MATHEMATICAL TRIPOS, PART IA

There will be an induction session for Part IA students at 9.00 a.m. on Wednesday 4 October 2023 in the Cockcroft Lecture Theatre.

A meeting will be held for all Part IA students on Thursday 14 March 2024 at 10.00 am in the Babbage Lecture Theatre to discuss examinations and exam techniques.

For Michaelmas term courses, Lecture recordings will be available until 23:59 on the day of the following lecture.

For a personalised version of the timetable, which you can import into your own electronic calendar, please see http://www.timetable.cam.ac.uk.

Michaelmas 2023	Lent 2024	Easter 2024
Vectors and Matrices	**Probability**	**Optimisation***
Prof. N. Peake	Prof. J. R. Norris	Dr V. Jog
M. W. F. 10, *Babbage Lecture Theatre*	M. W. F. 10, *Babbage Lecture Theatre*	M. W. F. 10, *Babbage Lecture Theatre* (twelve lectures)
Differential Equations	**Analysis I**	**Variational Principles***
Prof. A. D. Challinor	Prof. C. M. Warnick	Prof. J. R. Gog
M. W. F. 11, *Babbage Lecture Theatre*	M. W. F. 11, *Babbage Lecture Theatre*	M. W. F. 11, *Babbage Lecture Theatre* (twelve lectures)
Numbers and Sets	**Dynamics and Relativity**	**Computational Projects***
Prof. J. Wolf	Prof. S. A. Hartnoll	Prof. R. Jack
Tu. Th. S. 10, *Babbage Lecture Theatre*	Tu. Th. S. 10, *Babbage Lecture Theatre*	M. W. F. 12, *Arts Lecture Theatre A (TBC)* (eight lectures)
No lecture on 18 November. Additional lecture on 30 November.		
Groups	**Vector Calculus**	
Prof. H. Wilton	Prof. D. Tong	
Tu. Th. S. 11, *Babbage Lecture Theatre*	Tu. Th. S. 11, *Babbage Lecture Theatre*	

*Examined in Part IB of the Tripos

Information for non-examinable courses and the Mathematics with Physics option appear on the next page.

The following courses, proposed by the Board of the Faculty of Mathematics, are non-examinable.

| **Michaelmas 2023** | **Lent 2024** | **Easter 2024** |

For Mathematics with Physics Option only:
Numbers and Sets (Lecture Classes) §
Prof. J. Wolf and others
W. 12, *Hopkinson Lecture Theatre*

Introduction to Mechanics §
Dr P. J. O'Donnell
Tu. Th. 12, *Hopkinson Lecture Theatre* (ten lectures)

Mathematics with Physics Option

An introductory session for IA Physics students will be held at 11.00 am on Wednesday 6 October 2023 in the Pippard Lecture Theatre, Cavendish Laboratory.

Students taking this option should attend Vectors and Matrices, Groups, Differential Equations, Analysis I, Vector Calculus and Probability from Part IA of the Mathematical Tripos, together with the lectures listed at http://www.timetable.cam.ac.uk/ in Part IA Physics of the Natural Sciences Tripos. Students will also be required to do Physics practical work, and should attend at least the first lecture of the Scientific Computing Course.

Because of timetabling constraints, it is not possible to attend in person the Physics lectures and the lectures on Numbers and Sets and Dynamics and Relativity (but there is significant overlap between the Physics lectures and those on Dynamics and Relativity). Students should discuss with their Directors of Studies the potential benefits of attending the non-examinable lecture classes on Numbers and Sets.

§ This lecture theatre is not equipped for lecture capture. Students following this course with a recommendation for access to recordings in their Student Support Document (SSD) should contact the Undergraduate Office for further information on support. Students who require access to recordings as a reasonable adjustment, but who do not yet have a SSD, should consult their College Tutor (see also paragraph 3 of the Faculty's Statement on the Recording of Teaching Sessions).

MATHEMATICAL TRIPOS, PART IB

There will be an induction session for Part IB students at 4.00 p.m. on Wednesday 4 October 2023, in the Cockcroft Lecture Theatre.

