Lectures Proposed by the Board of the Faculty of Mathematics

For particulars of the University Composition Fee and the fees payable for attendance at separate courses of lectures see p. 2. Graduates of the University who are not reading for any University Examination may attend without payment any lectures proposed by the Faculty Board of Mathematics.

MATHEMATICAL TRIPoS

Lectures for Part IA of the Mathematical Tripos will be held in the Cockcroft Lecture Theatre unless otherwise stated.

Lectures Proposed by the Board of the Faculty of Mathematics. Graduates of the University who are not reading for any University Examination may attend without payment any lectures proposed by the Faculty Board of Mathematics.

First year mathematics students are recommended to attend the induction session which will be held from 9.30 a.m. to 10.45 a.m. on 8 October 2003, in the Cockcroft Lecture Theatre.

PART I A

Algebra and Geometry.
PROF. P. H. HAYNES AND PROF. T. W. KÖRNER M. Tu. W. Th. F. S. 10
Differential Equations.
PROF. D. O. GOUGH Tu. Th. S. 11
Numbers and Sets.
PROF. W. T. GOWERS M. W. F. 11

Non-Examinable Courses

Introduction to Physics***.
DR M. G. WORSTER M. W. 9 (Twelve lectures)
Mill Lane Room 9

Topics in the History of Mathematics.
DR P. BURNSILL-HALL M. W. F. 4

Analysis I.
DR A. F. BEARDON Tu. Th. S. 10

Probability.
PROF. F. P. KELLY M. W. F. 11

Vector Calculus.
DR S. T. C. SIKLOS Tu. Th. S. 11

Dynamics.
DR J. A. HUDSON M. W. F. 10

Numerical Analysis*.
DR A. SHADRIN M. W. F. 12 (Twelve lectures)
Mill Lane Room 3

Special Relativity*.
DR M. B. GREEN W. F. 10 (Eight lectures)

Optimization*.
DR D. P. KENNEDY Tu. Th. S. 11 (Twelve lectures)

Computational Projects**.
DR N. NIKIFORAKIS M. W. F. 11 (Six lectures)

Mathematics with Computer Science Option:

Students taking this option should attend Algebra and Geometry, Analysis I, Vector Calculus, Differential Equations and Probability from Part IA of the Mathematical Tripos, together with the courses from the Computer Science Tripos listed below. Students should note that the programming exercises will be taken into account by the Examiners.

Introduction to Computer Science.
PROF. I. M. LESLIE Th. 12 (One lecture)

Foundations of Computer Science.
DR A. C. NORMAN Tu. Th. S. 12 (Fifteen lectures, beginning 11 Oct.)

Discrete Mathematics.
DR P. ROBINSON Tu. Th. S. 12 (Eight lectures, beginning 15 Nov.)

Practical ML under Windows.
DR F. H. KING, MISS C. H. NORTHEAST AND MR R. J. STIBBS Th. 2–4 or 4–6 (Two Thursday classes) Lecture Theatre 1, William Gates Building

Programming Practical Class.
DR A. C. NORMAN AND DR F. H. KING Th. 2–4 (Three fortnightly classes, beginning 23 Oct. or 30 Oct.) Cockcroft Building, Floor 4

Assessed Exercise Work.
M. or Tu. or W. 2–4 Cockcroft Building, Floor 4

Operating Systems.
DR S. M. HAND Tu. Th. S. 12

Examination Briefing.
DR F. H. KING W. 10 (One lecture, 19 May) Hopkinson Lecture Room

Programming Practical Class.
DR F. H. KING AND DR A. F. BLACKWELL Th. 1–4 (Two fortnightly classes, beginning 22 Apr. or 29 Apr.) Cockcroft Building, Floor 4

Assessed Exercise Work.
M. or Tu. or W. 2–4 Cockcroft Building, Floor 4

* Not examined in Part IA of the Tripos
** Not examined in Part IA of the Tripos. CATAM (Computer-Aided Teaching of All Mathematics) practical sessions will be held during the last two weeks of full Easter Term. Examination credit in Part Ia for this course will be gained by the submission of project files, and no question will be set on it in the examination. The maximum credit available will be approximately equivalent to that for a normal course of 16 lectures, and will be added directly to the credit obtained in the written papers.
*** This course assumes no prior knowledge of A-level Physics.
## Mathematics with Physics Option:

Students taking this third option should attend Algebra and Geometry, Analysis I, Vector Calculus, Differential Equations and Probability from Part IA of the Mathematical Tripos, together with the lectures listed below in Part IA of the Natural Sciences Tripos (Course B version). They will be required to do Physics practical work, and are recommended to attend at least the first lecture of Course B of the Computing Course for Physical Scientists.

