BSc/MSci Programme Structures
(Full-time Undergraduate Degrees)

SESSION 2012/2013

Dates of College Terms 2012/2013

First Term: Monday, 24 September 2012- Friday, 14 December 2012	(12 weeks)
Second Term: Monday, 7 January 2013 – Friday, 22 March 2013	(11 weeks)
Third Term: Tuesday, 22 April 2013 - Friday, 7 June 2013	(7 weeks)

While every effort has been made to ensure the accuracy of the information in this document, the Department cannot accept responsibility for any errors or omissions contained herein.

A copy of this Handbook may be found at the Departmental Web site: www.phys.ucl.ac.uk.

FOREWORD

This handbook contains information on all the full-time degree programmes and their constituent courses, which the Department of Physics and Astronomy plans to offer in Session 2012/2013. Please note that it cannot be guaranteed that all courses offered will run and that only the most usual pre-requisites for courses are given.

The handbook is divided into three sections:

SECTION 1 – provides a brief overview on the different degree programmes.

SECTION 2 – provides details of the year-by-year course structure for each degree programme.

SECTION 3 – provides details of the 4th Year Intercollegiate MSci courses.

Detailed syllabuses and course descriptions are given in the handbooks of '*Course Descriptions'* prepared for each year.

Timetables for all courses can be found on the Central timetable website and on the following noticeboards:
Outside the Astronomy & Theoretical Physics Programme Tutor's Room, E4.
Also outside the Massey Theatre

If you need guidance on your choice of course(s), please contact either, the Astronomy & Theoretical Physics Programme Tutor, Dr I Furniss (if@star.ucl.ac.uk) or the Physics Programme Tutor, Dr S W Zochowski (s.zochowski@ucl.ac.uk).

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SECTION 1

1. FULL-TIME UNDERGRADUATE DEGREE PROGRAMMES

1.1 Overview

The Department offers a range of full-time undergraduate programmes for both the three-year BSc and four-year MSci honours degrees. These are listed in Table 1, along with the UCAS codes.

The present BSc and MSci degree structure was introduced in the 1993/94 session, following recommendations produced in 1990 by an Institute of Physics (IoP) report, "The Future Pattern of Higher Education in Physics".

The four-year integrated masters MSci degree provides a longer educational experience and more specialist training for students who intend to proceed directly to academic or industrial research in the relevant field. Both types of undergraduate degree provide substantial training in transferable skills to facilitate progression to a wide range of careers, both within and outside the physics and astronomy professions. It is the policy in this Department, and in most other major physics and astronomy departments in the UK, that the MSci route is recommended for direct transfer to a PhD programme. The three-year BSc programmes are designed for students who have a high interest in the relevant field, but do not necessarily wish to pursue it beyond a first degree. For others, further study may involve a subsequent, one-year, MSc postgraduate programme.

TABLE 1: Full-Time Undergraduate Degree programmes

Title of Programme	BSc UCAS Code	MSci UCAS Code
Single Honours		
Physics (p)	F300	F303
Theoretical Physics (p)	F340	F345
Astronomy* (a)	F500	F502
Astrophysics (a)	F510	F511
Combined Honours		
Mathematics and Physics (admission dept is the Maths dept)	GF13	GF1H

Note: (p) = ‘physics-related’; (a) = ‘astronomy-related’
* Not available for entry. This degree is being wound down as students on it pass through the system.

1.2 Aims and Objectives

The general teaching **aim** of the Department is to deliver a range of degree programmes, designed to develop a student's full potential, using the research strengths and experience of staff in a challenging, but friendly and supportive, environment. More specifically, our undergraduate programmes aim to:

- attract and recruit high quality applicants, whatever their background;
- encourage students to develop critical modes of thought and study, and an in-depth understanding of their chosen field of study;
- provide a sufficiently broad education, in specialist and transferable skills to facilitate progression to a wide variety of careers, both within and outside the physics and astronomy professions;
- equip students with knowledge and skills to progress to postgraduate study;

Associated with these aims are the **objectives** that a student should have achieved having successfully completed a given programme. Graduates for our full-time undergraduate programmes should have:

- followed a programme which is academically coherent, encompassing both depth and breadth;
- acquired a thorough knowledge and understanding of the scientific basis of their chosen field;
- gained practical and analytical skills through laboratory experiments and the ability to carry out accurate and informed analysis and interpretation of data;
- developed investigative skills (experimental and/or theoretical) through individual and/or team project work;
- learned how to communicate effectively, in speech and in writing, through the production of written essays, reports and oral presentations;
- developed basic skills in computer programming and information technology;
- in the case of MSci students, gained sufficient specialist knowledge in their 4th-year courses and research projects to allow a seamless progression to postgraduate study, including PhD programmes.

