflect the content and depth of an investigation involved.

Assessment: Project = 100%

MT4999 Advanced Project in Mathematics/Statistics

Credits: 40.0 Semester: Whole Year

Anti-requisite: MT4998

Programme(s): Optional module for Mathematics and Statistics Postgraduate Taught Programmes. The course of study to be approved by the Head of School.

Description: This is a more substantial project which, for M.Sci. students will replace the existing Honours project. The project will be chosen from an approved list of topics. The student may be required to review current literature and investigate a topic in some depth.

Assessment: Project = 100%