### Mechanics and Relativity
- **DR S. R. JULIAN** M. W. F. 9 (first twenty lectures) Chemical Laboratory, Lensfield Road

### Fields, Oscillations and Waves
- **DR J. RILEY** M. W. F. 9 (first sixteen lectures) Chemical Laboratory, Lensfield Road

### Statistics and Quantum Physics
- **DR P. ALEXANDER** M. W. F. 9 (first eight lectures) Chemical Laboratory, Lensfield Road

### Fluid Dynamics
- **DR A. J. MACFARLANE** Tu. Th. S. 10 (first sixteen lectures, ending 20 Feb.) Room 9
- **DR R. WILLIAMS** Tu. Th. S. 10 (last eight lectures, beginning 22 Feb.) Room 9

### Optimization
- **DR D. P. KENNEDY** Tu. Th. S. 11 (Twelve lectures) Room 9

**A meeting will be held for all Part IA students on Friday 2 May 2003 at 2 p.m. in Mill Lane Room 3 to discuss examinations and examination techniques.**

## MATHEMATICAL TRIPOS PART IB

### Analysis II
- **DR A. C. NORMAN AND OTHERS** Th. 5 (One lecture, 23 Oct.) Arts School, Room A

### UNIX Registration
- **DR F. H. KING, MISS C. H. NORTHEAST AND MR R. J. STIBBS** Th. or F. 2–4, 30 (One class, 29 Jan. or 30 Jan. or 5 Feb.) Lecture Theatre 1, William Gates Building

### Programming Practical Class
- **DR F. H. KING AND DR A. C. NORMAN** Th. 2–4 (Two fortnightly classes, beginning 12 Feb or 19 Feb.) Cockcroft Building, Floor 4

### Assessed Exercise Work
- **M. or Tu. or W. 2–4** Cockcroft Building, Floor 4
### ALTERNATIVE A

<table>
<thead>
<tr>
<th>Course</th>
<th>Lecturer/Professor</th>
<th>Time/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computational Statistics and Statistical Modelling</td>
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<tr>
<td>Geometry of Surfaces</td>
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<tr>
<td>Hilbert Spaces</td>
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### ALTERNATIVE B

<table>
<thead>
<tr>
<th>Course</th>
<th>Lecturer/Professor</th>
<th>Time/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hilbert Spaces</td>
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</tbody>
</table>

A meeting will be held on Monday, 7 June 2004 for finalists who may continue to Part III of the Tripos in 2004–05. The meeting will be held in MR2 at the Centre for Mathematical Sciences at 11.15 a.m.

A meeting will be held on Monday, 26 April 2004 to discuss Part II Essay and Examination Techniques. The meeting will be held in MR2 at the Centre for Mathematical Sciences at 2.15 p.m.

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Faculty of Mathematics (continued)

MATHMATICAL TRIPOS, PART II

Candidates for Part II may offer either Alternative A or Alternative B.

All lectures will be held in the Centre for Mathematical Sciences meeting rooms (MR), Clarkson Road unless otherwise stated.
Faculty of Mathematics (continued)

**MATHEMATICAL TRIPOS, PART III**

All lectures are held at the Centre for Mathematical Sciences, Clarkson Road unless otherwise stated. There will be a meeting in MR 2 on Wednesday 8 October 2003 at 9.30 a.m. for all those who intend to offer courses in Part III.