Detailed aims and objectives for each BSc and MSci degree, listed in Table 1, have been formulated and are reproduced in the Web version of this document (www.phys.ucl.ac.uk).

The detailed, year-by-year, course structures for each of the programmes listed in Table 1 are given in Section 2. Programmes are based on the University of London course-unit system. Most courses are of half-unit value and students normally take courses totaling four units per year. Following UCL guidelines, a half-unit course expects a total student commitment of approximately 180 hours, including lectures, practicals, homeworks, private study and revision.

1.3 THE CORE FOR PHYSICS RELATED DEGREES

Each of the physics-related degrees is built on a common core of half-unit courses, over the first three years of both the BSc and MSci programmes. The first three years of each BSc/MSci programme are generally taught in common and provide a transition from school and a firm foundation for future years. The core courses for the physics-related degrees are based on topics recommended by the IoP. These courses are indicated for each year in Table 2. Each module is identified by a four digit code (and prefixed by the Departmental code PHAS). The courses provide in the first year the firm foundation of subject strands in quantum-based phenomena and condensed matter, underpinned by mathematics 1245, 1246 and classical mechanics 1247, and a practical skills

course 1240 which includes a substantial element of computer-based and IT skills training. These strands are developed in the second year through core courses in quantum physics 2222 and its application to atoms and molecules 2224, in statistical thermodynamics 2228 and in electromagnetic theory 2201, with the necessary mathematics further developed 2246. The quantum and condensed matter elements of the core are completed in the third year courses 3201, 3224, 3225, 3226. The framework prepares students for the 2nd and 3rd year course variations and options that differentiate the different degree programmes, and for the 4th year specialist courses.

TABLE 2: CORE COURSES FOR PHYSICS RELATED DEGREES

YEAR 1	YEAR 2	YEAR 3
1202 Atoms, Stars and The Universe	2246 Mathematical Methods III	3224 Nuclear and Particle Physics
1224 Waves, Optics and Acoustics	2222 Quantum Physics	3225 Solid State Physics
1228 Thermal Physics	2224 Atomic & Molecular Physics	3226 Quantum Physics
1240 Practical Skills 1C (Core Physics)	2228 Statistical Thermodynamics	3201 Electromagnetic Theory
1245 Mathematical Methods I	2201 Electricity and Magnetism	
1246 Mathematical Methods II		
1247 Classical Mechanics		

All Physics students do two half-unit first year practical skills courses 1240, 1241, which include computing and IT skills elements. For most degrees this is followed by compulsory second and third year practical laboratory and project courses. Students reading for the Theoretical Physics degrees take 1240 and 1449, Practical Mathematics, in year one and replace second and third year experimental work with theory courses. The second and third years of the BSc and MSci degrees provide for optional courses to develop further and enhance knowledge of a range of physics topics.

The fourth year of the MSci degrees comprises a compulsory research project, and a further five half-unit courses, generally chosen from subjects in the relevant degree specialty. The range of courses available is very wide, and includes some courses taught by staff in physics departments from other London Colleges. To qualify for a given degree name, it is expected that the majority of fourth year courses (including the project) will be from those designated against the relevant degree area. The Physics Tutor and the Astronomy & Theoretical Physics Tutor will monitor and approve the coherence of the set of choices selected by each student.

1.4 THE CORE FOR ASTRONOMY RELATED DEGREES

Each of the Astronomy-related degrees is built on a common core of half-unit courses over the first three years of both BSc and MSci programmes, supplemented by degree-variation half-units and options. The core courses are listed is Table 3, and comprise: (i) those underpinning first and second year mathematics 1245, 1246 and 2246 (ii) classical and quantum physics elements in the first year 1224, 1247 and second year 2222, 2228, 2201, and (iii) courses which build up an increasing

exposure to topics in astronomy and astrophysics. This starts in the first year with core courses in Atoms, Stars and The Universe 1202, and Practical Astronomy 1130. These are followed in the second year by Astrophysical Processes: Nebulae to Stars 2112, Practical Astrophysics 2130, leading into core third year courses in the Physics of Stars 3135, Physical Cosmology 3137 and Astronomical Spectroscopy 3338.

