DIVISION OF MATHEMATICAL PHYSICAL AND LIFE SCIENCES

MSc in Mathematics and the Foundations of Computer Science
Report of the Examiners (2018-19)

PART I

A: Statistics

1. Numbers and percentages in each category

Category	Number			Percentage (%)		
	2018/19	2017/18	2016/17	2018/19	2017/18	2016/17
Distinction	14	15	11	52	75	50
Merit	9	N/A	N/A	33	N/A	N/A
Pass	4	2	11	15	10	50
Fail	0	1	0	0	5	0
Failed TT hurdle	0	0	0	0	0	0
Entries	27	20	22	100	100	100

2. Vivas
The 27 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, except for where the assignment had an accompanying mark scheme, this was marked by the lecturer of that course, 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 awarding of a merit to candidates was introduced.

C: Changes in examining methods and procedures envisaged
The examiners recommended that all assignments be double-blind marked and this decision has been referred to the supervisory committee.

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
46 courses were offered. 5 courses failed to attract any students. The overall performance was of a high standard with 24 mini-project scripts receiving marks of 90 and above, 39 receiving 80 and

above, 46 receiving 70 and above, 45 receiving 60 and above, 6 receiving 50 and above, and 8 failures. The overall standard of dissertations was very high this year. 1 was awarded a grade of 90 and above, 9 at 80 and above, 15 at 70 and above, 2 at 60 and above. No students were awarded marks under 60. There were 76 assessors appointed to contribute to the examination.

Examination Recommendations
None.

B: Breakdown of results by gender

	Total	Male	Female	Non-Binary
Entries	27	19	7	1
Passes awarded	4	3	1	0
Merits awarded	9	6	3	0
Distinctions Awarded	14	10	3	1

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

Michaelmas Term	**Passed**	**Failed**
Algabraic Topology	-	-
Algebraic Geometry	3	0
Analytic Number Theory	5	0
Analytic Topology	2	1
Categories, Proofs and Processes	11	0
Category Theory	4	0
Combinatorics	6	0
Computational Game Theory	3	0
Computational Learning Theory	2	2
Computer-aided Formal Verification	2	0
Differentiable Manifolds	1	0
Foundations of Computer Science	6	1
Graph Theory	8	0
Homological Algebra	5	0
Infinite Groups	2	0
Information Theory	2	0
Introduction to Cryptology	5	0
Introduction to Representation Theory	1	0
Lie Algebras	-	-
Model Theory	3	0
Quantum Computer Science	9	0
Topology and Groups	1	0

Hilary Term	**Passed**	**Failed**
Additive and Combinatorial Number Theory	3	0
Advanced Cryptology	1	0
Algebraic Number Theory	2	0
Analysing Logics using Tree Automata	-	-
Automata, Logic and Games	6	0

Axiomatic Set Theory	3	0
Categorical Quantum Mechanics	6	0
Commutative Algebra	1	0
Computational Algebraic Topology	4	0
Distributional Models of Meaning	4	1
Elliptic Curves	5	0
Geometric Group Theory	2	0
Godel Incompleteness Theorems	2	0
Introduction to Schemes	1	0
Lambda Calculus and Types	6	2
Lie Groups	-	-
Modular Forms	-	-
Networks	6	0
Non-Commutative Rings	2	0
Probabilistic Combinatorics	7	1
Probability and Computing	9	0
Representation Theory of Semisimple Lie Algebras	1	0

Trinity Term	**Passed**	**Failed**
Computational Number Theory	5	0
Concurrency	3	0

D: The dissertation topics were as follows:

- A Computational Exploration of the Polynomial Freiman-Ruzsa Conjecture
- A diagrammatic proof of the compact closure of traced $*$-autonomous categories internal to Prof
- A Post-Quantum Hash Function From Isogeny-Based Group Actions
- A Study of Distributed Coloring Algorithms
- Axiomatic and Empirical Study of Approval Based Committee Selection Rules
- Cannon's Conjecture and Generalizations
- Constructing Synchronisation Networks to Map and Predict Patterns of Trading Behaviour
- Developing the use of Quasi-sub elds polynomials for solving the Elliptic Curve Discrete Logarithm Problem
- Expanding categorical conceptual spaces to model meaning update mechanisms and semantic ambiguity
- Formal Veri cation of Consequences of V=L
- Hypergraph Container Lemma and its many applications
- Infinitesimals in Context: Their nature, origins and mathematical frameworks
- Large scale curvature and isoperimetric inequalities
- Lattices: from Mathematics to Cryptography Standards
- Learning in System F
- Morphisms of open games for iterated games
- On effective proof of the Manin-Mumford conjecture
- On Sparsifiability of Two-Variable CSPs
- Profunctor optics and traversals
- Quantum causality and Higher order processes
- Schelling Segregation: A game-theoretic analysis
- The Brauer Group of Rational Numbers
- The chromatic number of random graphs with a fixed degree sequence

- The complexity of approximating some complex-valued partition functions and its connections with quantum computation
- The Graph-Simplex Correspondence and its Algorithmic Foundations
- Topological Data Analysis for Dewetting Scenarios
- Topological Data Analysis of Enzyme Kinetics

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

E. Names of members of the board of examiners

C. Cirstea
T. Lukasiewicz (Chair)
I. Tomasic
P. Papazoglou

18/10/19