DIVISION OF MATHEMATICAL PHYSICAL AND LIFE SCIENCES

MSc in Mathematics and the Foundations of Computer Science
Report of the Examiners (2016-17)

PART I

A: Statistics

1. Numbers and percentages in each category

Category	Number			Percentage (%)		
	2016/17	2015/16	2014/15	2016/17	2015/16	2014/15
Distinction	11	(10)	(15)	50	(47.6)	(53.6)
Pass	11	(10)	(10)	50	(47.6)	(35.7)
Fail	0	(0)	(2)	0	(0)	(7.1)
Failed TT hurdle	0	(1)	(1)	0	(4.8)	(3.6)
Entries	22	(21)	(28)	100	(100)	(100)

2. Vivas
The twenty two who submitted dissertations also had viva examinations.

3. Number of scripts multiply marked
Each written assignment (mini project) was marked by the lecturer of that course (who was therefore appointed as an assessor if they were not already an examiner) and was also marked by a second assessor in accordance with the examination conventions. All of the marks were moderated by the examiners.

Each dissertation was marked by the dissertation supervisor (who was therefore appointed as an assessor) and was also marked by a second assessor. These marks were then moderated by the examiners taking into consideration comments provided by both markers.

B: New examination methods and procedures this academic year
The second assessors were required to be present at the vivas instead of the dissertation supervisors.

C: Changes in examining methods and procedures envisaged
None.

D: Examination Conventions
The conventions are available on the course webpage https://www.maths.ox.ac.uk/members/students/postgraduate-courses/msc-mfocs and are circulated to students along with Notices to Candidates.

PART II

A: General Comments
43 courses were offered. 7 courses failed to attract any students. The overall performance was of a high standard with 12 mini-project scripts receiving marks of 90 and above, 22 receiving 80 and above, 34 receiving 70 and above, 37 receiving 60 and above, 8 receiving 50 and above, and 4 failures. The overall standard of dissertations was very high this year. 8 were awarded a grade of 80

and above, 12 at 70 and above, 2 at 60 and above. No students were awarded marks under 60. There were 55 assessors appointed to contribute to the examination.

Examination Recommendations
None.

B: Breakdown of results by gender

	Total	Male	Female
Entries	22	19	3
Passes awarded	11	9	2
Distinctions Awarded	11	10	1

C. Distribution of topics
Of the 43 topics available, the numbers taken were as follows:

Michaelmas Term	**Passed**	**Failed**
Algebraic Topology	3	0
Analytic Number Theory	0	0
Analytic Topology	0	0
Introduction to Representation Theory	2	0
Lie Algebras	1	0
Model Theory	1	0
Topology and Groups	2	0
Algebraic Geometry	0	0
Homological Algebra	3	0
Applied Probability	0	0
Categories Proofs & Processes	7	1
Communication Theory	0	0
Computer-Aided Formal Verification	2	0
Foundations of Computer Science	5	2
Quantum Computer Science	6	0
Introduction to Cryptology	6	0
Automata, Logic and Games	3	0
Combinatorics	5	0
Probability and Computing	10	0

Hilary Term	**Passed**	**Failed**
Algebraic Number Theory	3	0
Analysing Logics using Tree Automata * (reading course)	1	0
Commutative Algebra	1	0
Gödel's Incompleteness Theorems	2	0
Lambda Calculus and Types	4	0
Modular Forms	0	0
Axiomatic Set Theory	1	0
Infinite Groups	1	0
Introduction to Schemes	1	0
Geometric Group Theory	2	0
Non-Commutative Rings	0	0

Representation of Semisimple Lie Algebras	1	0
Concurrency	1	0
Graph Theory	6	0
Advanced Cryptology	3	0
Categorical Quantum Mechanics	4	0
Computational Algebraic Topology	2	0
Computational Game Theory	7	0
Elliptic Curves	3	0
Advanced Machine Learning	1	1
Networks	2	0
Probabilistic Combinatorics	4	0
Distributional Models of Meaning * (reading course)	4	0

Trinity Term	**Passed**	**Failed**
Computational Number Theory * (reading course)	7	1

D: The dissertation topics were as follows:-

- A geometrically inspired category as a meaning space for natural language
- A Lattice-Based Anonymous Reputation System
- Analysing and optimising Kidney Paired Donation Markets
- Classifying the Computational Complexity of the Ramsey and Factoring Problems
- Complexity of learning and teaching
- Convergence Analysis of an Adaptive Method of Gradient Descent
- Game Comonads in Finite Model Theory
- Generalised Pontryagin Construction for CW Complexes
- Hopf Algebras in Quantum Computation
- On rainbow-free colourings of uniform hypergraphs
- On the Joint Spectral Radius for Nonnegative Matrices
- On the Tautological Ring of g(S^n x S^n)
- Ore's Conjecture, Character Theory and the Special Linear Group
- Packing algorithms applied to linear programming
- Representations of Semisimple Lie Algebras and the BGG Resolution
- Security of the Supersingular Isogeny Key Exchange when used with Special Curves
- The Expressivity of Artificial Neural Networks
- The Lemke-Howson Algorithm and Random Games
- The Model Checking and Satisfiability Problems for Strategy Logic and its Fragments
- The Thermodynamic Limit in the Resource-Theoretic Framework
- Unsolvable problems in Topology
- Zero Knowledge Proofs in Lattice Based Cryptography

Each candidate showed a good knowledge of his or her chosen area in the oral examination. Instead of inviting the dissertation supervisors, this year the Supervisory Committee recommended inviting the second assessors to attend the vivas and where they were unable to attend they appointed a representative.

E. Medical Certificate/Special Cases

This section has been removed from the public version of the report.

F: Names of members of the board of examiners

J. Barrett (Chair)
C. Cirstea
J. Pila
J. Talbot

24/10/17