TABLE 3: CORE COURSES FOR ASTROPHYSICS RELATED DEGREES

YEAR 1	YEAR 2	YEAR 3
1202 Atoms, Stars and The Universe.	2112 Astrophysical Processes: Nebulae to Stars	3135 The Physics of Stars
1228 Thermal Physics	2228 Statistical Thermodynamics	3137 Physical Cosmology
1224 Waves, Optics and Acoustics	2117 Physics of the Solar System	3338 Astronomical Spectroscopy
1130 Practical Skills 1A (Astronomy)	2246 Mathematical Methods III	
1240 Practical Skills 1C (Core Physics)	2222 Quantum Physics	
1245 Mathematical Methods I	2201 Electricity and Magnetism	
1246 Mathematical Methods II	2130 Practical Astrophysics 2A	
1247 Classical Mechanics		

Variations in compulsory courses and option courses distinguish the different degrees. These build on and supplement the Astronomy core programme, providing an exposure to a wide range of topics in classical and modern astronomy and astrophysics.

All astronomy-related students do the half-unit first year practical skills course 1240, which includes a computing and IT skills element. For most degrees this is followed by compulsory second and third year practical astronomy/astrophysics courses. The second and third years of the BSc and MSci degrees provide for optional courses to further enhance and enrich students' knowledge of astronomy and astrophysics topics.

The fourth year of the MSci degrees comprises a compulsory research project in astrophysics, and a further five half-unit courses, generally chosen from subjects in the relevant degree speciality. A wide range of courses is available, including some taught by staff from other London Colleges.

1.5 SKILLS TRAINING

1.5.1 Practical Skills and Projects

Practical skills teaching is structured to build up competence and a range of experience such that, on graduation, students are capable of independent work in a variety of situations. Most degree programmes include compulsory practical courses which total two to three units for years 1 to 3. For physics-related degrees these form experimental laboratory courses in the Teaching

Laboratories in the Department, whilst for the astronomy-related degrees Practical Astronomy classes are held in the first and third years at the University of London Observatory at Mill Hill.

Most students in the third year do a course in experimental work (in physics or astronomy) and a Group Project, which introduces students to the concept and challenges of teamwork within a scientific environment. All MSci students in their fourth year undertake a major research project, which draws upon the wide-ranging research activities in the Department. Students proceeding to the BSc rather than the MSci may possible undertake a full-unit project in their third year.

1.5.2 Computing and Information Technology

All students in their first year take a basic Practical Skills course 1240 which includes training in Windows-based computer skills. These are complemented in later years through the introduction of packages for the solution of scientific problems (e.g. Matlab) and a high-level computer language option.

1.5.3 Communication Skills

An integral part of your degree training is to learn how to get your message across, be it to other scientists or non-specialists, using a range of written and oral media. To this end, two 'Effective Communication" modules are followed by all students pursuing degrees in Physics and Astronomy, one in each of years 1 (PHAS1901) and 2 (PHAS2901). Writing skills are developed progressively, building up from short written pieces on scientific topics for both specialist and non-specialist audiences, to longer written reports. Oral presentations start with short talks in first year tutorial groups, and towards the end of the first and second years build up to more formal presentations to larger audiences. As part of these exercises, you will gain increasing abilities in using appropriate software, including that needed to construct and maintain your own personal web page. The skills you build in these modules will be increasingly employed in other courses, and will be particularly useful in the third year Group Project and final year dissertations and presentations.

The marks gained in these modules contribute to your assessment for honours in the third and fourth year, at a level equivalent to approximately 2% for each module.

Each laboratory/observatory practical course also includes a significant element of communications skills development, through the production of formal reports on experiments and projects.

1.6 DEGREE COURSE-STRUCTURES and OPTIONS

Details of each of the year-by-year course structures for the different BSc and MSci degrees are given in the following section. In addition to the relevant core and compulsory courses, students from year 2 onwards can exercise an increasingly flexible range of option courses (typically one in year 2, (depending on the degree), two or three in year 3, and five in year 4).

The option courses listed in the following degree descriptions are those most commonly chosen. In addition, and at the discretion of the Physics or Astronomy Programme Tutor, students can exercise a limited choice of courses from other Departments, most frequently the Departments of Science and Technology Studies, Mathematics, or Medical Physics and Bioengineering.