**DEPARTMENT OF APPLIED MATHEMATICS AND THEORETICAL PHYSICS**

### MICHAELMAS 2003

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Lecturer</th>
<th>Days</th>
<th>Time</th>
<th>Room</th>
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<tbody>
<tr>
<td>Quantum Field Theory.</td>
<td><strong>Prof. N. S. Manton</strong></td>
<td>Tu. Th. S.</td>
<td>9 MR 2</td>
<td></td>
</tr>
<tr>
<td>Statistical Field Theory.</td>
<td><strong>Dr. R. R. Iordan</strong></td>
<td>Tu. Th.</td>
<td>12 MR 9</td>
<td></td>
</tr>
<tr>
<td>Introduction to Quantum Computation.</td>
<td><strong>Prof. A. Ekert</strong></td>
<td>Tu. Th.</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>General Relativity.</td>
<td><strong>Dr. J. M. Stewart</strong></td>
<td>M. W. F.</td>
<td>9</td>
<td>MR 2</td>
</tr>
<tr>
<td>Local and Global Bifurcations.</td>
<td><strong>Prof. A. C. Davis</strong></td>
<td>Tu. Th.</td>
<td>10 MR 2</td>
<td></td>
</tr>
<tr>
<td>Structure and Evolution of Stars.</td>
<td><strong>Dr. C. A. Tout</strong></td>
<td>M. W. F.</td>
<td>12 MR 11</td>
<td></td>
</tr>
<tr>
<td>Astrophysical Fluid Dynamics.</td>
<td><strong>Prof. J. E. Pringle</strong></td>
<td>Tu. Th. S.</td>
<td>11 MR 15</td>
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</tr>
<tr>
<td>Theory of Elastic Solids.</td>
<td><strong>Prof. J. R. Willis</strong></td>
<td>Tu. Th.</td>
<td>12 MR 11</td>
<td></td>
</tr>
<tr>
<td>Numerical Solution of Differential Equations.</td>
<td><strong>Prof. A. Islerles</strong></td>
<td>M. W. F.</td>
<td>11 MR 5</td>
<td></td>
</tr>
<tr>
<td>Computer-aided Geometric Design.</td>
<td><strong>Dr. M. Sabin</strong></td>
<td>Tu. Th.</td>
<td>11 MR 11</td>
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<tr>
<td>Slow Viscous Flow.</td>
<td><strong>Dr. J. R. Lister</strong></td>
<td>M. W. F.</td>
<td>10 MR 11</td>
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<tr>
<td>Large-scale Atmosphere-Ocean Dynamics.</td>
<td><strong>Prof. E. H. Haynes</strong></td>
<td>M. W. F.</td>
<td>12 MR 15</td>
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### LENT 2004

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Lecturer</th>
<th>Days</th>
<th>Time</th>
<th>Room</th>
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<tbody>
<tr>
<td>Advanced Quantum Field Theory.</td>
<td><strong>Dr. J. M. Evans</strong></td>
<td>Tu. Th. S.</td>
<td>11 MR 3</td>
<td></td>
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<tr>
<td>Standard Model.</td>
<td><strong>Dr. R. Thorne</strong></td>
<td>Tu. Th. S.</td>
<td>10 MR 9</td>
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<tr>
<td>Supersymmetry and Extra Dimensions.</td>
<td><strong>Dr. F. Quevedo</strong></td>
<td>M. W. F.</td>
<td>10 MR 9</td>
<td></td>
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<tr>
<td>String Theory.</td>
<td><strong>Dr. D. Berman</strong></td>
<td>Tu. Th.</td>
<td>9 MR 3</td>
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<tr>
<td>Quantum Information Science.</td>
<td><strong>Dr. A. P. A. Kent</strong></td>
<td>Tu. Th.</td>
<td>12 MR 13</td>
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<tr>
<td>Black Holes.</td>
<td><strong>Dr. M. J. Perry</strong></td>
<td>M. W. F.</td>
<td>11 MR 9</td>
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</tr>
<tr>
<td>Applications of Differential Geometry to Physics.</td>
<td><strong>Prof. G. W. Gibbons</strong></td>
<td>M. W. F.</td>
<td>12 MR 4</td>
<td></td>
</tr>
<tr>
<td>Advanced Cosmology.</td>
<td><strong>Prof. N. G. Turok and Others</strong></td>
<td>M. W. F.</td>
<td>12 MR 4</td>
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<tr>
<td>Boundary Value Problems for Integrable PDEs.</td>
<td><strong>Prof. A. S. Fokas</strong></td>
<td>Tu. Th.</td>
<td>10 MR 4</td>
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<tr>
<td>Dynamo Theory.</td>
<td><strong>Prof. M. R. F. Proctor</strong></td>
<td>M. W. F.</td>
<td>12 MR 14</td>
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</tr>
<tr>
<td>Galaxies and Dark Matter.</td>
<td><strong>Prof. G. F. Gilmore</strong></td>
<td>M. W. F.</td>
<td>10 MR 11</td>
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<tr>
<td>Approximation Theory.</td>
<td><strong>Dr. A. Shadrin</strong></td>
<td>Tu. Th. S.</td>
<td>11 MR 13</td>
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<tr>
<td>Seismic Waves.</td>
<td><strong>Dr. A. J. Hains</strong></td>
<td>Tu.</td>
<td>11 MR 15</td>
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<tr>
<td>Physical Cosmology.</td>
<td><strong>Dr. Carswell and Prof. Pettini</strong></td>
<td>M. W. F.</td>
<td>9 MR 9</td>
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<tr>
<td>Asymptotic Methods in Fluid Mechanics.</td>
<td><strong>Dr. S. Cowley and Dr. N. Peake</strong></td>
<td>M. W. F.</td>
<td>9 MR 11</td>
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<tr>
<td>Fluid Mechanics of Swimming Organisms.</td>
<td><strong>Prof. T. J. Pedley</strong></td>
<td>Tu. Th.</td>
<td>9 MR 11</td>
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<tr>
<td>Non-Newtonian Fluid Mechanics.</td>
<td><strong>Dr. J. M. Rallison</strong></td>
<td>Tu. Th.</td>
<td>12 MR 15</td>
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<tr>
<td>Granular Flows.</td>
<td><strong>Prof. E. J. Hinch</strong></td>
<td>M. W.</td>
<td>11 MR 15</td>
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<tr>
<td>(Non-examinable, but essays will be set)</td>
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<tr>
<td>Demonstrations in Fluid Mechanics.</td>
<td><strong>Dr. S. B. Dalziel</strong></td>
<td>Th.</td>
<td>2 Fluids Lab, CMS</td>
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<td>(Non-examinable, but essays will be set)</td>
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### EASTER 2004

