Statistics

Programme Requirements:

Statistics - MSc
90 credits from List: MT5611, MT5751, MT5758, MT5802, MT5806, MT5809-MT5810, MT5812, MT5821, MT5824, MT5830-MT5831, MT5836, MT5852. **and** 30 credits from Module List: MT3000 - MT4598, MT4600 - MT5998 **and** MT5099 (60 credits)

Compulsory module:

MT5099 Dissertation for MSc Programme/s

SCOTCAT Credits:	60	SCQF Level 11	**Semester**	Full Year
Academic year:	2018/9			
Planned timetable:	At times to be arranged with the supervisor.			
Student dissertations will be supervised by members of the teaching staff who will advise on the choice of subject and provide guidance throughout the progress of the dissertation. The completed dissertation must be no more than 15,000 words.				
Learning and teaching methods of delivery:	**Weekly contact**: Individual supervision			
	Scheduled learning: 0 hours		**Guided independent study:** 0 hours	
Assessment pattern:	**As used by St Andrews:** Dissertation = 100%			
Re-assessment pattern:	No Re-Assessment Available			
Module coordinator:	Dr J D Mitchell			

90 credits from:

MT5611 Advanced Symbolic Computation

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	9.00 am Mon (odd weeks), Wed and Fri			
This module aims to enable students to use a computer as a tool in their other modules and to turn naturally to a computer when solving mathematical problems. The module aims to illustrate the following points: computation allows one to conduct mathematical experiments; computation 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 computer is not intelligent; 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 MT4111.				
Pre-requisite(s):	Before taking this module you must pass at least 4000-level mt module			
Anti-requisite(s)	You cannot take this module if you take MT4111			
Learning and teaching methods of delivery:	**Weekly contact**: 2.5 lectures (weeks 1 - 10) and 1 practical session (weeks 2 - 11).			
Assessment pattern:	2-hour Written Examination = 55%, Coursework: Project = 45%			
Re-assessment pattern:	2-hour Written Examination = 55%, Coursework: Project = 45%			
Module teaching staff:	TBC			

MT5751 Estimating Animal Abundance

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	12.00 noon Mon (odd), Wed and Fri			
The module will introduce students to the main types of survey method for wildlife populations. It will cover simple methods in some detail and provide students with a conceptual framework for building understanding of more advanced methods. By the end of the course, students will be able to identify an appropriate assessment method for a given population, be able to design a simple survey to assess the population, and perform simple analyses of survey data. Students will get experience in using the methods via computer practical sessions involving design and analyses of surveys conducted by computer simulation.				
Pre-requisite(s):	Before taking this module you must (pass MT3507 or pass MT3508) and pass one 4000-level mt module			
Learning and teaching methods of delivery:	**Weekly contact**: 1.5 hrs lecture, 1 hr practical, 0.5 hr tutorial (weeks 1 - 10)			
Assessment pattern:	2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module teaching staff:	TBC			

MT5758 Applied Multivariate Analysis

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	11.00 am Mon (even weeks), Tue and Thu			
This module provides introductory and advanced training in the applied analysis of multivariate data. The module emphasis is upon practical analysis of data and the extraction of answers from real-life data. Basic theory is given covering matrix algebra, metrics and general measures of similarity. The most common and fundamental methods including dimension reduction and classification are covered e.g. Multivariate Analysis of Variance, Principal Components Analysis, multidimensional scaling, Factor Analysis, clustering methods. The practical component of the module focuses on analysis of real data using the commercial software tools Excel, SAS and SPSS.				
Pre-requisite(s):	The student must have been accepted on to mmath statistics or mmath mathematics programmes			
Anti-requisite(s)	You cannot take this module if you take MT4609			
Learning and teaching methods of delivery:	**Weekly contact**: 2.5 lectures (weeks 1 - 10), and 4 tutorials and 4 project group meetings over the semester.			
Assessment pattern:	2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module teaching staff:	TBC			

MT5802 Advanced Analytical Techniques

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	12.00 noon Mon (odd weeks), Wed and Fri			
This module introduces students to some further important applied analytic techniques such as Variational Calculus, Integral equations and transforms, and the theory of Steepest Descent.				
Pre-requisite(s):	Before taking this module you must pass MT3503			
Learning and teaching methods of delivery:	**Weekly contact**: 2.5 lectures (weeks 1 - 10) and 1 tutorial (weeks 2 - 11).			
Assessment pattern:	2-hour Written Examination = 75%, Coursework = 25%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module teaching staff:	TBC			

MT5806 Advanced Computational Techniques

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	12.00 noon Mon (even weeks), Tue and Thu			
This module introduces students to some of the ideas, techniques and constraints that underpin modern approaches to the numerical modeling of physical processes that may be described by partial differential equations. Students will gain expertise in implementing standard methods and will submit a short dissertation together with a portfolio of computational work.				
Pre-requisite(s):	Before taking this module you must pass MT3802 and pass MT4112			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (weeks 1 - 10) and a typical average of 0.5 hours of project supervisions (weeks 2 - 11)			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	Resubmission of projects = 100%			
Module teaching staff:	Dr S J Brooks			

MT5809 Advanced Fluid Dynamics

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
Planned timetable:	11.00 am Mon (odd weeks), Wed and Fri			
This module will examine current research in fluid dynamics, with a particular focus on meteorology and oceanography. The large-scale atmosphere and oceans behave quite unlike a 'classical' fluid owing to the presence of stable density stratification and rotation. As a result, the fluid motion is dominated by slow, 'vortical' or eddying motions (like cyclones) which generally spin slower than the Earth. Superimposed on this slow motion are relatively fast wave-like motions analogous to surface waves on a pond. These lectures describe the mathematical basis of these fundamentally different types of motion, and furthermore illustrate the increasingly important role of computer modelling in this research.				
Pre-requisite(s):	Before taking this module you must pass MT4509			
Learning and teaching methods of delivery:	**Weekly contact**: 2.5 lectures (weeks 1 - 10) and 1 tutorial (weeks 2 - 11).			
Assessment pattern:	2.5-hour Written Examination = 100%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module teaching staff:	Dr J Reinaud			