SECTION 2

PROGRAMME STRUCTURES

PHYSICS F300 BSc (3-year) -- (UBSPHYSING05)

Programme Structure

YEAR 1	YEAR 2	YEAR 3
1202 Atoms, Stars and The Universe	2246 Mathematical Methods III	3224 Nuclear and Particle Physics
1224 Waves, Optics and Acoustics	2222 Quantum Physics	3225 Solid State Physics
1228 Thermal Physics	2224 Atomic & Molecular Physics	3226 Quantum Mechanics
1240 Practical Skills 1C (Core Physics)	2228 Statistical Thermodynamics	3400 Physics Project *OR* 3440 plus 1 extra option (1 unit)
1241 Practical Skills 1P (Experimental Physics)	2201 Electricity and Magnetism	
1245 Mathematical Methods I	2440 Practical Physics 2A	3201 Electromagnetic theory
1246 Mathematical Methods II	2441 Practical Physics 2B	3441 Group Project
1247 Classical Mechanics	*Option*	*Option*
1901 Developing Effective Communications 1*	2901 Developing Effective Communications 2*	

All courses are half units, unless otherwise stated.
*Compulsory modules (weighted into final assessment for honours). Refer to 1.6.3

Courses available for option selection

YEAR 2	YEAR 3	
MATH6202 Mathematics for Physics and Astronomy	3424 Theory of Dynamical Systems	
2427 Environmental Physics	3443 Lasers and Modern Optics	
2117 Physics of the Solar System	3447 Materials & Nanomaterials	3137 Physical Cosmology
	3459 Scientific Computing using Object Oriented Languages	
	3427 Energy & Climate	
	3661 Physics of the Earth	
	GEOL3039 Physics of Oceans, Ice Sheets and Climate (1 cu)	

PHYSICS F303 MSci (4-year) -- (UMSPHYSING05)

Programme Structure

YEAR 1	YEAR 2	YEAR 3	YEAR 4
1202 Atoms Stars and The Universe	2246 Mathematical Methods III	3224 Nuclear and Particle Physics	M201 Project (1.5 unit)
1224 Waves, Optics and Acoustics	2222 Quantum Physics	3225 Solid State Physics	
1228 Thermal Physics	2224 Atomic & Molecular Physics	3226 Quantum Mechanics	
1240 Practical Skills 1C (Core Physics)	2228 Statistical Thermodynamics	3440 Experimental Physics	*Option(M level)*
1241 Practical Skills 1P (Experimental Physics)	2201 Electricity and Magnetism	3441 Group Project	*Option(M level)*
1245 Mathematical Methods I	2440 Practical Physics 2A	3201 Electromagnetic theory	*Option(M level)*
1246 Mathematical Methods II	2441 Practical Physics 2B	*Option*	*Option*
1247 Classical Mechanics	*Option*	*Option*	*Option*
1901 Developing Effective Communications 1*	2901 Developing Effective Communications 2*		

All courses are half units, unless otherwise stated.
*Compulsory modules (weighted into final assessment for Honours). Refer to 1.6.3

Courses available for option selection

YEAR 2	YEAR 3	YEAR 4
MATH6202 Mathematics for Physics and Astronomy	3424 Theory of Dynamical Systems	*See Separate table of Options for year 4 Page 24.*
2427 Environmental Physics	3443 Lasers and Modern Optics	
2117 Physics of the Solar System	3447 Materials & Nanomaterials	
	3459 Scientific Computing using Object Oriented Languages	
	3427 Energy and Climate / 3137 Physical Cosmology	
	3661 Physics of the Earth	
	GEOL3039 Physics of Oceans,Ice Sheets and Climate(1 cu)	

THEORETICAL PHYSICS F340 BSc (3-year) -- (UBSPHYSTPH05)

Programme Structure

YEAR 1	YEAR 2	YEAR 3
1202 Atoms, Stars and The Universe	2246 Mathematical Methods III	3224 Nuclear and Particle Physics
1224 Waves, Optics and Acoustics	2222 Quantum Physics	3225 Solid State Physics
1228 Thermal Physics	2224 Atomic & Molecular Physics	3226 Quantum Mechanics
1240 Practical Skills 1C (Core Physics)	2228 Statistical Thermodynamics	3441 Group Project
1449 Practical Mathematics 1	2201 Electricity and Magnetism	3201 Electromagnetic Theory
1245 Mathematical Methods I	2443 Practical Mathematics II	*Option*
1246 Mathematical Methods II	MATH6202 Mathematics for Physics and Astronomy	*Option*
1247 Classical Mechanics	2423 Mathematical methods for Theoretical Physics	*Option*
1901 Developing Effective Communications 1*	2901 Developing Effective Communications 2*	

All courses are half units, unless otherwise stated.
*Compulsory modules (weighted into final assessment of honours). Refer 1.6.3.