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Lecturer</th>
<th>Days</th>
<th>Time</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solitons and Instantons.</td>
<td><strong>Dr. M. Dunaiski</strong></td>
<td>M. Tu. Th.</td>
<td>F. 11 MR 11</td>
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</tr>
<tr>
<td>Branes.</td>
<td><strong>Prof. P. K. Townsend</strong></td>
<td>M. Tu. Th.</td>
<td>F. 10 MR 5</td>
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<tr>
<td>Accretion Discs.</td>
<td><strong>Dr. G. I. Ogilvie</strong></td>
<td>M. Tu. Th.</td>
<td>F. 12 MR 15</td>
<td></td>
</tr>
<tr>
<td>Granular Flows.</td>
<td><strong>Prof. E. J. Hinch</strong></td>
<td>M. W.</td>
<td>11 MR 15</td>
<td></td>
</tr>
<tr>
<td>(Non-examinable, but essays will be set)</td>
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</tr>
<tr>
<td>Demonstrations in Fluid Mechanics.</td>
<td><strong>Dr. S. B. Dalziel</strong></td>
<td>Th.</td>
<td>2 Fluids Lab, CMS</td>
<td></td>
</tr>
<tr>
<td>(Non-examinable, but essays will be set)</td>
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</table>
Faculty of Mathematics (continued)

MATHEMATICAL TRIPOS, PART III (continued)

DEPARTMENT OF PURE MATHEMATICS AND MATHEMATICAL STATISTICS

A number of courses given by the Statistical Laboratory are available both to candidates for Part III and for the M.Phil. in Statistical Science.

Noetherian Algebras.
DR C. J. B. BROOKES M. W. F. 9 MR 9
Topics in Group Theory.
DR N. F. J. INGLIS Tu. Th. S. 11 MR 5
Introduction to Integrible Systems.
DR M. MAZZOCCHI M. W. 10 MR 13
Introduction to Functional Analysis.
PROF. T. W. KORNÉ Tu. Th. S. 12 MR 12
Harmonic Analysis.
DR D. J. H. GARLING M. W. F. 10 MR 15
Class Field Theory.
DR R. Leader M. W. 11 MR 15
Probabilistic Combinatorics.
DR A. G. THOMASON M. W. F. 12 MR 4
Ramsey Theory.
DR A. KOVÁLEV M. W. F. 11 MR 13
Algebraic Geometry.
PROF. N. I. SHEPHERD-BARRON Tu. Th. S. 9 MR 4
Algebraic Topology.
DR I. SMITH M. W. F. 12 MR 5
Knot Theory.
PROF. W. T. GOWERS M. W. F. 9 MR 3
Category Theory.
PROF. P. T. JOHNSTONE Tu. Th. S. 10 MR 11