MT5810 Advanced Solar Theory

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
Planned timetable:	12.00 noon Mon (even weeks), Tue and Thu			
The object of this module is to describe the magnetohydrodynamic processes at work in the Sun, using modern techniques of applied mathematics, and to discuss the latest theories in relation to aspects of current research within the School.				
Pre-requisite(s):	Before taking this module you must pass MT4510			
Learning and teaching methods of delivery:	**Weekly contact**: 2.5 lectures (weeks 1 - 10) and 1 tutorial (weeks 2 - 11).			
Assessment pattern:	2.5-hour Written Examination = 100%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module teaching staff:	Prof C E Parnell			

MT5821 Advanced Combinatorics

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	12.00 noon Mon (odd weeks), Wed and Fri			
Combinatorics underlies and interacts many topics in discrete mathematics including group theory, statistical design, and statistical mechanics, as well as being a lively subject in its own right. The module will give students a good grounding in the techniques and will engage students with research-level problems. It is designed to make a wide area of combinatorics available to students.				
Pre-requisite(s):	Before taking this module you must pass MT4514 or pass MT4516			
Learning and teaching methods of delivery:	**Weekly contact**: 2.5-hour lectures (weeks 1 - 10) and 1-hour tutorial (weeks 2 - 11).			
Assessment pattern:	2.5-hour Written Examination = 100%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module teaching staff:	Prof P J Cameron			

MT5824 Topics in Groups

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
Planned timetable:	10.00 am Mon (odd weeks), Wed and Fri			
The overall aim of this module is to build on the foundations established in MT4003, and take the students further into this important and beautiful branch of mathematics. More specifically, through a selection of topics, some of which will be of current research interest in St Andrews, it will introduce students to advanced techniques of handling groups and classifying them.				
Pre-requisite(s):	Before taking this module you must pass MT4003			
Learning and teaching methods of delivery:	**Weekly contact**: 2.5 lectures (weeks 1 - 10), 1 tutorial and 1 examples class (weeks 2 - 11).			
Assessment pattern:	2.5-hour Written Examination = 100%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module teaching staff:	TBC			

MT5830 Hyperbolic Geometry

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	10.00 am Mon (odd weeks), Wed and Fri			
We study two dimensional hyperbolic space, which is a fundamental example of a non-Euclidean metric space. Hyperbolic space has a rich structure and many counter intuitive properties and this module will focus on the geometry of this space, including a detailed study of the geodesic structure, the group of isometries, and the actions of Fuchsian groups which lead to beautiful tilings and fractal limit sets. We will combine ideas from analysis, geometry and group theory, with a strong emphasis on visual intuition.				
Pre-requisite(s):	Before taking this module you must pass MT2505 and pass MT3502 and pass MT3503			
Learning and teaching methods of delivery:	**Weekly contact**: 2.5 lectures (weeks 1 - 10) and 1 tutorial (weeks 2 - 11).			
Assessment pattern:	2.5-hour Written Examination = 100%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module teaching staff:	TBC			

MT5831 Advanced Bayesian Inference

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
Planned timetable:	10.00 am Mon (even weeks), Tue and Thu			
This module consists of MT4531 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. The syllabus includes Bayes' theorem, inference for Normal samples; univariate Normal linear regression; principles of Bayesian computational, Markov chain Monte Carlo - theory and applications.				
Pre-requisite(s):	Before taking this module you must pass MT3507 or pass MT3508 or pass MT3506			
Anti-requisite(s)	You cannot take this module if you take MT4531			
Learning and teaching methods of delivery:	**Weekly contact**: 24 lectures and 7 practical classes over semester.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module teaching staff:	TBC			

MT5836 Galois Theory

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	11.00 am Mon (odd weeks), Wed and Fri			
Galois theory is one of the most beautiful areas of mathematics, establishing a remarkable connection between the theory of polynomial equations and their roots and group theory. The subject brings together ideas from the theory of groups and fields in a powerful way, culminating in Galois' fundamental theorem. There are many applications of the work, for example demonstrating that certain ruler and compass constructions are impossible, and that there is no general formula for the solution of quintic equations.				
Pre-requisite(s):	Before taking this module you must pass MT3505 or pass MT4517			
Learning and teaching methods of delivery:	**Weekly contact**: 2.5 lectures (weeks 1 - 10) and 10 tutorials/practical classes over semester.			
Assessment pattern:	2.5-hour Written Examination = 100%			
Re-assessment pattern:	2.5-hour Written Examination = 100%			
Module teaching staff:	TBC			

MT5852 Mathematical Biology 2

SCOTCAT Credits:	20	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
Planned timetable:	9.00 am Mon (odd weeks), Wed and Fri			
This module will explore real world applications of mathematics to biological and medical problems e.g. cell movement, pattern formation in animal coat markings, spread of diseases (AIDS, measles). The mathematical techniques used in the modelling will be nonlinear partial differential equations. The module will be useful to students who wish to specialise in Applied Mathematics in their degree programme.				
Learning and teaching methods of delivery:	**Weekly contact**: 2.5 lectures (weeks 1 - 10) and 1 tutorial (weeks 2 - 11).			
Assessment pattern:	2-hour Written Examination = 90%, Coursework (Class Test) = 10%			
Re-assessment pattern:	Take-Home Examination = 100%			
Module teaching staff:	TBC			

Further optional modules - see also Undergraduate Mathematics modules 2018-2019.