For a personalised version of the timetable, which you can import into your own electronic calendar, please see http://www.timetable.cam.ac.uk.

Michaelmas 2023	Lent 2024	Easter 2024
Linear Algebra Dr J. Sahasrabudhe M. W. F. 10, *Cockcroft Lecture Theatre*	**Groups, Rings and Modules †** Prof. O. Randal-Williams M. W. F. 9, *Arts School Lecture Theatre A*	**Optimisation*** Dr V. Jog M. W. F. 10, *Babbage Lecture Theatre* (twelve lectures)
Methods § Dr A. C. L. Ashton M. W. F. 11, *Cockcroft Lecture Theatre*	**Complex Analysis** Prof. H. Krieger M. Th. 10, *Cockcroft Lecture Theatre*	**Variational Principles*** Prof. J. R. Gog M. W. F. 11, *Babbage Lecture Theatre* (twelve lectures)
Markov Chains Prof. P. Sousi Tu. Th. 10, *Cockcroft Lecture Theatre*	**Statistics ‡** Dr S. Bacallado W. F. 10, *Cockcroft Lecture Theatre*	*Examined in Part IB of the Tripos
Analysis and Topology ‡ Dr P. A. Russell Tu. Th. S. 11, *Cockcroft Lecture Theatre*	**Electromagnetism** Prof. H. S. Reall Tu. Th. 9, *Cockcroft Lecture Theatre*	
Quantum Mechanics Prof. F. Verstraete Tu. Th. 12, *Cockcroft Lecture Theatre*	**Fluid Dynamics §** Prof. J. R. Lister Tu. S. 10, *Cockcroft Lecture Theatre*	
	Geometry Dr J. Smith Tu. Th. S. 11, *Cockcroft Lecture Theatre*	

Complex Methods
Prof. U. Sperhake
Th. S. 12, *Cockcroft Lecture Theatre*

Numerical Analysis ‡
Dr A. Shadrin
Tu. 12, S. 9, *Cockcroft Lecture Theatre*

† Recordings for this course will not include the whiteboards. Lecture notes will be made available.

‡ Recordings for this course will only be made available as a reasonable adjustment for students with a recommendation for access to recordings. Students with such a recommendation in their Student Support Document (SSD) who have not automatically been granted access to the recordings should contact the Undergraduate Office. Students who require access to recordings as a reasonable adjustment, but who do not yet have a SSD, should consult their College Tutor (see also paragraph 3 of the Faculty's Statement on the Recording of Teaching Sessions).

§ There will be no recordings available for this course; the lecturer will make alternative accommodations for students with recommendations for reasonable adjustments that include access to recordings. Students with such a recommendation in their Student Support Document (SSD) who have not automatically been notified of the alternative accommodations should contact the Undergraduate Office. Students who require access to recordings as a reasonable adjustment, but who do not yet have a SSD, should consult their College Tutor (see also paragraph 3 of the Faculty's Statement on the Recording of Teaching Sessions).

MATHEMATICAL TRIPOS, PART II

Lectures will be held in the Meeting Rooms (MR) of the Centre for Mathematical Sciences, Clarkson Road, unless otherwise stated.

There will be an induction session for Part II students at 2.00pm on Wednesday 4 October 2023, in the Cockcroft Lecture Theatre.

The Faculty will facilitate an opportunity, at the beginning of the Lent Term, for students who wish to give a short mathematical presentation to a small audience on a mathematical topic. Details will be circulated during the Michaelmas Term.

For a personalised version of the timetable, which you can import into your own electronic calendar, please see http://www.timetable.cam.ac.uk.

