School of Mathematics & Statistics

Mathematics & Statistics (MT) modules

MT1001 Introductory Mathematics

SCOTCAT Credits:	20	SCQF Level 7	**Semester:**	1
Academic year:	2017/8 & 2018/9			
Planned timetable:	9.00 am			
This module is designed to give students a secure base in elementary calculus to allow them to tackle the mathematics needed in other sciences. Students wishing to do more mathematics will be given a good foundation from which they can proceed to MT1002. Some of the work covered is a revision and reinforcement of material in the Scottish Highers and many A-Level syllabuses.				
Programme module type:	Compulsory for students on all programmes in the School who do not meet the direct entry requirements for MT1002. All other students should take MT1002 instead.			
Pre-requisite(s):	Higher or A-Level Mathematics (A/S level Mathematics with approval of Head of School).		**Required for:**	MT1002
Anti-requisite(s):	MT1003, CS1010. Students may not take MT1001 and EC1003 at the same time, but they may take MT1001 in first year and EC1003 in second year			
Learning and teaching methods and delivery:	**Weekly contact**: 5 lectures (weeks 1 - 10), 1 tutorial and 1 laboratory (weeks 2 -11).			
	Scheduled learning: 70 hours		**Guided independent study:** 130 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 90%, Practical Examinations = 0%, Coursework = 10%			
	As used by St Andrews: Written Examination = 90% (2-hour final exam = 70%, 2 class tests = 10% each), Coursework = 10%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module coordinator:	Dr C V Tran			
Module teaching staff:	Dr C V Tran, Prof T Neukirch, Dr B H Burgess, TBC			

MT1002 Mathematics

SCOTCAT Credits:	20	SCQF Level 7	**Semester:**	1 & 2 (taught twice)
Academic year:	2017/8 & 2018/9			
Planned timetable:	9.00 am			
This module is designed to introduce students to the ideas, methods and techniques which they will need for applying mathematics in the physical sciences or for taking the study of mathematics further. It aims to extend and enhance their skills in algebraic manipulation and in differential and integral calculus, to develop their geometric insight and their understanding of limiting processes, and to introduce them to complex numbers and matrices.				
Programme module type:	Compulsory for all programmes within the School. Compulsory for all single and joint BSc Management Science degree programmes and all programmes within the School of Physics & Astronomy (except Direct entry to Second year).			
Pre-requisite(s):	MT1001 or B at Advanced Higher Mathematics or B at A-Level Mathematics.			
Required for:	AS2001, MT1003, MT2501, MT2502, MT2503, MT2504, MT2505, MT3832, PH2011, PH2012			
Learning and teaching methods and delivery:	**Weekly contact**: 5 lectures (weeks 1 - 10), 1 tutorial and 1 laboratory (weeks 2 - 11).			
	Scheduled learning: 66 hours		**Guided independent study:** 134 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 90%, Practical Examinations = 0%, Coursework = 10%			
	As used by St Andrews: Written Examination = 90% (2-hour final exam = 70%, 2 class tests = 10% each), Coursework = 10%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module coordinator:	Dr R K Scott (S1), Prof K J Falconer (S2)			
Module teaching staff:	Dr R K Scott, Dr A P Naughton, Dr J M Fraser, Prof L Olsen, Prof K J Falconer, Dr J N Reinaud			

MT1003 Pure and Applied Mathematics

SCOTCAT Credits:	20	SCQF Level 7	**Semester:**	2
Academic year:	2017/8 & 2018/9			
Planned timetable:	9.00 am			
The aim of this module is to provide students with a taste of both pure and applied mathematics, to give them insight into areas available for study in later years and to provide them with the opportunity to broaden their mathematical experience.				
Programme module type:	Optional for all programmes within the School.			
Pre-requisite(s):	MT1002		**Required for:**	MT3600, MT4514
Learning and teaching methods and delivery:	**Weekly contact**: 5 lectures (weeks 1 - 10), 1 tutorial and 1 laboratory (weeks 2 - 11).			
	Scheduled learning: 70 hours		**Guided independent study:** 130 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 90%, Practical Examinations = 0%, Coursework = 10%			
	As used by St Andrews: Written Examination = 90% (2-hour final exam = 70%, 2 class tests = 10% each), Coursework = 10%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module coordinator:	Dr A P Naughton			
Module teaching staff:	Dr A P Naughton, Dr A L Wilmot-Smith, TBC			

