

## NATURAL SCIENCES TRIPOS, PART III

MICHAELMAS 2010

LENT 2011

EASTER 2011

## ASTROPHYSICS

Course organiser: Prof. I. R. Perry (email: irp@ast.cam.ac.uk)  
 Course Website: <http://www.ast.cam.ac.uk/teaching/undergrad/partiii/courseguide.php>

All lectures will be held in *the Centre for Mathematical Sciences meeting rooms (MR), Clarkson Road except \* which will be held in the Raymond and Beverly Sackler Lecture Theatre at the Institute of Astronomy, Madingley Road and † in the Small Lecture Theatre at the Cavendish Laboratory (West Cambridge).*

## PROF. M. THOMSON†

Particle Physics. M. W. F. 9

PROF. J. D. BARROW AND DR A. D. CHALLINOR

Cosmology. M. W. F. 10, *MR5*

DR H. S. REALL

General Relativity. M. W. F. 11, *MR2*

PROF. K. F. PRIESTLEY, PROF. D. MCKENZIE AND DR A. DEUSS†

Physics of the Earth as a Planet. M. W. F. 11

PROF. J. C. B. PAPALOIZOU

Astrophysical Fluid Dynamics. M. W. F. 12, *MR11*

PROF. N. S. MANTON

Quantum Field Theory. Tu. Th. S. 9, *MR2*

DR J. J. ELDRIDGE

Structure and Evolution of Stars. Tu. Th. S. 11, *MR5*

DR J. S. SANDERS\*

Introduction to Unix and Computing. (Five lectures daily, starting Th. 7 October.) 2, *024, CTA*

## PROF. M. R. E. PROCTOR

Stellar and Planetary Magnetic Fields. M. W. F. 9, *MR11*

DR G. I. OGILVIE

Dynamics of Astrophysical Discs. M. W. 10, *MR11*

DR S. C. CHAPMAN

Galaxies. M. W. F. 11, *MR11*

DR M. C. WYATT

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

DR C. A. TOUT

Binary Stars. Tu. Th. 9, *MR11*

PROF. M. A. PARKER AND PROF. G. P.

EFSTATHIOU†

Particle Astrophysics. Tu. Th. 10

PROF. E. P. S. SHELLARD

Advanced Cosmology. Tu. Th. 12, *MR9*

## BIOCHEMISTRY

Course Organiser: Dr N. M. Standart (email nms@mole.bio.cam.ac.uk)  
 Course Website: <http://www.bioc.cam.ac.uk/teaching/partii/index.html>

Lectures are given in *the Department of Biochemistry*

The course starts with an introductory lecture by DR STANDART at 9 a.m. on M. 4 Oct. in the *Lecture Theatre in the Sanger Building, Department of Biochemistry, Old Addenbrooke's Site.*

A detailed timetable for this course will be available in the Department of Biochemistry

## Research project support

DEPARTMENTAL STAFF

Laboratory Safety, Preparation of Scientific Figures and Scientific Reports, Record Keeping, Experimental Design, Seminar Presentation. 4–8 Oct.

## Module MT1

DR M. HYVONEN, PROF. B. LUISI, DR L. PELLEGRINI, DR R. WILLIAMS AND DR S. JACKSON

Molecular recognition and interaction Tu. Th. 9 (Twelve lectures, beginning 12 Oct.)

## Module MT2

PROF. A. G. SMITH, DR B. HENDRICH, DR F. J. LIVESEY, PROF. M. SPILLANTINI AND DR G. C. BROWN

Fate and Longevity Tu. Th. 11 except 14 Oct. when second lecture at 12. (Twelve lectures, beginning 14 Oct.)

## Methods Workshops and Landmark Papers

PROF. G. I. EVAN, PROF. G. P. C. SALMOND, PROF. DAME JEAN THOMAS, DR D. M. CARRINGTON, PROF. S. G. OLIVER, DR A. D. J. SCADDEN, DR F. J. LIVESEY AND PROF. SIR JOHN WALKER

M. 2–5 (Eight workshops, beginning 11 Oct.)

## Research Project Symposium

DR N. M. STANDART AND DR M. HYVONEN (Joint chairs)  
Presentation of interim reports. 6–7 Dec.

## Research Project Symposium

DR N. M. STANDART AND DR M. HYVONEN (Joint chairs)

Presentation of final reports. 28–29 Apr.