C Courses

Michaelmas 2023	**Lent 2024**	**Easter 2024**
Cosmology	**Coding and Cryptography**	
Prof. E. P. S. Shellard	Prof. S. Martin	
M. W. F. 9, *MR4*	M. W. F. 9, *MR2*	
Number Theory	**Quantum Information and Computation** §	
Prof. J. A. Thorne	Prof. N. Datta	
M. W. F. 10, *MR2*	M. W. F. 10, *MR3*	
Classical Dynamics	**Mathematical Biology**	
Prof. D. B. Skinner	Prof. R. E. Goldstein	
M. W. F. 11, *MR9*	Tu. Th. S. 10, *MR2*	
Automata and Formal Languages §	**Further Complex Methods**	
Prof. B. Loewe	Dr D. Frank	
M. W. F. 12, *MR3*	Tu. Th. S. 11, *MR2*	
Statistical Modelling	**Topics in Analysis**	
Dr R. Altmeyer	Prof. T. W. Korner	
Tu. Th. S. 11, *MR4*	Tu. Th. S. 12, *MR4*	
No lecture on 21 November. Additional lecture on 30 November.		

D Courses

| Michaelmas 2023 | Lent 2024 | Easter 2024 |

Stochastic Financial Models
Dr M. R. Tehranchi
M. W. F. 9, *MR5*

Statistical Physics
Prof. C. E. Thomas
M. W. F. 9, *MR3*

Fluid Dynamics ‡
Prof. M. G. Worster
M. W. F. 10, *MR4*

Analysis of Functions
Prof. R. Nickl
M. W. F. 10, *MR4*

Representation Theory
Dr S. J. Wadsley
M. W. F. 11, *MR3*

Algebraic Topology
Prof. O. Randal-Williams
M. W. F. 11, *MR2*

Principles of Statistics
Prof. P.-L. Loh
M. W. F. 11, *MR4*

Applications of Quantum Mechanics
Dr A. Castro
M. W. F. 11, *MR5*

Principles of Quantum Mechanics
Prof. E. Pajer
M. W. F. 12, *MR2*

General Relativity
Dr J. M. Evans
M. W. F. 12, *MR3*

Graph Theory §
Prof. I. Leader
Tu. Th. S. 9, *MR2*

Algebraic Geometry
Prof. M. Gross
M. W. F. 12, *MR4*

Numerical Analysis
Prof. H. Fawzi
Tu. Th. S. 9, *MR4*

Logic and Set Theory §
Dr A. Zsák
Tu. Th. S. 9, *MR2*

Probability and Measure
Dr S. Sarkar
Tu. Th. S. 10, *MR3*

Waves
Prof. C. P. Caulfield
Tu. Th. S. 9, *MR4*
No lecture on Saturday 20 January. Additional
lecture on Thursday 14 March.

Asymptotic Methods
Prof. H. Latter
Tu. Th. 10, *MR4*

Number Fields
Prof. P. Varjú
Tu. Th. 10, *MR3*

Riemann Surfaces
Dr J. Button
Tu. Th. 10, *MR14*

Applied Probability
Dr S. Sarkar
Tu. Th. S. 11, *MR3*

Linear Analysis §
Prof. I. Leader
Tu. Th. S. 11, *MR3*

Differential Geometry
Prof. C. Mouhot
Tu. Th. S. 11*, MR4*
First lecture on Saturday 20 January. Additional
lecture on Tuesday 23 January, 2pm in MR9.

Electrodynamics
Dr R. Adhikari
Tu. Th. 11, *MR14*

Integrable Systems
Prof. D. M. A. Stuart
Tu. Th. 12, *MR5*

Dynamical Systems ‡
Prof. R. R. Kerswell
Tu. Th. S. 12, *MR3*

Mathematics of Machine Learning
Prof. R. Shah
Tu. Th. 12, *MR9*

Galois Theory
Prof. T. Fisher
Tu. Th. S. 12, *MR9*

The following courses, proposed by the Board of the Faculty of Mathematics, are non-examinable.

Laboratory Demonstrations in Fluid Dynamics
Prof. S. Dalziel
M. Tu. W. 2-3.30 every second week,
Fluids Laboratory

‡ Recordings for this course will only be made available as a reasonable adjustment for students with a recommendation for access to recordings. Students with such a recommendation in their Student Support Document (SSD) who have not automatically been granted access to the recordings should contact the Undergraduate Office. Students who require access to recordings as a reasonable adjustment, but who do not yet have a SSD, should consult their College Tutor (see also paragraph 3 of the Faculty's Statement on the Recording of Teaching Sessions).