Courses available for option selection

YEAR 3	
3424 Theory of Dynamical Systems	
3443 Lasers and Modern Optics	3137 Physical Cosmology
3427 Energy & Climate	
MATH2301 Fluid Mechanics	
MATH3305 Mathematics for General Relativity	
GEOL3039 Physics of Oceans, Ice Sheets and Climate (1 cu) Term 1 and 2.	
3459 Scientific Computing using Object Oriented Languages	
3400 Project (1 unit)	

THEORETICAL PHYSICS F345 MSci (4-year) -- (UMSPHYSTPH05)

Programme Structure

YEAR 1	YEAR 2	YEAR 3	YEAR 4
1202 Atoms, Stars and The Universe	2246 Mathematical Methods III	3224 Nuclear and Particle Physics	M201 Project (1.5 unit)
1224 Waves, Optics and Acoustics	2222 Quantum Physics	3225 Solid State Physics	
1228 Thermal Physics	2224 Atomic & Molecular Physics	3226 Quantum Mechanics	
1240 Practical Skills 1C (Core Physics)	2228 Statistical Thermodynamics	3441 Group Project	*Option (M level)*
1449 Practical Mathematics 1	2201 Electricity and Magnetism	3201 Electromagnetic Theory	*Option (M level)*
1245 Mathematical Methods I	2443 Practical Mathematics II	*Option*	*Option (M level)*
1246 Mathematical Methods II	MATH6202 Mathematics for Physics and Astronomy	*Option*	*Option*
1247 Classical Mechanics	2423 Mathematical methods for Theoretical Physics	*Option*	*Option*
1901 Developing Effective Communications 1*	2901 Developing Effective Communications 2*		

All courses are half units, unless otherwise stated.
*Compulsory modules (weighted into final assessment of honours). Refer 1.6.3.

Courses available for option selection

YEAR 3		YEAR 4
3424 Theory of Dynamical Systems	3137 Physical Cosmology	*See separate table of options*
3427 Energy & Climate		
3443 Lasers and Modern Optics		*for Year 4. Page 24.*
MATH2301 Fluid Mechanics		
MATH3305 Mathematics for General Relativity		
3459 Scientific Computing using Object Oriented Languages		
GEOL3039 Physics of Oceans, Ice Sheets and Climate (1 cu) Term 1 and 2.		

ASTRONOMY F500 BSc (3-year) -- (UBSASTSING05)

Programme Structure

YEAR 3
3135 The Physics of Stars
3137 Physical Cosmology
3334 Interstellar Physics
3338 Astronomical Spectroscopy
3330 Practical Astronomy 1 - Techniques
3331 Practical Astronomy 2 - Applications OR 3332 Practical Astronomy 3 - Field Trip
Option
Option

All courses are half units, unless otherwise stated
Compulsory modules 1901 & 2901 (weighted into final assessment of honours). Refer to 1.6.3.

Courses available for option selection

YEAR 3
3424 Theory of Dynamical Systems
3224 Nuclear and Particle Physics
3226 Quantum Mechanics
3427 Energy & Climate
3459 Scientific Computing using Object Oriented Languages
3661 Physics of the Earth
3201 Electromagnetic Theory
GEOL3039 Physics of Oceans, Ice Sheets and Climate (1 cu) Term 1 and 2.

ASTRONOMY F502 MSci (4-year) -- (UMSASTING05)

Programme Structure

YEAR 3	YEAR 4
3135 The Physics of Stars	M101 Astrophysics Project (1.5 unit)
3137 Physical Cosmology	
3334 Interstellar Physics	
3338 Astronomical Spectroscopy	*Option (M level)*
3330 Practical Astronomy 1 - Techniques	*Option (M level)*
3331 Practical Astronomy 2 - Applications OR 3332 Practical Astronomy 3 - Field Trip	*Option (M level)*
Option	*Option*
Option	*Option*

All courses are half units, unless otherwise stated.
Compulsory modules 1901 & 2901 (weighted into final assessment of honours). Refer to 1.6.3.

Courses available for option selection

YEAR 3	YEAR 4
3424 Theory of Dynamical Systems	*See*
3224 Nuclear and Particle Physics	*Option table*
3226 Quantum Mechanics	
3427 Energy & Climate	
3459 Scientific Computing using Object Oriented Languages	*For year 4,*
3661 Physics of the Earth	*Page24.*
3201 Electromagnetic Theory	
GEOL3039 Physics of Oceans, Ice Sheets and Climate (1 cu) term 1 and 2.	

