DIVISION OF MATHEMATICAL AND PHYSICAL SCIENCES

MSc in Mathematics and the Foundations of Computer Science
Report of the Examiners (2015-16)

Part I

1. Results split by gender breakdown

Two students resat components of the course. Both students were female. One student passed the overall course and the other failed the overall course. These figures are not included in the below table.

	Total	Male	Female
Entries	21	19	2
Passes awarded	10	8	2
Distinctions Awarded	10	10	0
Failed TT hurdle & failed course	1	1	0

2. Vivas

The twenty candidates 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. 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 both markers.

4. Distribution of topics

Of the 45 topics available, the numbers taken were as follows:

Michaelmas Term	***Passed***	***Failed***
Algebraic Topology	3	0
Analytic Number Theory	2	0
Analytic Topology	1	0
Introduction to Representation Theory	1	0
Lie Algebras	0	0
Model Theory	1	0
Topology and Groups	3	0
Algebraic Geometry	2	0
Homological Algebra	2	0
Applied Probability	0	0
Categories Proofs & Processes	8	0
Communication Theory	1	0
Computer-Aided Formal Verification	0	0
Computational Learning Theory	5	0
Foundations of Computer Science	2	0
Quantum Computer Science	7	0
Introduction to Cryptology	5	0
Automata, Logic and Games	2	0

Combinatorics	3	0
Probability and Computing	4	0

Hilary Term	***Passed***	***Failed***
Algebraic Number Theory	3	0
Commutative Algebra	0	0
Gödel's Incompleteness Theorems	0	0
Lambda Calculus and Types	5	0
Modular Forms	0	0
Axiomatic Set Theory	2	0
Infinite Groups	1	0
Introduction to Schemes	0	0
Geometric Group Theory	1	0
Non-Commutative Rings	0	0
Representation of Semisimple Lie Algebras	1	0
Concurrency	1	0
Computational Complexity	1	0
Graph Theory	6	0
Advanced Cryptology	5	0
Categorical Quantum Mechanics	3	1
Computational Algebraic Topology	4	0
Computational Game Theory	6	0
Elliptic Curves	3	0
Machine Learning	3	0
Networks	3	0
Probabilistic Combinatorics	1	0
Theory of Data and Knowledge Bases	1	0
Distributional Models of Meaning * (reading course)	4	0

Trinity Term	***Passed***	***Failed***
Computational Number Theory * (reading course)	8	0

5. Assessors

There were 65 assessors appointed to contribute to the examination.

A. Changes in examination methods and procedures this academic year

The mark sheet had been updated so that first assessors (only) would provide feedback on the mini project/dissertation which would be circulated to the students after the marks had been officially released.

B. Changes in examining methods and procedures envisaged

None.

Part II

45 courses were offered. 8 courses failed to attract any students. The overall performance was of a high standard with 1 mini-project script receiving marks of 90 and above, 27 receiving 80 and above, 40 receiving 70 and above, 33 receiving 60 and above, 12 receiving 50 and above, and 1 failure. The overall standard of dissertations was very high this year. 8 were awarded a grade of 80 and above, 7 at 70 and above, 5 at 60 and above. No students were awarded marks under 60.

The dissertation topics were as follows:-

- Algebras of generalized multicategories via classifying discrete opfibrations
- Quantum algorithms and symmetric-key cryptology
- Topological data analysis of real algebraic varieties
- Deductive verification of the s2n HMAC code
- Matchings in hypergraphs and progress towards proving Erdös' Matching Conjecture
- Intersection Type Systems Corresponding to Nominal Automata
- Distance-Transitive Graph and the Sims Conjecture
- Non-standard Random Graph Models that Produce Graphs with many Small Cycles
- Optimizing Randomization in Exam Creation
- Mixed Strategies in Boolean Games
- Classifications of elliptic potentials for the 3x3 spectral problem
- Resolutions in the Representation Theory of Complex Semisimple Lie Algebras
- Randomised Strategies in Boolean Games: A study on extending one-shot and iterated Boolean games into mixed and behavioural strategies
- Toric varieties and combinatorics
- On rotating needles and related problems
- Learning and Consistency for Weighted Automata
- Post-quantum signatures based on supersingular endomorphism ring computation
- Negation, and Logic within the Distributional Models of Meaning.
- Community detection in the European Parliament – A Network Approach
- Finding short polynomials in multivariate ideal lattices

Each candidate showed a good knowledge of his or her chosen area in the oral examination.
As with last year, the dissertation supervisors attended the vivas and where they were unable to attend they appointed a representative.

6. Examination Recommendations
None.

M Escardo
J Barrett
J Talbot
J Pila (Chairman)

13/10/16