§ There will be no recordings available for this course; the lecturer will make alternative accommodations for students with recommendations for reasonable adjustments that include access to recordings. Students with such a recommendation in their Student Support Document (SSD) who have not automatically been notified of the alternative accommodations should contact the Undergraduate Office. Students who require access to recordings as a reasonable adjustment, but who do not yet have a SSD, should consult their College Tutor (see also paragraph 3 of the Faculty's Statement on the Recording of Teaching Sessions).

MATHEMATICAL TRIPOS, PART III

Lectures will be held in the Meeting Rooms (MR) of the Centre for Mathematical Sciences, Clarkson Road, unless otherwise stated.

All Part III and PhD students in the Faculty are able to self-enrol on Part III Moodle courses; they will be sent instructions on how to do so. All other members of the University wishing to access these courses are requested to complete the relevant form in the Part III Guide to Courses.

There will be a meeting on the morning of Wednesday 4 October for those intending to offer courses in Part III. Students should refer to the Notes for New Part III Students for further details.

There is a series of meetings for Part III students on Wednesdays at 4.15pm. Students are invited to refer to the Part III Handbook for more details.

For a personalised version of the timetable, which you can import into your own electronic calendar, please see http://www.timetable.cam.ac.uk.

Michaelmas 2023	Lent 2024	Easter 2024
General Relativity	**Field Theory in Cosmology**	**Applications of Quantum Field Theory**
Prof. C. M. Warnick	Prof. E. Pajer	Prof. S. A. Hartnoll
M. W. F. 9, *MR2*	M. W. F. 9, *MR4*	M. Tu. Th. F. 11, *MR3*
Advanced Probability	**Stochastic Calculus and Applications**	**Gravitational Waves and Numerical Relativity**
Prof. P. Sousi	Prof. J. Miller	Prof. U Sperhake
M. W. F. 9, *MR3*	M. W. F. 9, *MR5*	M. Tu. Th. F. 12, *MR3*
Lie Algebras and Their Representations	**Algebraic Number Theory**	
Prof. S. Martin	Dr H. Wiersema	
M. W. F. 9, *MR9*	M. W. F. 9, *MR9*	
Biological Physics and Fluid Dynamics	**Spectral Computations in Infinite Dimensions**	
Prof. R. Goldstein	Dr M. Colbrook	
M. W. F. 9, *MR12*	M. W. 9, *MR11*	

Combinatorics §
Prof. B. Bollobas
M. W. F. 10, *MR3* (sixteen lectures)

Fluid Dynamics of the Solid Earth ‡
Prof. M. G. Worster
M. W. F. 9, *MR12*

Algebraic Geometry
Dr D. Ranganathan
M. W. F. 10, *MR5*

Cubulating Spaces and Groups
Dr M. Arenas
M. W. 9, *MR13*

Quantum Information, Foundations and Gravity
Prof. A. P. A. Kent
W. F. 10, *MR9*

Quantum Computation ‡
Dr S. Subramanian
W. F. 9, *MR14*
No lecture on 19 January. Additional lecture
on 15 March.

Slow Viscous Flow §
Prof. J. R. Lister
M. W. F. 10, *MR12*

Black Holes
Prof. H. S. Reall
M. W. F. 10, *MR2*

Structure and Evolution of Stars
Prof. C. A. Tout
M. W. F. 10, *MR14*

Distribution Theory and Applications §
Dr A. C. L. Ashton
M. W. 10, *MR5*

Quantum Field Theory
Dr A. Castro
M. W. F. 11, *MR2*

Abelian Varieties
Prof. A. J. Scholl
M. W. F. 10, *MR9*

Algebraic Topology
Prof. I. Smith
M. W. F. 11, *MR5*

Fluid Dynamics of the Environment
Prof. S. Dalziel, Dr R. Bhagat
M. W. F. 10, *MR12*

