DIVISION OF MATHEMATICAL AND PHYSICAL SCIENCES

MSc in Mathematics and the Foundations of Computer Science
Report of the Examiners (2007-2008)

Part I

1. Results

Entries	13
Passed	12
Distinctions Awarded	6
Failed	0
Incomplete	1

The incomplete result was given permission from the Proctors for a late submission on there dissertation.

2. Vivas

Twelve candidates who submitted dissertations had vivas.

3. Number of scripts multiply marked

Each written assignment (mini-project) was marked by the lecturer for that course (who was therefore appointed as an assessor if he was not already an examiner) and moderated by the examiners. Each dissertation was marked by one reader, and then moderated by the examiners.

4. Distribution of topics

Of the 32 topics available, the numbers taken were as follows:

Michaelmas Term	*Passed*	*Failed*
Algebraic Geometry	1	0
Algebras	3	0
Analytic Number Theory	4	0
Analytic Topology	0	0
Godels Incompleteness Theorems	3	0
Lie Algebras	3	0
Lie Groups	2	0
Applied Probability	1	0
Categories, Proofs and Processes	4	1
Communication Theory	2	0
Computational Complexity	7	0
Concurrency	0	0
Graph Theory	7	0
Computer Aided Formal Verification	1	0

Hilary Term	*Passed*	*Failed*
Algebraic Number Theory	0	0
Axiomatic Set Theory	0	0
Group Theory	2	0
Model Theory	1	0
Lambda Calculus & Types	2	0
Algebraic & Relational Methods for Propositional Logics	0	0
Representation Theory of Symmetric Groups	0	0

Representations of Finite Groups & Categories	1	0
Probabilistic Combinatorics	3	0
Automata, Logic and Games	5	0
Computing with Finitely Presented Groups	4	0
Elliptic Curves	4	0
Game Semantics	1	0
Percolation	3	0
Quantum Computer Science	3	0
Randomized Algorithms	4	0
Theory of Data and Knowledge Bases	2	0

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

There was one case of a written assignment being given a fail grade.

5. Assessors

There were 31 assessors appointed to help with the examination. Of these, 6 were not required at all and 8 were called upon to assess dissertations (including taking part in vivas).

A. Changes in examination methods and procedures this academic year

The switch to USMs was fully implemented this year, which led to a completely new method for computing the final marks. The following algorithm was used to compute the final mark for each student based on the marks on miniprojects and the mark of the dissertation:

MFOCS ALGORITHM FOR FINAL USM CALCULATION

I. Check that the candidate has passed five courses, including TWO in Section B and TWO in Schedule II, and the dissertation.
If NO, then FAIL with a USM of min{P, 49} where P is computed in Step II.

Otherwise:

II. Let X and Y be the best two marks obtained on Schedule II courses, and A, B, C be the three highest of all remaining course marks. Let D be the dissertation mark and compute

$P = (X + Y + A + B + C + 3D)/8$

where 0 is assigned to a symbol if fewer than five miniprojects (or the dissertation) have been submitted.

III. If $P < 70$, put $F = P$.

IV. If $P \geq 70$, then
(i) If all components to compute P are at least 70, put $F = P$;
(ii) If not, but $X, Y \geq 67$ and SIX courses and the dissertation have marks of at least 70, put $F = P$;
otherwise put $F = 69$ EXCEPT THAT
(iii) If neither (i) nor (ii) is satisfied but the Examiners are of the opinion that the dissertation is of such outstanding originality or importance that the dissertation and all submitted miniprojects can be deemed "excellent" if taken as a whole, then the Examiners shall have the right to put $F = P$.

The final USM is F, and a distinction is then automatically awarded
if and only if $F \geq 70$.

B. Changes in examining methods and procedures envisaged

While the Examiners felt that the application of the above algorithm led to fair results, they have expressed a general feeling that a simpler algorithm for computing USMs would be advantageous in the future, but this ought be discussed further in the a separate meeting. One external examiner (Richard Pinch) expressed his concern that a student may be misguided as to how to achieve a distinction in light of the current algorithm being so complex. It should be reasonable enough to be explained to the students.

Note by Chair of Examiners: Any such decision to alter the algorithm substantially will only affect the academic year 2009/10 at the earliest. The marking method for the academic year 2008/09 had to be published at the beginning of MT 2008 in the MFoCS handbook. Therefore, for the academic year 2008/09, the marking method as for 2007/08 will be adopted with minor changes.

A meeting with enough time for a thorough discussion of the marking scheme will be arranged in due course.

Part II

32 courses were offered. 6 courses failed to attract any students. The performance was of a high standard, with 13 receiving 90 and above, 18 receiving 80 and above, 18 receiving 70 and above, 14 receiving 60 and above, 6 receiving 50 and above and 1 Fail, (including dissertations). The overall standard of dissertations was very high this year. Three dissertations were awarded a grade of 90 and above, two 80 and above, two 70 and above, three 60 and above and two 50 and above.

The dissertation topics, which all had some (theoretical or practical) computing aspect to them, were as follows:-

- Singer Cycles
- Representations of the Heisenberg algebra associated to symmetric groups and Hilbert schemes
- Rational Points on Elliptic Curves over Function Fields
- Bismash Products and Groups Algebras
- Higher Genus Curves and Abelian Varieties
- Discrete Models of Categorical Quantum Computational Semantics
- Computing Tree- and Kelly-decompositions of Graphs and Digraphs"
- Rewrite Systems for a Graphical Representation of Classical Objects in a Dagger-Symmetric Monoidal Category
- Recognising graphs without disjoint cycles
- The Chromatic Number of Random Graphs
- Algorithmic Mechanism Design in Inter-domain Routing
- Comparing Hypergraph Invariants
- Reachability in Multi-threaded Programs

Each candidate showed a good knowledge of his or her chosen area in the oral examination.

G Gottlob (Chairman)
R Pinch
V Sassonne
A Scott