MT1007 Statistics in Practice

SCOTCAT Credits:	20	SCQF Level 7	**Semester:**	2
Academic year:	2017/8 & 2018/9			
Planned timetable:	11.00 am			
This module provides an introduction to statistical reasoning, elementary but powerful statistical methodologies, and real world applications of statistics. Case studies based on environmental impact assessment, medicine and economics & finance are used throughout the module to motivate and demonstrate the principles. Students get hands-on experience exploring data for patterns and interesting anomalies as well as experience using modern statistical software to fit statistical models to data.				
Programme module type:	Compulsory for all single and joint Honours BSc Management Science degree programmes Optional for all programmes in the School			
Pre-requisite(s):	An A grade at GCSE/Grade 1 at Standard Grade Mathematics or a C grade at AS level/Higher Mathematics.			
Required for:	MT3833, MT4551			
Learning and teaching methods and delivery:	**Weekly contact**: 4 lectures (weeks 1 - 10), 1 tutorial and 1 laboratory (weeks 2 - 11).			
	Scheduled learning: 60 hours		**Guided independent study:** 140 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 2-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	2-hour Written Examination = 75%, Existing Coursework = 25%			
Module coordinator:	Dr M L Burt			
Module teaching staff:	Dr M L Burt, Dr C G Paxton, TBC			

MT1010 Topics in Mathematics: Problem-solving Techniques

SCOTCAT Credits:	10	SCQF Level 7	**Semester:**	1
Academic year:	2017/8 & 2018/9			
Availability restrictions:	Available only to students on the Fast Track route through the MMath degree programme.			
Planned timetable:	10.00 am Mon (odd weeks), Wed and Fri			
This module introduces some important basic concepts in mathematics and also explores problem-solving in the context of these topics. It is intended to strengthen the mathematical skills of an undergraduate entering on the Fast Track route into the MMath degree programme.				
Programme module type:	Compulsory for MMath Fast Track degree programme			
Pre-requisite(s):	Admission onto the Fast Track MMath degree programme			
Learning and teaching methods and delivery:	**Weekly contact**: 1.5-hour lecture, 1 practical and 1 tutorial (x 10 weeks)			
	Scheduled learning: 35 hours		**Guided independent study:** 65 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 50%, Practical Examinations = 0%, Coursework = 50%			
	As used by St Andrews: 1.5-hour Written Examination = 50%, Coursework = 50%			
Re-assessment pattern:	1.5-hour Written Examination = 50%, Existing Coursework = 50%			
Module coordinator:	Dr V Popov			
Module teaching staff:	Dr V M Popov, Dr C Venkataraman, TBC			

MT2501 Linear Mathematics

SCOTCAT Credits:	15	SCQF Level 8	**Semester:**	1 & 2 (taught twice)
Academic year:	2017/8 & 2018/9			
Planned timetable:	12.00 noon Mon (odd weeks), Wed and Fri [Semester 1]; 11.00 am on Mon (even weeks), Tue and Thu [Semester 2]			
This module extends the knowledge and skills that students have gained concerning matrices and systems of linear equations. It introduces the basic theory of vector spaces, linear independence, linear transformations and diagonalization. These concepts are used throughout the mathematical sciences and physics. It is recommended that students in the Faculties of Arts and Divinity take an even number of the 15-credit 2000-level MT modules.				
Programme module type:	Compulsory for all programmes in the School of Mathematics & Statistics. Compulsory for all programmes in the School of Physics & Astronomy. Compulsory for all single and joint BSc Management Science degree programmes.			
Pre-requisite(s):	MT1002, or A at Advanced Higher Mathematics, or A at A-level Further Mathematics, or A at both A-level Mathematics and A-level Physics			
Anti-requisite(s):	MT2001			
Required for:	MT3501, MT3802, MT3832, MT4515, MT4517			
Learning and teaching methods and delivery:	**Weekly contact**: 2.5-hours lectures (x 10 weeks), 1 tutorial (x 4 weeks), 1 examples class (x 6 week)			
	Scheduled learning: 35 hours		**Guided independent study:** 115 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 85%, Practical Examinations = 0%, Coursework = 15%			
	As used by St Andrews: 2-hour Written Examination = 70%, Coursework (including class test) = 30%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module coordinator:	Dr A L Wilmot-Smith			
Module teaching staff:	Dr A L Wilmot-Smith, Dr S Huczynska			