Courses given by the Statistical Laboratory

Advanced Probability.
DR O. HRYNIV Tu. Th. S. 11 MR 12
Poisson Processes.
PROF. SIR JOHN KINGMAN M. W. 11 MR 12
Stochastic Calculus and Applications.
DR M. J. LOULAKIS M. W. 10 MR 12
Mathematics of Operational Research.
PROF. R. W. WEBER M. W. 12 MR 12
Advanced Financial Models.
DR D. P. KENNEDY M. W. F. 9 MR 4

Applied Statistics.
DR P. M. E. ALTHAM Tu. Th. 9 (Eight lectures and eight classes) MR 5
Survival Data Analysis+
DR F. P. TREASURE Tu. Th. 10 (Ten lectures and two classes) Starting 14 October MR 12
Actuarial Statistics.
DR S. M. PITTS Tu. Th. 12 MR 5

Pro-p Groups.
DR R. D. CAMINA M. W. F. 10 MR 5
Modular Representations of Finite Groups.
DR S. MARTIN M. W. F. 11 MR 4
Conformal Mappings.
DR A. F. BEARDON M. W. F. 12 MR 15
Banach Algebra.
DR G. R. ALLAN M. W. F. 10 MR 4
Topics in Combinatorics.
PROF. W. T. GOWERS M. W. F. 9 MR 3
Spectral Geometry.
DR D. BARDEN Tu. Th. S. 10 MR 5
Riemannian Geometry.
DR G. PATERNAIN M. W. F. 11 MR 13
Lie Groups.
PROF. C. B. THOMAS Tu. Th. 9 MR 13
Topological Methods in Algebraic Geometry.
PROF. R. TOTARO Tu. Th. S. 11 MR 4
Intersection Cohomology.
DR J. WOOLF M. W. F. 9 MR 4
Set Theory.
DR T. FORSTER Tu. Th. S. 10 MR 13
Modular Forms.
PROF. A. SCHOLL Tu. Th. 12 MR 4
Cyclotomic Fields.
PROF. J. H. COATES M. W. F. 12 MR 11
Finite Dimensional Lie Algebras and their Representations.
DR J. GROJNOWSKI Tu. Th. S. 10 MR 11

Courses given by the Statistical Laboratory

Large Deviations and Queues.
DR D. J. WISCHIK Tu. Th. 11 MR 12
Quantum Information Theory.
PROF. Y. SUHOV AND DR N. DATTA M. W. F. 11
Mathematical Models in Financial Management.
PROF. M. A. H. DEMPSTER Tu. Th. 9 MR 12
Mathematical Methods in General Equilibrium Theory.
DR C. HARA M. W. 9 MR 12
Case Studies in Medical Statistics+
DR R. BIRD, DR N. FAREWELL AND DR D. SPIEGELHALTER W. 4–6 p.m. (three lectures) MR 11

Statistical and Population Genetics.
DR D. CLAYTON, DR H. CORDELL AND PROF. S. TAWARE M. 4–6 p.m. MR 11
Time Series.
DR O. HRYNIV M. W. F. 11 (eight lectures) MR 12
Monte Carlo Inference.
DRS S. P. BROOKS AND R. DEARDON M. W. F. 11 (sixteen lectures starting 3 Feb.) MR 12
Statistical Theory.
DR R. J. SAMWORTH M. W. F. 10 MR 12
Applied Multivariate Analysis.
DR P. M. E. ALTHAM Tu. Th. 12 MR 12

+ These two courses constitute the sixteen hour course in Biostatistics

There is a series of meetings for Part III students in MR2, Centre for Mathematical Sciences, at 4:15 p.m. on the following topics:
15 October 2003: PhD applications to Cambridge and other universities
22 October 2003: Exams and lectures
29 October 2003: How to write a Part III essay
26 November 2003: Research opportunities in Cambridge

continued >