Approximation Theory
Dr A. Shadrin
M. W. 11, *MR12*

Introduction to Additive Combinatorics
Prof. J. Wolf
M. W. F. 10, *MR13* (sixteen lectures)

Model Theory and Non-Classical Logic
Dr J. Siqueira
M. W. F. 11, *MR13*

Astrophysical Fluid Dynamics
Prof. R. Rafikov
M. W. F. 11, *MR14*
Extra lecture on 26 Oct at 2pm, MR9
No lecture on 1 Nov

Category Theory
Prof. P. T. Johnstone
M. W. F. 12, *MR4*

Modular Forms
Prof. J. A. Thorne
M. W. F. 12, *MR5*

Modern Statistical Methods ‡
Dr S. Bacallado
M. W. F. 12, *MR9*

Fluid Dynamics of Climate
Prof. J. R. Taylor, Dr A. Ming
M. W. F. 12, *MR12*

Numerical Solution of Differential Equations
Prof. A. Iserles
M. W. F. 12, *MR13*

Planetary System Dynamics
Prof. M. Wyatt
M. W. F. 12, *MR14*

Functional Data Analysis
Prof. J. Aston
M. W. 10, *MR14*

Elliptic Curves §
Prof. T. Fisher
M. W. F. 11, *MR3*

Elliptic Partial Differential Equations
Prof. N. Wickramasekera, Dr G. Taujanskas
M. W. F. 11, *MR4*

Quantum Entanglement in Many-body Physics
Prof. F. Verstraete
M. W. 11, *MR9*

The Life and Death of Galaxies
Prof. V. Belokurov
M. W. F. 11, *MR11*

Solitons, Instantons and Geometry
Prof. D. M. A. Stuart
M. W. 11, *MR12*

Large Cardinals §
Prof. B. Loewe
M. F. 11, *MR13*

Advanced Financial Models
Prof. M. R. Tehranchi
M. W. F. 11, *MR14*

Commutative Algebra
Dr O. Becker
Tu. Th. S. 9, *MR3*

Advanced Quantum Field Theory
Dr R. A. Reid-Edwards
M. W. F. 12, *MR2*

Topics in Statistical Theory
Prof. R. Samworth
Tu. Th. 9, *MR5*
Starting 10 Oct. Additional lecture on 13 Oct, 4pm in MR5

Geometric Group Theory
Prof. H. Wilton
M. W. F. 12, *MR5*

Functional Analysis §
Dr A. Zsák
Tu. Th. S. 9, *MR13*

Statistical Learning in Practice
Dr R. Altmeyer
M. W. F. 12, *MR9*

Statistical Field Theory
Prof. C. E. Thomas
Tu. Th. 10, *MR2*

Forcing and the Continuum Hypothesis
Dr R. Matthews
M. W. F. 12, *MR13*
No lecture on 19 Feb. Additional lecture on 15 Mar.