MT2502 Analysis

SCOTCAT Credits:	15	SCQF Level 8	**Semester:**	1
Academic year:	2017/8 & 2018/9			
Planned timetable:	11.00 am Mon (even weeks), Tue and Thu			

The main purpose of this module is to introduce the key concepts of real analysis: limit, continuity and differentiation. Emphasis will be placed on the rigourous development of the material, giving precise definitions of the concepts involved and exploring the proofs of important theorems. This module forms the prerequisite for all later modules in mathematical analysis.

It is recommended that students in the Faculties of Arts and Divinity take an even number of the 15-credit 2000-level MT modules.

Programme module type:	Compulsory for all MMath programmes. Optional for all other undergraduate programmes in the School of Mathematics & Statistics.	
Pre-requisite(s):	MT1002 or A at Advanced Higher Mathematics or A at A-level Further Mathematics	
Anti-requisite(s):	MT2002	
Required for:	MT3502, MT3503, MT3600, MT4515, MT4526	
Learning and teaching methods and delivery:	**Weekly contact**: 2.5 hours lectures (x 10 weeks), 1-hour tutorial (x 5 weeks), 1-hour examples class (x 5 weeks)	
	Scheduled learning: 35 hours	**Guided independent study:** 115 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 85%, Practical Examinations = 0%, Coursework = 15%	
	As used by St Andrews: 2-hour Written Examination = 70%, Coursework (including 1 class test) = 30%	
Re-assessment pattern:	2-hour Written Examination = 100%	
Module coordinator:	Dr M Todd	
Module teaching staff:	Dr M Todd	

MT2503 Multivariate Calculus

SCOTCAT Credits:	15	SCQF Level 8	**Semester:**	1
Academic year:	2017/8 & 2018/9			
Planned timetable:	12.00 noon Mon (even weeks), Tue and Thu			

This module extends the basic calculus in a single variable to the setting of real functions of several variables. It introduces techniques and concepts that are used throughout the mathematical sciences and physics: partial derivatives, double and triple integrals, surface sketching, cylindrical and spherical coordinates.

It is recommended that students in the Faculties of Arts and Divinity take an even number of the 15-credit 2000-level MT modules.

Programme module type:	Compulsory for all MMath programmes. Compulsory for BSc Mathematics & Physics and MPhys Mathematics & Theoretical Physics degree programmes. Compulsory for all single and joint Honours BSc/MA Statistics programmes. Compulsory for all programmes in the School of Physics & Astronomy. Optional for all other undergraduate programmes in the School of Mathematics & Statistics.
Pre-requisite(s):	MT1002, or A at Advanced Higher Mathematics, or A at A-level Further Mathematics, or A at both A-level Mathematics and A-level Physics, or Co-requisite MT1010
Anti-requisite(s):	MT2001
Required for:	MT2506, MT2507, MT3503, MT3504, MT3601, MT4507, MT4513, MT4551, MT4607
Learning and teaching methods and delivery:	**Weekly contact**: 23 hours of lectures, 1-hour tutorial (x 4 weeks), 1-hour examples class (x 4 weeks)
	Scheduled learning: 31 hours — **Guided independent study:** 119 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 85%, Practical Examinations = 0%, Coursework = 15%
	As used by St Andrews: 2-hour Written Examination = 70%, Coursework = 30% (including 1 class test)
Re-assessment pattern:	2-hour Written Examination = 100%
Module coordinator:	Prof A W Hood
Module teaching staff:	Prof A W Hood

MT2504 Combinatorics and Probability

SCOTCAT Credits:	15	SCQF Level 8	**Semester:**	1
Academic year:	2017/8 & 2018/9			
Planned timetable:	11.00 am Mon (odd weeks), Wed and Fri			

This module provides an introduction to the study of combinatorics and finite sets and also the study of probability. It will describe the links between these two areas of study. It provides a foundation both for further study of combinatorics within pure mathematics and for the various statistics modules that are available.

