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.

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.

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**Michaelmas 2023**

- **Vectors and Matrices**
  - Prof. N. Peake
  - M. W. F. 10, *Babbage Lecture Theatre*

- **Differential Equations**
  - Prof. A. D. Challinor
  - M. W. F. 11, *Babbage Lecture Theatre*

- **Numbers and Sets**
  - Prof. J. Wolf
  - Tu. Th. S. 10, *Babbage Lecture Theatre*
  - No lecture on 18 November. Additional lecture on 30 November.

- **Groups**
  - Prof. H. Wilton
  - Tu. Th. S. 11, *Babbage Lecture Theatre*

**Lent 2024**

- **Probability**
  - Prof. J. R. Norris
  - M. W. F. 10, *Babbage Lecture Theatre*

- **Analysis I**
  - Prof. C. M. Warnick
  - M. W. F. 11, *Babbage Lecture Theatre*

- **Dynamics and Relativity**
  - Prof. S. A. Hartnoll
  - Tu. Th. S. 10, *Babbage Lecture Theatre*

- **Vector Calculus**
  - Prof. D. Tong
  - Tu. Th. S. 11, *Babbage Lecture Theatre*

**Easter 2024**

- **Optimisation***
  - Dr V. Jog
  - M. W. F. 10, *Babbage Lecture Theatre* (twelve lectures)

- **Variational Principles***
  - Prof. J. R. Gog
  - M. W. F. 11, *Babbage Lecture Theatre* (twelve lectures)

- **Computational Projects***
  - Prof. R. Jack
  - M. W. F. 12, *Arts Lecture Theatre A (TBC)* (eight lectures)

*Examined in Part IB of the Tripos

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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.

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<tr>
<td>Numbers and Sets (Lecture Classes) §</td>
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<tr>
<td>Prof. J. Wolf and others</td>
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<tr>
<td>W. 12, Hopkinson Lecture Theatre</td>
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<tr>
<td>Introduction to Mechanics §</td>
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<tr>
<td>Dr P. J. O'Donnell</td>
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<tr>
<td>Tu. Th. 12, Hopkinson Lecture Theatre (ten lectures)</td>
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**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](http://www.timetable.cam.ac.uk).

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<td>Groups, Rings and Modules</td>
<td>Optimisation*</td>
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<tr>
<td>Dr J. Sahasrabudhe</td>
<td>Prof. O. Randal-Williams</td>
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<tr>
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<td>M. W. F. 9, Arts School Lecture Theatre A</td>
<td>M. W. F. 10, Babbage Lecture Theatre (twelve lectures)</td>
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<tr>
<td><strong>Methods §</strong></td>
<td>Complex Analysis</td>
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<tr>
<td>Dr A. C. L. Ashton</td>
<td>Prof. H. Krieger</td>
<td>Prof. J. R. Gog</td>
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<tr>
<td>M. W. F. 11, Cockcroft Lecture Theatre</td>
<td>M. Th. 10, Cockcroft Lecture Theatre</td>
<td>M. W. F. 11, Babbage Lecture Theatre (twelve lectures)</td>
</tr>
<tr>
<td><strong>Markov Chains</strong></td>
<td>Statistics</td>
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<tr>
<td>Prof. P. Sousi</td>
<td>Dr S. Bacallado</td>
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<tr>
<td>Tu. Th. 10, Cockcroft Lecture Theatre</td>
<td>W. F. 10, Cockcroft Lecture Theatre</td>
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<tr>
<td><strong>Analysis and Topology ‡</strong></td>
<td>Electromagnetism</td>
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<tr>
<td>Dr P. A. Russell</td>
<td>Prof. H. S. Reall</td>
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<tr>
<td>Tu. Th. S. 11, Cockcroft Lecture Theatre</td>
<td>Tu. Th. 9, Cockcroft Lecture Theatre</td>
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<tr>
<td><strong>Quantum Mechanics</strong></td>
<td>Fluid Dynamics</td>
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<tr>
<td>Prof. F. Verstraete</td>
<td>Prof. J. R. Lister</td>
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<tr>
<td><strong>Geometry</strong></td>
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<tr>
<td>Dr J. Smith</td>
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<tr>
<td>Tu. Th. S. 11, Cockcroft Lecture Theatre</td>
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</table>
‡ 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).
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](http://www.timetable.cam.ac.uk).

