DIVISION OF MATHEMATICAL PHYSICAL AND LIFE SCIENCES

**MSc in Mathematics and the Foundations of Computer Science
Report of the Examiners (2019-20)**

PART I

A: Statistics

1. Numbers and percentages in each category

Category	Number			Percentage (%)		
	2019-20	2018/19	2017/18	2019-20	2018/19	2017/18
Distinction	13	14	15	93	52	75
Merit	0	9	N/A	0	33	N/A
Pass	1	4	2	7	15	10
Fail	0	0	1	0	0	5
Failed TT hurdle	0	0	0	0	0	0
Entries	14	27	20	100	100	100

2 students are applying for suspension and did not submit a dissertation for 2019-20.

2. Vivas
The 14 students who completed dissertations all had vivas with two examiners and their second assessor (or a first assessor if the second was unavailable).

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
Owing to Covid-19 a safety net policy was introduced as follows:

 1. The requirements for passing the course remain unchanged.

2. The main criterion (ii)(a) for a distinction is that the dissertation, and five mini-projects, including at least two from Schedule II, are all at distinction level. For this criterion, a Michaelmas Term mini-project will count as distinction level if the mark is at least 70, as usual. A Hilary or Trinity Term mini-project, and the dissertation, will count as distinction level if the mark is at least 67.

3. The main criterion (iii)(a) for a merit is that the dissertation, and five mini-projects, including at least two from Schedule II, are all at merit level. For this criterion, a Michaelmas Term mini-project will count as merit level if the mark is at least 65, as usual. A Hilary or Trinity Term mini-project, and the dissertation, will count as merit level if the mark is at least 62.

4. The exceptional criteria (ii)(b) and (iii)(b) for distinction/merit will remain formally unchanged. However, in all cases the Examiners will have discretion to award a distinction/merit where they feel based on the pattern of a candidate's marks that this is what the student would likely have achieved in normal circumstances.

C: Changes in examining methods and procedures envisaged
No changes are envisaged

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
47 courses were offered. 8 courses failed to attract any students. The overall performance was of a high standard with 9 mini-project scripts receiving marks of 90 and above, 43 receiving 80 and above, 23 receiving 70 and above, 10 receiving 60 and above, 5 receiving 50 and above, and 1 failure. The overall standard of dissertations was very high this year. 0 were awarded a grade of 90 and above, 12 at 80 and above, 2 at 70 to 80, 0 at 60 to 70. No students were awarded marks under 60.

Examination Recommendations
None.

B: Breakdown of results by gender

	Total	Male	Female	Non-Binary
Entries	14	11	3	0
Passes awarded	1	1	0	0
Merits awarded	0	0	0	0
Distinctions Awarded	13	10	3	1

C. Distribution of topics
Of the 48 topics available, the numbers taken were as follows:

Michaelmas Term	Passed	Failed
Algebraic Topology	2	0
Algebraic Geometry	1	0
Analytic Number Theory	2	0
Analytic Topology	-	-
Automata Logic and Games	3	0
Categories, Proofs and Processes	4	0
Category Theory	2	0
Combinatorics	6	0

Computation Algebraic Topology	1	0
Computational Game Theory	4	0
Computational Learning Theory	2	0
Computer-aided Formal Verification	1	0
Differentiable Manifolds	-	-
Distributional Models of Meaning	1	0
Foundations of Computer Science	5	0
Geometric Group Theory	1	0
Graph Theory	3	0
Homological Algebra	2	0
Infinite Groups	-	-
Information Theory	-	-
Integer Programming	1	0
Introduction to Cryptology	2	0
Introduction to Representation Theory	-	-
Lie Algebras	-	-
Model Theory	2	-
Quantum Computer Science	2	0
Topology and Groups	1	0

Hilary Term	Passed	Failed
Additive and Combinatorial Number Theory	1	0
Algebraic Number Theory	3	0
Analysing Logics using Tree Automata	3	0
Applied Category Theory	3	0
Axiomatic Set Theory	2	0
Categorical Quantum Mechanics	3	0
Commutative Algebra	-	-
Computational Complexity	1	0
Elliptic Curves	3	0
Godel Incompleteness Theorems	1	-
Introduction to Schemes	1	0
Introduction to Quantum Information	1	0
Lambda Calculus and Types	1	2
Lie Groups	-	-
Networks	1	0
Non-Commutative Rings	2	0
Probabilistic Combinatorics	3	0
Probability and Computing	3	1
Representation Theory of Semisimple Lie Algebras	1	0

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

D: The dissertation topics were as follows:

- Additive Sparsification of Graphs
- An Analysis of the Micali-Schnorr PRNG with Composite Moduli

- Approximation of continuous-variable quantum computing on NISQ devices
- Biases amongst products of primes and patterns of consecutive primes
- Communication Advantages for the Superposition of Asymptotically Long Sequences of Quantum Channels
- Higher Artin Stacks and Moduli Stacks
- Infinitary Logic and Infinite Time Turing Machines
- On the Kakeya Conjectures and the Polynomial Method
- Partial Order Games
- Perfectly Sampling from the Anti-Ferromagnetic Potts Model
- Recent Developments on the Erd́os-Hajnal Conjecture
- Representation theory of quantum groups and modular tensor categories
- Small, Indiscernible Sequences in NIP Structures
- The d-regular r-in-k-SAT problem

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. Mitigating Circumstances

There were five mitigating circumstances applications to be considered in the final meeting.

F: Special Cases

There were no special cases to discuss.

G: Names of members of the board of examiners
S. Abramsky
P. Papazoglou
I. Potapov
I. Tomasic

15/10/20