It is recommended that students in the Faculties of Arts and Divinity take an even number of the 15-credit 2000-level MT modules.

Programme module type:	Compulsory for all MMath programmes. Compulsory for all BSc/MA Statistics programmes. Compulsory for all single and joint BSc Management Science degree programmes. Optional for all other undergraduate programmes in the School of Mathematics & Statistics.	
Pre-requisite(s):	MT1002 or A at Advanced Higher Mathematics or A at A-level Further Mathematics, or Co-requisite MT1010	
Anti-requisite(s):	MT2004 or MT2005	
Required for:	MT2508, MT3706, MT3833, MT4514, MT4516, MT4528, MT4551	
Learning and teaching methods and delivery:	**Weekly contact**: 2.5 hours of lectures (x 10 weeks), 1-hour tutorial (x 4 weeks), 1-hour examples class (x 5 weeks)	
	Scheduled learning: 34 hours	**Guided independent study:** 116 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 70%, Practical Examinations = 0%, Coursework = 30%	
	As used by St Andrews: 2-hour Written Examination = 70%, Coursework = 30%	
Re-assessment pattern:	2-hour Written Examination = 100%	
Module coordinator:	Dr H Worthington	
Module teaching staff:	Dr L S Theran, Dr H Worthington	

MT2505 Abstract Algebra

SCOTCAT Credits:	15	SCQF Level 8	**Semester:**	2
Academic year:	2017/8 & 2018/9			
Planned timetable:	11.00 am Mon (odd weeks), Wed and Fri			
This main purpose of this module is to introduce the key concepts of modern abstract algebra: groups, rings and fields. Emphasis will be placed on the rigourous development of the material and the proofs of important theorems in the foundations of group theory. This module forms the prerequisite for later modules in algebra. It is recommended that students in the Faculties of Arts and Divinity take an even number of the 15-credit 2000-level MT modules.				
Programme module type:	Compulsory for all MMath programmes. Optional for all other undergraduate programmes in the School of Mathematics & Statistics.			
Pre-requisite(s):	MT1002 or A at Advanced Higher Mathematics or A at A-level Further Mathematics			
Anti-requisite(s):	MT2002			
Required for:	MT3505, MT3600, MT4003, MT4516, MT4517, MT4519			
Learning and teaching methods and delivery:	**Weekly contact**: 2.5 hours of lectures (x 10 weeks), 1-hour tutorial (x 5 weeks), 1-hour examples class (x 5 weeks)			
	Scheduled learning: 35 hours		**Guided independent study:** 115 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 70%, Practical Examinations = 0%, Coursework = 30%			
	As used by St Andrews: 2-hour Written Examination = 70%, Coursework = 30%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module coordinator:	Dr J D Mitchell			
Module teaching staff:	Dr J D Mitchell			