## Module LT1

PROF. G. I. EVAN, SIR TIM HUNT, DR D. TUVESON, DR P. WORKMAN, DR B. HUNTLY, DR J. GRIGGS, DR J. MCCAFFERTY, PROF. D. BENTLEY, PROF. W. OUWEHAND, PROF. K. M. BRINDLE, DR K. VOUSDEN AND DR T. R. HESKETH

Contemporary cancer studies. W. Th. 12–2 (Eight workshops, beginning 26 Jan.)

## Module LT2

DR D. SAVAGE, DR G. YEO, DR A. GRACE, DR S. LUMMIS AND PROF. R. W. FARNDAL

Contemporary approaches to metabolic disease. Tu. Th. 9 or 11 (Twelve lectures, beginning 25 Jan.)

## Methods Workshops and Landmark Papers

DR E. A. MISKA, PROF. D. ST JOHNSTON, DR L. PELLEGRINI, SIR TIM HUNT, DR J. PINES, DR T. R. HESKETH, DR D. NIETLISPACH AND PROF. A. G. SMITH  
M. 2–5 (Eight workshops, beginning 24 Jan.)

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## CHEMISTRY

Course Organiser: Dr J. H. Keeler email: (jhk10@cam.ac.uk)  
 Course Website: www-teach.ch.cam.ac.uk

Students must register for the course in the *Department of Chemistry, Lensfield Road*, between 09.00 and 16.00 on Tu. 5 Oct.

A booklet containing details of the times of the lecture courses will be given out on registration. Others interested in the lecture courses can obtain a copy of this booklet on application to the Course Organiser. This information is also available on the website, www-teach.ch.cam.ac.uk

All students must attend an introductory talk concerning the course at 10 a.m. on W. 6 Oct. in the *Wolfson Lecture Theatre*.

All lectures will be given in the *Department of Chemistry, Lensfield Road* unless otherwise stated

## EXPERIMENTAL AND THEORETICAL PHYSICS

Departmental Contact: Helen Marshall, email III-physics@phy.cam.ac.uk  
 Course Website: www.phy.cam.ac.uk/teaching/

Students must offer three or more courses from **Major Options**, together with three or more courses from **Minor Topics**. **Quantum Field Theory** may be substituted for one **Major Topic**. A **Vacation project** and courses from **Interdisciplinary Topics**, **Advanced Quantum Field Theory**, **Galaxies Nuclear Power Engineering**, **Nuclear Materials** and **Further Work** may each be substituted for one **Minor Topic**.

The courses from the **Major Topics** and **Minor Topics**, **Nuclear Power Engineering and Nuclear Materials** are examined at the start of the term following that in which they are given. **Quantum Field Theory**, **Advanced Quantum Field Theory**, **Galaxies** and courses from the **Interdisciplinary Topics** will be examined in June. The **Entrepreneurship** course from **Further Work** is continually assessed.

All students are recommended to attend the **Non-examinable courses**.

The course will begin with a meeting on the first Wednesday of Full Term (6 Oct.) at 12.30 p.m. in the *Small Lecture Theatre*.

Lectures are given at the *Cavendish Laboratory (West Cambridge)* unless otherwise stated

The lecture rooms are indicated as follows: (P) *Pippard Lecture Theatre*, (S) *Small Lecture Theatre*, (M) *Mott Seminar Room*.

All Part III Mathematics courses are given in the *Centre for Mathematical Sciences, Clarkson Road* in the rooms indicated in parentheses.

**Major Topics**

PROF. H. SIRRINGHAUS (*S*)  
 Advanced Quantum Condensed Matter Physics. T. Th.  
 11–12.30  
 DR U. KEYSER (*S*)  
 Soft Matter. M. W. F. 12  
 PROF. A. C. FABIAN AND PROF. A. N. LASENBY (*S*)  
 Relativistic Astrophysics and Cosmology. M. W. F. 10  
 PROF. M. A. THOMSON (*S*)  
 Particle Physics. M. W. F. 9  
 PROF. K. F. PRIESTLEY, PROF. D. MCKENZIE AND DR A.  
 DEUSS (*S*)  
 Physics of the Earth as a Planet. M. W. F. 11  
 PROF. P. B. LITTLEWOOD (*S*)  
 Quantum Condensed Matter Field Theory. Tu. Th. 2  
 DR M. K. KÖHL AND DR Z. HADZIBABIC (*S*)  
 Atomic and Optical Physics. W. F. 2