Causal Inference
Dr Q. Zhao
Tu. Th. 10, *MR5*

Direct and Inverse Scattering of Waves
Dr O. Rath Spivack
M. W. 12, *MR14*

Differential Geometry
Dr A. Kovalev
Tu. Th. S. 10, *MR9*

The Standard Model
Prof. D. Tong
Tu. Th. S. 9, *MR3*

Cosmology
Prof. B. D. Sherwin
Tu. Th. S. 11, *MR2*

Topics in Convex Optimisation ‡
Prof. H. Fawzi
Tu. Th. 9, *MR9*

Lattice Models
Prof. W. Werner
Tu. Th. 11, *MR5*

Hydrodynamic Stability
Prof. R. R. Kerswell
Tu. Th. 9, *MR12*

Information Theory
Prof. I. Kontoyiannis
Tu. Th. 11, *MR9*

Schramm-Loewner Evolutions
Dr Y. Yuan
Tu. Th. 9, *MR13*

Analysis of Partial Differential Equations
Dr Z. Wyatt
Tu. Th. S. 11, *MR13*

Toric Varieties §
Dr R. Picciotto
Tu. Th. 9, *MR14*

Symmetries, Fields and Particles
Prof. M. Wingate
Tu. Th. S. 12, *MR2*

Symplectic Topology
Dr A. Ward
Tu. Th. 10, *MR4*

Ramsey Theory on Graphs
Dr J. Sahasrabudhe
Tu. Th. 12, *MR4*

Introduction to Computational Complexity
Prof. W. T. Gowers
Tu. Th. 10, *MR5*

Local Fields
Dr R. Zhou
Tu. Th. S. 12, *MR5*
Starting 7 Oct

Supersymmetry
Prof. B. Allanach
Tu. Th. 10, *MR9*

Statistics in Medical Practice +
Dr C. Jackson and colleagues
Tu. Th. 12, *MR11* (twelve lectures)
First lecture on 17 Oct, no lectures on 9 Nov or 28 Nov

Astrophysical Black Holes
Dr D. Sijacki
Tu. Th. 10, *MR12*

Perturbation Methods
Prof. D. Abrahams
Tu. Th. 12, *MR12*
Extra lecture on Sat 21 October, 12pm, MR12
No lecture on Th 26 October

Theoretical Physics of Soft Condensed Matter
Prof. M. E. Cates
Tu. Th. 10, *MR13*

Robust Statistics
Prof. P-L. Loh
Tu. Th. 10, *MR14*

Topological Quantum Matter
Prof. B. Béri
Tu. Th. 11, *MR9*

Dynamics of Astrophysical Discs
Prof. H. Latter
Tu. Th. 11, *MR12*

Analysis of Survival Data +
Dr P. Treasure
Tu. Th. 11, *MR13*

Group Cohomology
Dr C. J. B. Brookes
Tu. Th. 11, *MR14*

String Theory
Prof D. B. Skinner
Tu. Th. 12, *MR2*
S. 10, *MR3*

Concentration Inequalities
Dr V. Jog
Tu. Th. 12, *MR3*

Stochastic Processes in Biology
Dr M. Bruna, Dr T. Plesa
Tu. Th. 12, *MR12*

Laboratory Demonstrations in Fluid Dynamics
Prof. S. Dalziel
W. 2-3:30, *Fluids Laboratory*

+ These two courses constitute the 24-lecture course in Statistics in Medicine. For examination purposes, Statistics in Medicine is considered a Lent term course.

‡ Recordings for this course will only be made available as a reasonable adjustment for students with a recommendation for access to recordings.

§ There will be no recordings available for this course; the lecturer will make alternative accommodations for students with recommendations for reasonable adjustments that include access to recordings.

COURSES INTENDED FOR POSTGRADUATES (NON-EXAMINABLE)

Lectures will be held in the Meeting Rooms (MR) of the Centre for Mathematical Sciences, Clarkson Road, unless otherwise stated.

For a personalised version of the timetable, which you can import into your own electronic calendar, please see http://www.timetable.cam.ac.uk.

Michaelmas 2023	**Lent 2024**	**Easter 2024**
Canonical Gravity (Hamiltonian Approach to General Relativity) Prof. M. Perry M. W. 10, *MR13*	**Topics in Mathematics for Deep Learning** Dr C. Esteve-Yagüe M. W. 12, *MR11*	**Extremal Graph Theory** Dr O. Janzer M. W. F. 10, *MR4* (twelve lectures)
Non-Equilibrium Statistical Field Theory Dr R. Garcia-Millan Tu. Th. 9, *MR12* (eight lectures)	**Radiative Processes in Astrophysical Plasma §** Dr G. Del Zanna M. W. 12, *MR12*	
	Advanced Stellar Evolution Dr A. Zytkow Tu. Th. 12, *MR11*	

‡ Recordings for this course will only be made available as a reasonable adjustment for students with a recommendation for access to recordings.

§ There will be no recordings available for this course; the lecturer will make alternative accommodations for students with recommendations for reasonable adjustments that include access to recordings.