MT2506 Vector Calculus

SCOTCAT Credits:	15	SCQF Level 8	**Semester:**	2
Academic year:	2017/8 & 2018/9			
Planned timetable:	9.00 am Mon (even weeks), Tue and Thu			
This module introduces students to some of the fundamental techniques that are used throughout the mathematical modelling of problems arising in the physical world such as grad, div and curl as well as cylindrical and spherical coordinate systems. Fundamental theorems such as Green's Theorem, Stokes' Theorem and Gauss's Divergence Theorem will also be studied. It provides the foundation for many of the modules available in applied mathematics later in the Honours programme. It is recommended that students in the Faculties of Arts and Divinity take an even number of the 15-credit 2000-level MT modules.				
Programme module type:	Compulsory for all MMath programmes. Optional for all other undergraduate programmes in the School of Mathematics & Statistics.			
Pre-requisite(s):	MT2503		**Anti-requisite(s):**	MT2003
Required for:	MT3506, MT3601, MT4005, MT4509, MT4510			
Learning and teaching methods and delivery:	**Weekly contact**: 2.5 hours of lectures (x 10 weeks), 1-hour tutorial (x 5 weeks), 1-hour examples class (x 5 weeks)			
	Scheduled learning: 35 hours		**Guided independent study:** 115 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 85%, Practical Examinations = 0%, Coursework = 15%			
	As used by St Andrews: 2-hour Written Examination = 70%, Coursework (including class test) = 30%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module coordinator:	Prof D G Dritschel			
Module teaching staff:	Prof D G Dritschel			

MT2507 Mathematical Modelling

SCOTCAT Credits:	15	SCQF Level 8	**Semester:**	2
Academic year:	2017/8 & 2018/9			
Planned timetable:	12.00 noon Mon (odd weeks), Wed and Fri			
This module provides an introduction to a variety of techniques that are used throughout applied mathematics. It discusses how to translate physical problems into mathematics and covers such topics as differential equations, dynamics, numerical methods and Fourier series. It illustrates how these are used when solving problems. It is recommended that students in the Faculties of Arts and Divinity take an even number of the 15-credit 2000-level MT modules.				
Programme module type:	Compulsory for all MMath programmes. Optional for all other undergraduate programmes in the School of Mathematics & Statistics.			
Pre-requisite(s):	MT2503		**Anti-requisite(s):**	MT2003
Required for:	MT3601			
Learning and teaching methods and delivery:	**Weekly contact**: 2.5 hours of lectures (x 10 weeks), 1-hour tutorial (x 5 weeks), 1-hour examples class (x 5 weeks)			
	Scheduled learning: 35 hours		**Guided independent study:** 115 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 70%, Practical Examinations = 0%, Coursework = 30%			
	As used by St Andrews: 2-hour Written Examination = 70%, Coursework = 30%			
Re-assessment pattern:	2-hour Written Examination = 100%			
Module coordinator:	Prof M A J Chaplain			
Module teaching staff:	Prof M A J Chaplain			

MT2508 Statistical Inference

SCOTCAT Credits:	15	SCQF Level 8	**Semester:**	2
Academic year:	2017/8 & 2018/9			
Planned timetable:	12.00 noon Mon (even weeks), Tue and Thu			

This module provides an introduction to the mathematical models of randomness. These models are used to perform statistical analysis, where the aim is to evaluate our uncertainty on a certain quantity after observing data. Important topics in statistics are described including maximum likelihood estimation, confidence intervals and hypothesis testing, permutation tests, and linear regression. It forms a prerequisite for the statistics modules in the Honours programme.

It is recommended that students in the Faculties of Arts and Divinity take an even number of the 15-credit 2000-level MT modules.

Programme module type:	Compulsory for all MMath programmes. Compulsory for all BSc/MA Statistics programmes. Compulsory for all single and joint Honours BSc Management Science programmes. Optional for all other undergraduate programmes in the School of Mathematics & Statistics.		
Pre-requisite(s):	MT2504	**Anti-requisite(s):**	MT2004 or EC2003
Required for:	MT3507, MT3508, MT3606, MT3607, MT4113, MT4527, MT4530, MT4607, MT4608, MT4614		
Learning and teaching methods and delivery:	**Weekly contact**: 2.5 hours of lectures (x 10 weeks), 1-hour tutorial (x 5 weeks), 1-hour examples class (x 5 weeks)		
	Scheduled learning: 35 hours	**Guided independent study:** 115 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 70%, Practical Examinations = 0%, Coursework = 30%		
	As used by St Andrews: 2-hour Written Examination = 70%, Coursework = 30%		
Re-assessment pattern:	2-hour Written Examination = 100%		
Module coordinator:	Dr H Worthington		
Module teaching staff:	Dr H Worthington		