**Minor Topics**

Twelve-lecture courses unless otherwise stated.  
 DR J. R. BATLEY (*S*)  
 Gauge Field Theory. Tu. Th. 9  
 DR W. A. ALLISON (*M*)  
 The Frontiers of Experimental Condensed  
 Matter Physics. M. F. 9  
 PROF. G. G. LONZARICH (*M*)  
 Superconductivity and Quantum Coherence.  
 W. F. 11  
 DR R. D. E. SAUNDERS (*S*)  
 The Frontiers of Observational Astrophysics.  
 W. F. 12  
 DR R. E. ANSORGE AND OTHERS (*P*)  
 Medical Physics. M. W. 2  
 DR J. GUCK (*S*)  
 Biological Physics. M. 12, W. 9  
 DR C. J. B. FORD (*M*)  
 The Physics of Nanoelectronic Systems. M.  
 W. 10  
 PROF. M. A. PARKER AND PROF. G. EFSTATHIOU  
 (*S*)  
 Particle Astrophysics. Tu. Th. 10 (16 lectures)  
 PROF. P. ALEXANDER (*S*)  
 Formation of Structure in the Universe. M.  
 W. 10 (16 lectures)  
 DR M. ATATURÉ (*M*)  
 Nonlinear Optics and Quantum States of  
 Light. W. F. 12  
 DR C. H. W. BARNES (*S*)  
 Quantum Information. Tu. Th. 2  
 DR M. HERZOG AND PROF. H. GRAF (*M*)  
 Atmospheric Physics. Tu. Th. 11 (16 lectures)

**Quantum Field Theory**

The following course from Part III  
 Mathematics (p. 144) may be offered for examination in  
 place of **one** major topic.

PROF. N. S. MANTON  
 Quantum Field Theory. Tu. Th. S. 9 (CMS MR2)

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**Advanced Quantum Field Theory**

The following courses from Part III  
Mathematics (p. 145) may be offered for  
examination in place of **one** Minor Topic.  
PROF. N. DOREY  
Advanced Quantum Field Theory. Tu. Th. S.  
11 (CMS MR3)  
DR S. C. CHAPMAN  
Galaxies. M. W. F. 11 (CMS MR11)

**Galaxies**

The following courses from Part III  
Mathematics (p. 145) may be offered for  
examination in place of **one** Minor Topic.  
DR S. C. CHAPMAN  
Galaxies. M. W. F. 11 (CMS MR11)

**Nuclear Materials**

The following course from Part III Materials  
Science (p. 206) may be offered for  
examination in place of **one** Minor Topic.  
PROF. A. L. GREER (*Austin Building Lecture  
Theatre*)  
Nuclear Materials. M. F. 9 (beginning 21 Jan.)

**Nuclear Power Engineering**

The following course from Part IIB Engineering  
(p. 128) may be offered for examination  
in place of **one** Minor Topic.  
DR G. T. PARKS (*venue to be confirmed*)  
Nuclear Power Engineering. M. 12 W. 9  
(beginning 24 Jan.)

**Interdisciplinary Topics**

PROF. N. C. GREENHAM (*S*)  
Materials, Electronics and Renewable Energy.  
(Interdisciplinary course). Tu. Th. 12  
(beginning 20 Jan.)  
PROF. D. HODELL AND OTHERS (*Tilley LT*)  
Climate Change. (Interdisciplinary course). Tu.  
Th. 10 (beginning 20 Jan.)  
PROF. R. L. JONES AND OTHERS (*venue to be  
confirmed*)  
Atmospheric Chemistry and Global Change.  
(Interdisciplinary course). Tu. Th. 9  
(beginning 20 Jan.)

**Examples Classes**

DR J. R. BATLEY AND OTHERS (*P*)  
Examples Classes in General Physics. Tu. F.  
2–4 (Nine classes, beginning 29 April,  
no class on 13 May)

**Non-examinable courses**

THE STAFF OF THE CAVENDISH LABORATORY  
Postgraduate Research Opportunities at the Cavendish.  
Reception on Th. 18 Nov. at 1 p.m. in the Committee  
Room.  
Exhibition from 15 Nov. to 26 Nov.

DR R. C. JENNINGS (*M*)  
Ethics of Physics. M. 11 (Four lectures  
beginning 24 Jan.)  
DR J. N. BUTTERFIELD (*M*)  
Philosophy of Physics. M. 11 (Four lectures  
beginning 21 Feb.)