ASTROPHYSICS F510 BSc (3-year) -- (UBSASTSPHY05)

Programme Structure

YEAR 1	YEAR 2	YEAR 3
1228 Thermal Physics	2222 Quantum Physics	3338 Astronomical Spectroscopy
1202 Atoms, Stars and The Universe	2112 Astrophysical Processes: Nebulae to Stars	3135 The Physics of Stars
1224 Waves, Optics and Acoustics	2228 Statistical Thermodynamics	3137 Physical Cosmology
1130 Practical Skills 1A (Astronomy)	2117 Physics of the Solar System	3334 Interstellar Physics
1240 Practical Skills 1C (Core Physics)	2246 Mathematical Methods III	3330 Practical Astronomy 1 - Techniques
1245 Mathematical Methods I	2201 Electricity and Magnetism	3331 Practical Astronomy 2 - Applications OR 3332 Practical Astronomy 3 - Field Trip OR 3441 Physics Group Project
1246 Mathematical Methods II	2130 Practical Astrophysics 2A	*Option*
1247 Classical Mechanics	*Option*	*Option*
1901 Developing Effective Communications 1*	2901 Developing Effective Communications 2*	

All courses are half units, unless otherwise stated.
*Compulsory modules (weighted into final assessment of honours). Refer 1.6.3.

Courses available for option selection

YEAR 2	YEAR 3
MATH6202 Mathematics for Physics & Astronomy	GEOL3039 Physics of Oceans, Ice Sheets and Climate (1 cu) Term 1 and 2
08GL064U Astrobiology (evening course taught at Birkbeck)	3201 Electromagnetic Theory
2427 Environmental Physics	3427 Energy & Climate
	3226 Quantum Mechanics
	3424 Theory of Dynamical Systems
	3224 Nuclear and Particle Physics

	3661 Physics of the Earth
	3459 Scientific Computing using Object oriented Languages

ASTROPHYSICS F511 MSci (4-year) -- (UMSASTSPHY05)

Programme Structure

YEAR 1	YEAR 2	YEAR 3	YEAR 4
1228 Thermal Physics	2222 Quantum Physics	3334 Interstellar Physics	M101 Astrophysics Project (1.5 unit)
1202 Atoms, Stars and The Universe	2112 Astrophysical Processes: Nebulae to Stars	3135 The Physics of Stars	
1224 Waves, Optics and Acoustics	2228 Statistical Thermodynamics	3137 Physical Cosmology	
1130 Practical Skills 1A (Astronomy)	2117 Physics of the Solar System	3338 Astronomical Spectroscopy	*Option (M level)*
1240 Practical Skills 1C (Core Physics)	2246 Mathematical Methods III	3330 Practical Astronomy 1 - Techniques OR 3440 Experimental Physics	*Option (M level)*
1245 Mathematical Methods I	2201 Electricity and Magnetism	3331 Practical Astronomy 2 - Applications OR 3332 Practical Astronomy 3 - Field Trip OR 3441 Physics Group Project	*Option (M level)*
1246 Mathematical Methods II	2130 Practical Astrophysics 2A	*Option*	*Option*
1247 Classical Mechanics	*Option*	*Option*	*Option*
1901 Developing Effective Communications 1*	2901 Developing Effective Communications 2*		

All courses are half units, unless otherwise stated.
*Compulsory modules (weighted into final assessment of honours). Refer to 1.6.3.

Courses available for option selection

YEAR 2	YEAR 3	YEAR 4
MATH6202 Mathematics for Physics & Astronomy	GEOL3039 Physics of Oceans, Ice Sheets and Climate (1 cu) Term 1 and 2	*See Separate table of*
08GL064U Astrobiology (evening course taught at Birkbeck)	3424 Theory of Dynamical Systems	
2427 Environmental Physics	3427 Energy & Climate	

	3226 Quantum Mechanics	
	3201 Electromagnetic Theory	
	3224 Nuclear and Particle Physics	
	3661 Physics of the Earth	*Options on Page 24 at year 4 level*
	3459 Scientific Computing using Object oriented Languages	

MATHEMATICS AND PHYSICS GF13 BSc (3-year).

Programme Structure

YEAR 1	YEAR 2	YEAR 3
1202 Atoms, Stars and The Universe	2222 Quantum Physics	3224 Nuclear and Particle Physics
1224 Waves, Optics and Acoustics	2224 Atomic & Molecular Physics	3225 Solid State Physics
1228 Thermal Physics	2228 Statistical Thermodynamics	3226 Quantum Mechanics
1247 Classical Mechanics	2201 Electricity and Magnetism	3201 Electromagnetic Theory
MATH1101 Analysis 1	MATH2101 Analysis 3: Complex Analysis	MATH2301 Fluid Mechanics
MATH1401 Mathematical Methods 1	MATH2401 Mathematical Methods 3	*Option*
MATH1402 Mathematical Methods II	*Option*	*Option*
MATH1203 Algebra for Joint Honours	*Option*	*Option*

All courses are half units, unless otherwise stated.
It will be necessary for 1st year to attend the 5-6 lectures on Special Relativity in PHAS1246.

