DIVISION OF MATHEMATICAL PHYSICAL AND LIFE SCIENCES

MSc in Mathematics and the Foundations of Computer Science
Report of the Examiners (2023-24)

PART I

A: Statistics

1. Numbers and percentages in each category

Category	Number			Percentage (%)		
	2023-24	2022-23	2021-22	2023-24	2022-23	2021-22
Distinction	13	12	10	39.4	54.5	62
Merit	8	4	4	24.2	18.2	25
Pass	11	6	2	33.3	27.3	13
Fail	1	0	0	3.1	0	0
Entries	33	22	16	100	100	100

2. Vivas
The 33 students who completed dissertations all had vivas with two examiners and their second assessor.

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
There were no new methods or procedures.

C: Changes in examining methods and procedures envisaged
There were no changes. However, the use of the new results spreadsheet proved successful.

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

47 courses were offered. 8 courses failed to attract any students. The overall performance was of a high standard with 15 mini-project scripts receiving marks of 90 and above, 53 receiving 80 and above, 62 receiving 70 and above, 46 receiving 60 and above, 9 receiving 50 and above, and 13 fails.

The overall standard of dissertations was high this year; 2 were awarded a grade of 90 and above, 8 at 80 and above, 10 at 70 to 80, 12 at 60 to 70 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	33	19	14	0
Passes awarded	11	7	4	0
Merits awarded	8	2	6	0
Distinctions Awarded	13	9	4	0

C. Distribution of topics

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

Michaelmas Term	**Passed**	**Failed**
Algebraic Topology C	3	0
Analytic Topology B	1	0
Category Theory C	8	1
Differentiable Manifolds C	1	0
Intro to Representation Theory B	2	0
Lie Groups C	0	1
Model Theory C	3	0
Algebraic Geometry C	0	1
Homological Algebra C	1	0
Infinite Groups C	2	0
Graph Theory B	15	0
Information Theory B	4	1
Integer Programming B	3	0
Quantum Processes and Computation (CS)	9	0
Additive Combinatorics C	1	1
Combinatorics C	6	0
Computational Game Theory (CS)	19	1
Networks C	4	0
Distributed processes, types and programming (CS)	1	0

Hilary Term	Passed	Failed
Algebraic Number Theory B	4	0
Analytic Number Theory C	1	0
Commutative Algebra B	1	1
Godel Incompleteness C	1	0
Lambda Calculus and Types (CS)	7	0
Axiomatic Set Theory C	1	0
Geometric Group Theory C	7	0
intro to schemes C	3	0
Categories, proofs and processes (CS)	11	1
Computational Complexity (CS)	3	0
Introduction to Quantum Information C	10	0
Algorithmic Foundations of collective decision (CS)	8	2
Computational Algebraic Topology C	5	0
Classical and Quantum Compositional Distributional Meaning* besp	7	0
Elliptic Curves C	2	0
Probabilistic Combinatorics C	8	0
Geometric deep learning CS	4	0
Quantum Software (CS)	6	1

Trinity Term	Passed	Failed
Topological Groups - bespoke	2	2
Applied Category Theory - bespoke	11	0

D: The dissertation topics were as follows:

Nilpotent group automata
How to Tell Your Mice Apart: An Introduction to $0^{\#}$ and Mice
Local-to-global principle and the Brauer-Manin obstruction
Algebraic Properties of Conditioning
Compilation of FBQC patterns with linear resource states
Long Refinement Graphs with Low Degrees
Friendship-Based Hedonic Games with Coalition Size Constraints
A Convergent Hierarchy of Semidefinite Programs Characterizing the Class of Localizable Bipartite Quantum Processes
Frugal Stochastic Processes
Complexity of Popular Partitions in Hedonic Games
Origins of Fractality in Complex Networks
Fair Division on graphs
Experimental Analysis of Multi-winner voting rules for selecting interlacing committees
Top-down Multiparty Session Types – Subject Reduction Theorem and Probability
Steady-State Solutions of a Neural Fokker-Planck Equation
Exploring the relationship between Fermionic and Spin-1/2 operators using the ZXW Calculus.

Analytic and Algebraic Moduli Spaces of Vector Bundles
CRM Property and Ore Condition on Group Rings of Amenable Groups
An interpretation of Bell non-locality using bubble theory
Evading Quantum Pre- and Post-selection Paradoxes with Causal Structure
Verifying privacy-type properties in a probabilistic setting
Classically Simulable Fragments of Quantum Machine Learning
Persistent Intersection Homology for the Analysis of Word Embeddings
Strengthening Proportional Representation in Temporal Voting Systems" instead of "Proportional Representation Axioms in Temporal Voting Systems
Handling cryptographic primitives with complex algebraic properties
Mathematical Models for Adaptive Thresholding in Multiplex Immunofluorescence Imaging of Large-Scale Clinical Trial Datasets
A deep dive into sequence models for the brain
Formalisation of Subject Reduction for Synchronous Multiparty Session Types in Coq
Understanding Macro Economics from the Bottom-up
Applications of Graph Theory in Additive Combinatorics
Investigating Relatively Hyperbolic Groups which are Virtually Diffuse
Diophantine properties of modular curves
Hypergraph Models in Higher-Order Network Analysis

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

There were no special cases to discuss.

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