### C Courses

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

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<tr>
<td><strong>Stochastic Financial Models</strong>&lt;br&gt;Dr M. R. Tehranchi&lt;br&gt;M. W. F. 9, MR5</td>
<td><strong>Statistical Physics</strong>&lt;br&gt;Prof. C. E. Thomas&lt;br&gt;M. W. F. 9, <strong>MR3</strong></td>
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<tr>
<td><strong>Fluid Dynamics ‡</strong>&lt;br&gt;Prof. M. G. Worster&lt;br&gt;M. W. F. 10, <strong>MR4</strong></td>
<td><strong>Analysis of Functions</strong>&lt;br&gt;Prof. R. Nickl&lt;br&gt;M. W. F. 10, <strong>MR4</strong></td>
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<tr>
<td><strong>Representation Theory</strong>&lt;br&gt;Dr S. J. Wadsley&lt;br&gt;M. W. F. 11, <strong>MR3</strong></td>
<td><strong>Algebraic Topology</strong>&lt;br&gt;Prof. O. Randal-Williams&lt;br&gt;M. W. F. <strong>11, MR2</strong></td>
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<tr>
<td><strong>Principles of Statistics</strong>&lt;br&gt;Prof. P.-L. Loh&lt;br&gt;M. W. F. 11, <strong>MR4</strong></td>
<td><strong>Applications of Quantum Mechanics</strong>&lt;br&gt;Dr A. Castro&lt;br&gt;M. W. F. 11, <strong>MR5</strong></td>
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<tr>
<td><strong>Principles of Quantum Mechanics</strong>&lt;br&gt;Prof. E. Pajer&lt;br&gt;M. W. F. 12, <strong>MR2</strong></td>
<td><strong>General Relativity</strong>&lt;br&gt;Dr J. M. Evans&lt;br&gt;M. W. F. 12, <strong>MR3</strong></td>
<td></td>
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<tr>
<td><strong>Graph Theory §</strong>&lt;br&gt;Prof. I. Leader&lt;br&gt;Tu. Th. S. 9, <strong>MR2</strong></td>
<td><strong>Algebraic Geometry</strong>&lt;br&gt;Prof. M. Gross&lt;br&gt;M. W. F. 12, <strong>MR4</strong></td>
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<tr>
<td><strong>Numerical Analysis</strong>&lt;br&gt;Prof. H. Fawzi&lt;br&gt;Tu. Th. S. 9, <strong>MR4</strong></td>
<td><strong>Logic and Set Theory</strong>&lt;br&gt;Dr A. Zsák&lt;br&gt;Tu. Th. S. 9, <strong>MR2</strong></td>
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</table>
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.

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<td>Field Theory in Cosmology</td>
<td>Applications of Quantum Field Theory</td>
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<td>Prof. C. M. Warnick</td>
<td>Prof. E. Pajer</td>
<td>Prof. S. A. Hartnoll</td>
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<td>M. W. F. 9, MR4</td>
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<tr>
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<td>Prof. J. Miller</td>
<td>Prof. U Sperhake</td>
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<td>Dr M. Colbrook</td>
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<tr>
<td>M. W. F. 9, MR12</td>
<td>M. W. 9, MR11</td>
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Combinatorics §
Prof. B. Bollobas
M. W. F. 10, MR3 (sixteen lectures)

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

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

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

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

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

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

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

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

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

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

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

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

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

Introduction to Additive Combinatorics
Prof. J. Wolf
M. W. F. 10, MR13 (sixteen lectures)
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<td>Prof. R. Rafikov</td>
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<td>Category Theory</td>
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<tr>
<td>Modular Forms</td>
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<td>M. W. F. 12, MR5</td>
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<td>Modern Statistical Methods ‡</td>
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<td>Numerical Solution of Differential Equations</td>
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<td>Planetary System Dynamics</td>
<td>Prof. M. Wyatt</td>
<td>M. W. F. 12, MR14</td>
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<td>Functional Data Analysis</td>
<td>Prof. J. Aston</td>
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<tr>
<td>Elliptic Curves</td>
<td>Prof. T. Fisher</td>
<td>M. W. F. 11, MR3</td>
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<tr>
<td>Elliptic Partial Differential Equations</td>
<td>Prof. N. Wickramasekera, Dr. G. Taujanskas</td>
<td>M. W. F. 11, MR4</td>
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<tr>
<td>Quantum Entanglement in Many-body Physics</td>
<td>Prof. F. Verstraete</td>
<td>M. W. 11, MR9</td>
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<td>The Life and Death of Galaxies</td>
<td>Prof. V. Belokurov</td>
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<td>Solitons, Instantons and Geometry</td>
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<tr>
<td>Large Cardinals</td>
<td>Prof. B. Loewe</td>
<td>M. F. 11, MR13</td>
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Commutative Algebra
Dr O. Becker
Tu. Th. S. 9, MR3

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

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

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

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

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

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

Forcing and the Continuum Hypothesis
Dr R. Matthews
M. W. F. 12, MR13

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

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

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

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

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

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

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

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

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

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

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

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

Robust Statistics  
Prof. P-L. Loh  
Tu. Th. 10, MR5

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

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

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

Introduction to Computational Complexity  
Prof. W. T. Gowers  
Tu. Th. 11, MR5
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. S. 12, MR2

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](http://www.timetable.cam.ac.uk).

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