Courses available for option selection

YEAR 2	YEAR 3
MATH7302 Analytic Dynamics	2112 Astrophysical Processes: Nebulae to Stars
MATH7402 Mathematical Methods 4	2427 Environmental Physics
MATH7501 Probability and Statistics	3427 Energy & Climate
	3661 Physics of the Earth
	MATH2201 Algebra 3: Further Linear Algebra
	3459 Scientific Computing using Object oriented Languages
	Other Mathematics options are possible. See Maths dept list.

MATHEMATICS AND PHYSICS GF1H MSci (4-year).

Programme Structure

YEAR 1	YEAR 2	YEAR 3	YEAR 4
1202 Atoms, Stars and The Universe	2222 Quantum Physics	3224 Nuclear and Particle Physics	M201 Physics Project (1.5 unit) OR MATH4901 Maths Project (1 unit) plus an *Option*
1224 Waves, Optics and Acoustics	2224 Atomic & Molecular Physics	3225 Solid State Physics	
1228 Thermal Physics	2228 Statistical Thermodynamics	3226 Quantum Mechanics	
1247 Classical Mechanics	2201 Electricity and Magnetism	MATH2201 Algebra 3: Further Linear Algebra	*Option (Physics)*
MATH1101 Analysis 1	MATH2101 Analysis 3: Complex Analysis	3201 Electromagnetic Theory	*Option (Physics)*
MATH1401 Mathematical Methods 1	MATH2401 Mathematical Methods 3	MATH2301 Fluid Mechanics	*Option (Maths)*
MATH1402 Mathematical Methods 2	*Option*	*Option*	*Option (Maths)*
MATH1203 Algebra for Joint Honours	*Option*	*Option*	*Option (either)*

All courses are half units, unless otherwise stated.
It will be necessary for 1st year to attend the 5-6 lectures on Special Relativity in PHAS1246.

Courses available for option selection

YEAR 2	YEAR 3	YEAR 4
MATH7302 Analytical Dynamics	2112 Astrophysical Processes: Nebulae to Stars	*See Separate table of Options on Page 24 for 1 cu of Physics to be taken at year 4 level.*
MATH7402 Mathematical Methods 4	2427 Environmental Physics	
	3427 Energy & Climate	
MATH7501 Probability and Statistics	3661 Physics of the Earth	
	3459 Scientific Computing using Object oriented Languages	
	Mathematics Options	

MAIN COURSE OPTIONS FOR ALL 4TH YEAR MSci DEGREES

(Read the notes below the table pertaining to possible choices of courses depending on degree programme.)
Masters level UCL undergraduate courses are labeled with an 'M' as the 5th character.
All courses are half units. They have a pass mark of 50%.

UCL Mainly astronomy-related	**UCL Mainly physics-related**	**UCL Mainly medical physics**
3334 Interstellar Physics	M426 Advanced Quantum Theory (was 4426 or 4226)	MPHYM886 Optics in Medicine
M312 Planetary Atmospheres	M421 Atom and Photon Physics	MPHYM890 Medical Imaging with Ionising Radiation
M314 Solar Physics	M431 Molecular Physics	MPHYM891 Medical Imaging with Non-Ionising Radiation
M315 High Energy Astrophysics	M442 Particle Physics	MPHYM892 Treatment using Ionising Radiation
M336 Advanced Physical Cosmology	M427 Quantum Computation and Communication	MPHYM012 Physiological Monitoring
M319 Formation and Evolution of Stellar Systems	M465 Space Plasma and Magnetospheric Physics	MPHYM013 Medical Electronics
MATH3305 Mathematics for General Relativity	M472 Order and Excitations in Condensed Matter	**UCL Mainly maths- related**
MATHM306 Cosmology	M800 Molecular Biophysics	MATHM302 Boundary layers
	3661 Physics of the Earth	MATHM303 Gas Dynamics
	3443 Lasers and Modern optics	
	3447 Materials and Nanomaterials	
	3226 Quantum Mechanics	
	3424 Theory of Dynamical Systems	

See Section 3 of this booklet, page 28, for a list of Intercollegiate courses available.

ALL STUDENTS MUST TAKE & PASS 3 or MORE MASTER LEVEL LECTURE COURSE TO BE GRANTED AN MSci DEGREE AND ALSO PASS THE MASTER LEVEL PROJECT.

Physics students normally take the majority of options from the physics-related courses.
Theoretical Physics students normally take the majority of options from the physics-related courses.

Astronomy students normally take the majority of options from the astronomy-related courses.

Astrophysics students take at least 3 options from the astronomy-related courses.

Mathematics and Physics students normally take about half their options from the physics-related courses and half from the options offered by the Mathematics Department.

