ROYAL HOLLOWAY
University of London

PROGRAMME SPECIFICATION

This document describes **MSci Honours Degree programmes in Physics**. For Combined and Joint Honours Degree programmes, please also refer to the equivalent document(s) for the other subject(s). This specification is valid for entrants from **September 2013**.

The aims of all Honours MSci Degree programmes in Physics are:

- to impart an advanced knowledge of the fundamental elements of Physics and a critical awareness of current problems in the discipline;
- to develop a high level of competence in the use of appropriate techniques in physics and mathematics;
- to develop the skills and knowledge required for experimentation and/or theoretical modelling at postgraduate level;
- to promote oral and written communication skills to a professional level;
- to teach the effective use of information technology and computing facilities for the treatment and presentation of complex experimental data;
- to provide a critical awareness of safety procedures and environmental issues;
- to develop critical problem solving abilities to a professional level;
- to provide a strong foundation for postgraduate research in the physical sciences, for advanced entry into a wide range of both scientific and non-vocational careers, and for continuing professional development.

Programmes are delivered in four stages, each of which comprises one year of full-time study during which the student must follow courses to the value of four units (one unit is roughly equivalent to 30 national credits). For some programmes there is the option of part-time study. In that case a stage may be spread over two years of study; in each part-time year the student will follow courses to the value of two units. The curriculum is characterised by strong progression and opportunities for specialisation throughout the programme. Stages one and two provide a foundation for the later stages through a compulsory spine of courses that complete a core, discipline-specific, knowledge base. Stages three and four offer a wide range of optional courses with the latter being taught on an intercollegiate basis by members of the University of London Physics MSci consortium.
Specifically, stage one gives a balanced foundation for progression, offers opportunities for students to select and move between degree programmes according to their interests and provides a foundation which serves students from a wide variety of educational backgrounds. The stage one curriculum aims:

1. to extend and develop classical physics covered at A-level, to bring students to a common level and to set their knowledge into an appropriate context;
2. to develop modern physics and establish it on a firm foundation, enabling students to experience the flavour of modern physics, without excessive technical detail;
3. to extend and develop the mathematics covered at A-level;
4. to start the programme of discipline-specific and transferable skills.

Stage two builds on this and applies the skills and knowledge acquired to specific subjects. The available courses complete the essential physics core consisting of classical and modern physics, emphasising Electromagnetism, Quantum Mechanics, and Classical and Statistical Thermodynamics. Skills are further developed and Physics specialists take courses in Mathematical Methods, Solid State Physics, Optics, and Atomic and Nuclear Physics. Other courses are available for the other programmes. In stage three, students take a number of advanced courses including options depending on their degree programme and personal interests. Students take Scientific Skills for MSci, PH3010, designed to provide a transition between the straightforward experiments of the stage two and the comprehensive and open-ended project work, which is a major component of stage four. In stage four all Royal Holloway students take the Research Review, PH4110 and the Major Project, PH4100, as well as the optional courses taught by the intercollegiate consortium. Much of the study undertaken in stage four is at, or informed by, the forefront of Physics. Students will have shown originality in the application of knowledge and will understand how this knowledge is advanced by research. They will deal with complex issues both systematically and creatively and show originality in tackling and solving problems. Many third and fourth year courses closely reflect the research interests of members of staff, who are active specialists in their fields.

Further information

This document provides a summary of the main features of the programme(s), and of the outcomes which a student might reasonably be expected to achieve if full advantage is taken of the learning opportunities provided. Further information is contained in the College prospectus, the College Regulations and in various handbooks issued to students upon arrival. Whilst Royal Holloway keeps all its information for prospective applicants and students under review, programmes and the availability of individual courses are necessarily subject to change at any time, and prospective applicants are therefore advised to seek confirmation of any factors which might affect their decision to follow a specific programme. In turn, Royal Holloway will inform applicants and students as soon as is practicable of any substantial changes which might affect their studies.

Learning outcomes

Teaching and learning in the programmes are closely informed by the active research of staff. In general terms, the programmes provide opportunities for students to develop and demonstrate the following learning outcomes:

Knowledge and understanding

- a systematic knowledge of current understanding of the inanimate physical universe and critical awareness of current problems in the discipline to a level appropriate to a Master's degree;
- a critical understanding of the fundamental concepts of Physics and how these may be applied to evaluate current research and advanced scholarship in the discipline;
- a detailed understanding of the quantum and continuum descriptions of natural phenomena;
- an understanding of the microscopic and macroscopic structure of all the states (phases) of matter and their interactions with different forms of energy;
- a comprehensive understanding of fundamental physical laws and principles, along with their application to more diverse areas of Physics, including those at the forefront of the discipline;
- a comprehensive understanding of the experimental and/or theoretical and computational techniques and diagnostic tools appropriate to the particular field of endeavour and an awareness of such techniques in other fields;
- a critical approach to the gathering, collating, analysis and reporting of experimental data based on an understanding of errors and the limits of measurement;
- an understanding of the significance of error analysis and the relationship between theory and experiment.

