DIVISION OF MATHEMATICAL PHYSICAL AND LIFE SCIENCES

MSc in Mathematics and the Foundations of Computer Science
Report of the Examiners (2024-25)

PART I

A: Statistics

1. Numbers and percentages in each category

Category	Number			Percentage (%)		
	2024-25	2023-24	2022-23	2024-25	2023-24	2022-23
Distinction	17	13	12	77.3	39.4	54.5
Merit	2	8	4	13.7	24.2	18.2
Pass	2	11	6	4.5	33.3	27.3
Fail	0	1	0	0	3.1	0
Entries	22	33	22	95.5*	100	100

*Plus 1 DDM as noted in item F (4.5%).

2. Vivas
The 21 students who completed dissertations all had vivas with two examiners and their second assessor. One student didn't submit their dissertation or take their viva. See section F.

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
This year we introduced approved subjects. Five students took these. Two were assessed by exam and three by mini project.

C: Changes in examining methods and procedures envisaged
There were no changes envisaged.

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

PART II

A: General Comments

39 courses were offered, 5 courses failed to attract any students. The overall performance was of a high standard with 22 mini-project scripts receiving marks of 90 and above, 32 receiving 80 and above, 41 receiving 70 and above, 19 receiving 60 and above, 4 receiving 50 and above, and 2 fails.

The overall standard of dissertations was high this year; 5 were awarded a grade of 90 and above, 12 at 80 and above, 0 at 70 and above, 3 at 60 and above and 1 student was awarded a mark under 60. No overall fails.

Examination Recommendations

None.

B: Breakdown of results by gender

	Total	Male	Female	Non-Binary
Entries	22	19	3	0
Passes awarded	2	2	0	0
Merits awarded	2	1	1	0
Distinctions Awarded	17	15	2	0

Plus 1 DDM as noted in item F

C. Distribution of topics

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

Michaelmas Term	**Passed**	**Failed**
Algebraic Topology - C	2	1 non submission
Analytic Number Theory - C	2	0
Category Theory - C	3	1 non submission
Computer-Aided Formal Verification - CS	4	0
Graph Theory – B	4	0
Information Theory - B	9	0
Integer Programming - B	2	0
Model Theory – C	5	0
Quantum Processes and Computation CS	6	0
Topology and Groups B	1	0
Algebraic Geometry - C	0	1 non submission
Axiomatic Set Theory - C	2	0
Bayesian Statistical Probabilistic Programming - CS	2	0
Combinatorics – C	9	0
Distributed Processes, Types, and Programming – CS	2	0
Elliptic Curves - C	1	0

Graph Representation Learning - CS (WITH PRACTICAL)	4	0
Homological Algebra - C	2	1
Infinite groups - C	Not chosen	

Hilary Term	**Passed**	**Failed**
Algebraic Number Theory - B	3	0
Analytic Topology - C	Not chosen	
Categories, Proofs and Processes - CS	3	0
Computational Complexity CS	1	0
Godel's Incompleteness Theorem - C	1	0
Introduction to Quantum Information - C	5	0
Lambda Calculus and Types - CS	6	0
Additive Combinatorics - C	6	0
Automata, Logic and Games - CS	4	1
Computational Algebraic Topology - C	3	0
Foundations of Self-Programming Agents - CS	Not chosen	
Geometric Deep Learning CS (WITH PRACTICAL)	4	0
Geometric Group Theory - C	2	0
Intro to Schemes - C	Not chosen	
Low-dimensional Topology and Knot Theory - C	Not chosen	
Networks - C	2	0
Probabilistic Combinatorics - C	7	0
Classical and Quantum Compositional Distributional Meaning	1	0

Trinity Term	**Passed**	**Failed**
Topological Groups - bespoke	2	0
Applied Category Theory - bespoke	4	1 DDM

Approved subjects	**Method of assessment**	**Passed**	**Failed**
Computational Learning Theory	Mini project	3	0
Computational game Theory	Exam	2	0

D: The dissertation topics were as follows:

Colour Refinement on Infinite Graphs
Extending proof rules for almost-sure termination to LTL verification
Approximation Algorithms for Generalisations of Matching Problems
Finding detours in graphs

Robustness of Community Detection under Edge Perturbations
On Fairness in The Online k-Server Problem
Sampling efficiently from the Potts model on G(n, d/n)
Ramsey Theory on sets and the integers
Division Algebras, K-Theory, and Bott Periodicity
GNNs for Fast Classical Simulation of Quantum Circuits through optimizing ZX-Graph Decompositions
Structural Aspects of Banach Categories
Quantum Pebble Games with Applications to Lower Bounds for Symmetric Quantum Circuits
Moduli Spaces of Elliptic Curves and Modular Forms
A Rank-Width–Based Approach to Quantum Circuit Simulation via ZX-Calculus
Topological Flow Matching
Testing Hamiltonian Properties via Quantum Dynamics
Formal Verification of Capability-Safety for the Context Switcher of the CHERIoT-Ibex Processor
Automata over Nested Data
Undetectability Constraints in Illusory Attack Games
Categorical Structures for Riemannian Geometry
Descents of Abelian Varieties over Number Fields

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.

E. Mitigating Circumstances

This information has been removed for the public version.

F: Special Cases

This information has been removed for the public version.

G: Names of members of the board of examiners
O Riordan (Chair)
S Kiefer
M Walters (External)
M Backens (External)