SECTION 3

4TH YEAR INTERCOLLEGIATE MSci COURSES

FOURTH YEAR INTERCOLLEGIATE MSci COURSES.

N.B. For full details, content etc., please refer to the MSci Handbook on the web.
http://personal.rhul.ac.uk/UHAP/027/MSci/Files/handbook.pdf
This list indicates some taught courses of the fourth year of the Intercollegiate MSci degree programmes available to UCL students. Any courses not listed here will need the approval of the Programme Tutors at UCL. Dr Furniss of Dr Zochowski.
Each course has a code number used by the Intercollegiate MSci board, shown at the left hand side. Colleges use local codes for the courses they teach. The *number* is usually the same as the MSci number, but some are different so beware! Local course codes are shown at the right hand side. All courses are a half course unit (in QMUL language, they are a full course unit). The list shows the course title and the term in which it is taught. Also indicated is the course teacher and the College supplying the course.

MSci No.	Title	Term	Lecturer	College	Local No.
4201	Math methods for Theoretical Physics	1	Prof S. Sarkar	KCL	7CCP4201
4205	Lie Groups and Lie Algebras	1	Dr I Runkel	KCL+	7CMMS01
4211	Statistical Mechanics	2	Prof. B. Cowan	RHUL%	PHS4211
4226	Advanced Quantum Theory	1	Dr D Brown	UCL	PHASM426
4242	Relativistic waves and Quantum Fields	1	Dr. R Russo	QMUL	PHY899
?	Advanced Quantum Field Theory	2	Dr A Brandhuber	QMUL	?
4261	Electromagnetic Theory	1	Dr. S Thomas	QMUL	PHY966
4319	Formation & Evolution of Stellar Systems	1	? T B A	UCL	PHASM319
4421	Atom and Photon Physics	1	Dr C Faria	UCL	PHASM421
4427	Quantum Computation and Communication	2	Dr. S. Bose	UCL	PHASM427
4431	Molecular Physics	2	Prof A Shluger	UCL	PHASM431
4442	Particle Physics	1	Prof. M. Lancaster	UCL	PHASM442
4450	Particle Accelerator Physics	2	Dr P. Karataev	RHUL	PH4450
4472	Order & Excitations in Condensed Matter	2	Prof. D. McMorrow	UCL	PHASM472
?	Advanced Cosmology	?	? T B A	KCL	7CCP4600
4475	Physics at the Nanoscale	1	Prof. V. Petrashov	RHUL	PH4475
4478	Superfluids, Superconductors & Condensates.	1	Prof. J. Saunders	RHUL	PH4478
4501	Standard Model Physics & beyond	2	Prof Mavromatos	KCL	7CCP4500
4512	Nuclear Magnetic Resonance	2	Prof. B. Cowan	RHUL*	PH4512
4515	Computing and statistical data analysis	1	Dr G. Cowan	RHUL	PH4515
4534	String Theory and Branes	2	Dr N Lambert	KCL+	7CMMS34
4541	Supersymmetry & Gauge Symmetry	2	Dr N Lambert	KCL+	7CMMS41
4630	Planetary Atmospheres	2	Dr I. Mason	UCL	PHASM312
4640	Solar Physics	2	Dr I. Philips & Dr L. M van Driel-Gesztelyi	UCL	PHASM314
4650	Solar System	1$	Prof C Murray	QMUL‡	MAS423
4660	The Galaxy	2	Dr W Sutherland	QMUL‡	MAS430
4680	Space Plasma & Magnetospheric Physics	2	Dr A. Coates & Dr C. Owen	UCL	PHASM465
4690	Extra-solar planets & astrophysical discs	2$	Prof R Nelson	QMUL	MTH735U
?	Environmental Remote Sensing	?	? T B A	KCL	7SSG5029
4800	Molecular Biophysics	2	Dr B Hoogenboom	UCL	PHASM800
4820	Equilibrium Analysis of complex systems	1	Dr Reimer Kuehn	KCL+	7CCMCS03
4830	Dynamical Analysis of Complex systems	2	Dr Alessia Annibale	KCL+	7CCMCS04
4840	Mathematical Biology	2	Dr Eytan Katzav	KCL+	7CCMCS05

Students will undertake project-related courses in accordance with practice at their own colleges.

‡ Taught by the Mathematics Department of QMUL.
$ These QMUL courses are taught in the evenings.
* Courses taught at RHUL in Egham. Also available over VideoCon at QMUL
+ Taught by the Mathematics Department of KCL
% Course taught over Video-Con network – sites at UCL, QMUL and RHUL.

Portico College Prefixes, KCL=10PI, QMUL=13PI, RHUL=47PI