THE STAFF OF THE CAVENDISH LABORATORY  
Current Research Work in the Cavendish  
Laboratory.  
Open Days for students reading Part II or Part  
III  
Physics W. 2–5 The Open Days will start with  
introductory talks at 2 p.m. in the  
*Cavendish Laboratory*  
Research in the *TCM Group* (2 Feb. 2.15 in  
*TCM Seminar Room*)

PROF. P. B. LITTLEWOOD AND OTHERS  
Cavendish Physical Society Seminars. W. 4.15 (Alternate  
weeks beginning 13 Oct.)

PROF. P. B. LITTLEWOOD AND OTHERS  
The same continued.

PROF. P. B. LITTLEWOOD AND OTHERS  
The same continued.

**Further Work**

DR D. F. BUSCHER  
Long Vacation Project

DR A. MUTHIRULAN AND OTHERS (*Mill Lane  
Lecture Theatre 6*)  
Entrepreneurship. M. Th. 4 (beginning 20 Jan.)

**Project Work**

PROF. C. G. SMITH AND OTHERS  
Project Work.

PROF. C. G. SMITH AND OTHERS  
The same continued.

PROF. C. G. SMITH AND OTHERS  
The same continued.

## NATURAL SCIENCES TRIPOS, PART III (continued)

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## GEOLOGICAL SCIENCES AND MINERAL SCIENCES

Course Website: <https://camtools.caret.cam.ac.uk/> and  
<http://www.esc.cam.ac.uk/teaching/geological-sciences> and  
<http://www.esc.cam.ac.uk/teaching/mineral-sciences>

Students attend the seminar course in the Michaelmas Term and take three options in the Lent and Easter Term.

**Seminar Course**

A series of seminars will be run during the Michaelmas Term. Tu. 5 *Tilley Lecture Theatre*; Th. 5 *Harker Room*

**Field Course to Spain**

7–14 April  
DR J. MACLENNAN

**Option 6 Continental Tectonics and Mountains**

PROF. J. A. JACKSON AND PROF. D. MCKENZIE  
 Convenor: Prof. J. A. Jackson  
 Lectures. Tu. Th. 2 *Tilley Room*  
**Practicals.** Tu. Th. 3–4.30 *Petrology Laboratory*

The same continued. (Eight revision sessions)

**Option 7 Oceanic and Continental Margins**

PROF. R. S. WHITE AND DR J. MACLENNAN  
 Convenor: Prof. R. S. White  
 Lectures. W. F. 9 *Harker Room*  
**Practicals.** W. F. 10–11.30 *Petrology Laboratory*

The same continued. (Eight revision sessions)

**Option 8 Magmatic Processes**

DR S. GIBSON, DR M. HOLNESS AND PROF. A. WOODS  
 Convenor: Dr S. Gibson  
 Lectures. M. W. 2 *Harker Room*  
**Practicals.** M. W. 3–4.30 *Palaeontology Laboratory*

The same continued. (Eight revision sessions)

**IDP2 Interdisciplinary Course: The Earth System and Climate Change**

PROF. D. HODELL, DR A. PIOTROWSKI DR L. SKINNER AND DR A. TURCHYN  
 Convenor: Prof. D. Hodell  
 Lectures. Tu. Th. 10, *Tilley Room*  
**Practicals.** Tu. Th. 11–12.30, *Harker 1 Room*

The same continued. (Eight revision sessions)

**Option 10 Ancient Ecosystems**

DR N. J. BUTTERFIELD AND PROF. S. CONWAY MORRIS  
 Convenor: Dr N. J. Butterfield  
 Lectures. M. 9, F. 2 *Harker Room*  
**Practicals.** M. 10–11.30, F. 3–4.30 *Palaeontology Laboratory*

The same continued. (Eight revision sessions)

**Option M4 Mechanical Behaviour and Minerals**

PROF. S. A. T. REDFERN AND DR R. HARRISON  
 Convenor: Prof. S. A. T. Redfern  
 Lectures: Tu. F. 2 *Harker 2 room*  
**Practicals.** Tu. F. 3–4.30 *IB Minerals Laboratory*

The same continued. (Eight revision sessions)

**Option M5 Computational Methods in Crystal Physics**

PROF. E. ARTACHO AND OTHERS  
 Convenor: Prof. E. Artacho  
 Lectures. M. 9, W. 2 *Harker 2 room*  
**Practicals.** M. 10–11.30, W. 3–4.30 *IB Minerals Laboratory*

The same continued. (Eight revision sessions)

**Option M6 Diffraction, Electron Microscopy and Microanalysis**

PROF. E. SALJE, DR J. LOUDON, PROF. M. T. DOVE AND DR C. M. PETRONE  
 Convenor: Prof. E. Salje  
 Lectures. Th. 2. F. 9 *Harker 2 room*  
**Practicals.** Th. 3–4.30, F. 10–11.30 *IB Minerals Laboratory*

The same continued. (Eight revision sessions)

## NATURAL SCIENCES TRIPOS, PART III (continued)

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## HISTORY AND PHILOSOPHY OF SCIENCE

Course Organiser: Dr E. Robson (email: er264@cam.ac.uk)  
 Course Website: www.hps.cam.ac.uk/students

All students must attend an introductory meeting at 2.p.m. on W. 6 Oct. in *Seminar Room 2, Department of History and Philosophy of Science*.

M.Phil./Part III Seminar in History, Philosophy and Sociology of Science, Technology and Medicine.  
 W. 3 (*Seminar Room 1, Department of History and Philosophy of Science*)

The same continued.

The same continued.

## MATERIALS SCIENCE

Course Organiser: Prof. J. L. Driscoll (email: PartIII@msm.cam.ac.uk)  
 Course Website: www.msm.cam.ac.uk/teaching/  
 A detailed timetable is available on the Department website.

All lectures will be given in the *Austin Lecture Room*

DR N. A. RUTTER  
**T1** Thermal Analysis. (Four lectures)  
 DR C. DUCATI  
**T2** Electron Microscopy and Analysis. (Eight lectures)  
 DR H. J. STONE  
**T3** Optical, X-Ray and Neutron Techniques. (Six lectures)  
 PROF. W. J. CLEGG  
**M5** Deformation Kinetics. (Twelve lectures)  
 PROF. R. E. CAMERON  
**M11** Biomaterials. (Twelve lectures)  
 DR E. R. WALLACH  
**M12** Materials: Energy and Sustainability. (Twelve lectures)  
 PROF. G. T. BURSTEIN  
**M15** Corrosion and Protection. (Twelve lectures)  
 DR P. D. BRISTOWE  
**M16** Materials Modelling. (Twelve lectures)  
 PROF. M. G. BLAMIRE  
**M18** Materials Aspects of Microdevices. (Twelve lectures)  
 PROF. J. L. DRISCOLL  
**M19** Functional Nanomaterials. (Twelve lectures)  
 DR H. K. D. H. BHADOSHIA  
**M21** Steels. (Twelve lectures)

**Speakers from Industry**

Details available from Department website.

**Visit to Industry**

Details available from the Department website.

**Project**

Individual research project

**Management, Language and Computing Options**

Details available from the Department website.

DR C. DUCATI  
**M1** Electron and Photons in Solids. (Twelve lectures)  
 DR Z. H. BARBER  
**M2** Thin Films. (Twelve lectures)  
 PROF. A. H. WINDLE AND DR D. EDER  
**M6** Polymeric Materials and Carbon Nanotubes. (Twelve lectures)  
 DR N. D. MATHUR  
**M7** Electronic Ceramics (Twelve lectures)  
 PROF. A. K. CHEETHAM  
**M9** Functional Inorganic Materials (Twelve lectures)  
 DR M. A. MORAM AND DR R. A. OLIVER  
**M10** Semiconductor Nanostructures for Devices (Twelve lectures)  
 PROF. A. L. GREER AND DR I. FARNAN  
**M17** Nuclear Materials. (Twelve lectures)  
 DR B. A. GLOWACKI  
**M20** Cryogenic Materials and Techniques. (Twelve lectures)

**Speakers from Industry**

Details available from Department website.

**Visit to Industry**

Details available from the Department website.

**Project**

Individual research project

**Management, Language and Computing Options**

Details available from the Department website.

**Examples Classes**

Timetable available on Department website.

## SYSTEMS BIOLOGY

Course Organiser: Prof. S. G. Oliver (email: steve.oliver@bioc.cam.ac.uk)  
 Course Website: <http://www.sysbiol.cam.ac.uk/index.php?page=part-iii-course-in-systems-biology>

The Course starts at 9.00 a.m. on Mon. 27 September with an Introductory Lecture by Prof. S. G. Oliver in Meeting Room B in the *Sanger Building, Department of Biochemistry, 80 Tennis Court Road*. Registration will follow this Lecture.

A booklet containing details of the times of the lectures and practical sessions will be provided on registration and further information can be obtained from the Course Website (see above).

All lectures will be given in the *Sanger Building, Tennis Court Road* and all practical classes in the *Department of Genetics, Downing Site*, unless otherwise stated.