Skills and other attributes

The programme is designed to allow students to acquire competence in the ability to:

- use appropriate mathematical and/or computational tools to formulate and tackle complex problems in physics and to model physical behaviour and thus compare critically the results of calculations with those from experimental observation;
- use appropriate methods to analyse data and to evaluate the level of its uncertainty and to relate any conclusions to current theories of the physics involved;
- formulate problems in precise terms, including translating them into mathematical statements (and vice versa) and making sensible assumptions and exercising a degree of originality in tackling them. To obtain order-of-magnitude or exact numerical solutions as appropriate;
- plan and execute an extended open-ended investigation, to analyse critically the data and to relate any conclusions to current theories of the physics involved;
- communicate complex scientific ideas and the conclusions of an experiment, investigation or project concisely, accurately and informatively, both orally and in writing;*

- employ IT skills which show fluency at the level and range needed for project work; for example a familiarity with a programming language or simulation software, and the use of mathematical packages for manipulation and numerical solution of equations;*
- employ experimental skills showing the selection of appropriate pieces of equipment and competent use of it, and the ability to master new techniques and equipment rapidly (experimental-based programmes only);
- read critically demanding textbooks, and research literature, search databases and listen carefully and interact with colleagues to extract important information. Make use of appropriate IT packages/systems for the analysis of this data;*
- manipulate numerical data, and present and interpret information graphically;*
- make sound judgements in the absence of complete data;*
- analyse complex information, manipulating precise and intricate ideas to construct logical arguments and then presenting them in a clear and concise manner to both specialist and non-specialist audiences.*

* transferable skills

In addition, the programmes foster the development of a range of personal attributes that are important in the world of work, and that strengthen our graduates' abilities to engage in lifelong learning and contribute to the wider community. These include: personal motivation and initiative; the ability to work autonomously and with others; the ability to meet deadlines; listening skills; the ability to interact constructively with other people; self-awareness and self-management; empathy and insight; intellectual integrity; awareness of responsibility as a local, national and international citizen; the independent learning ability required for continuing professional development; flexibility and adaptability; creativity and originality; the ability to make decisions in complex and unpredictable situations.

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Teaching, learning and assessment

Teaching is mostly by means of lectures, seminars, laboratory practical classes and problem-solving sessions; the latter generally providing a forum for students, with the support of their instructors, to work through problem sets and applications in a smaller and more interactive setting. Learning is through participation in lectures and seminars, designated reading, completion of problem sets and guided independent study and research. All students are expected to meet basic standards in information technology, for which training is provided by the College Computer Centre. Assessment of knowledge and understanding is mainly by formal, unseen written examination; coursework exercises, laboratory reports, oral and poster presentations and a Project dissertation are also assessed. A detailed mapping of the ways in which particular courses and modules achieve the programmes' learning outcomes may be found in the Department of Physics Student Handbook and the Physics MSci Student Handbook.

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Details of the programme structure(s)

Please note that the list of available courses offered is subject to change. Definitive current information is provided in the Department of Physics Student Handbook. A summary is provided in the tables below. The entries indicate:

Comp - compulsory courses must be passed in order to progress to the next stage;
Core - core courses must be taken at the designated stage of the programme;
Option - option courses may be chosen, with guidance, by students.

Single Honours MSci Degree programmes

Students take the following courses:			F303 Physics	F321 Theoretical Physics	F510 Astrophysics	F372 Physics with Particle Physics	F313 Experimental Physics
Stage 1							
Mathematics for scientists 1	PH1110	1/2 unit	comp	comp	comp	comp	comp
Mathematics for scientists 2	PH1120	1/2 unit	comp	comp	comp	comp	comp
Scientific skills 1	PH1140	1/2 unit	core	core	core	core	core
Scientific skills 2	PH1150	1/2 unit	core	core	core	core	core
Mechanics and Relativity	PH1320	1/2 unit	core	core	core	core	core
Fields and Waves	PH1420	1/2 unit	core	core	core	core	core
Classical Matter	PH1620	1/2 unit	core	core	core	core	core
Physics of the Universe	PH1920	1/2 unit	core	core	core	core	core
Stage 2							
Mathematical methods	PH2130	1/2 unit	comp	comp	comp	comp	comp
Scientific computing skills	PH2150	1/2 unit	core	core	core	core	core
Quantum mechanics	PH2210	1/2 unit	comp	comp	comp	comp	comp
Optics	PH2310	1/2 unit	core	core	core		core
Electromagnetism	PH2420	1/2 unit	core	core	core	core	core
Atomic and Nuclear Physics	PH2510	1/2 unit	core	core	core	core	core
Particle Detectors and Accelerators	PH2520	1/2 unit				core	
Classical and Statistical Thermodynamics	PH2610	1/2 unit	core	core	core	core	core
The Solid State	PH2710	1/2 unit	core	core		core	core
Astronomy	PH2900	1/2 unit			core		
plus Physics options	x 1/2 unit		0	0	0	0	0
Stage 3							
Scientific Skills for MSci	PH3010	1/2 unit	core	core	core	core	core
Energy	PH3040	1/2 unit	option	option	option	option	option
Further Mathematical Methods	PH3150	1/2 unit	option	core	option	option	option
Nonlinear Systems and Chaos	PH3160	1/2 unit	option	option		option	option
C++ and Object Oriented Programming	PH3170	1/2 unit	option	option	option	option	option
Experimental Design	PH3180	1/2 unit	option	option	option	option	option
Quantum Theory	PH3210	1/2 unit	core	core	core	core	core
Particle Physics	PH3520	1/2 unit	option	option	core	core	option
Semiconductors and Superconductors	PH3710	1/2 unit	option	option		option	core
Modern Topics in Condensed Matter	PH3730	1/2 unit	option	option		option	core
Frontiers of Metrology	PH3810	1/2 unit	option	option		option	core
General Relativity and Cosmology	PH3910	1/2 unit	option	core	core	option	
Stellar Astrophysics	PH3920	1/2 unit	option	option	core	option	option
Particle Astrophysics	PH3930	1/2 unit	option	option	core	core	option
Planetary Geology and Geophysics	GL3510	1/2 unit	option	option	option	option	option
Optics	PH2310	1/2 unit				core	
Particle Detectors and Accelerators	PH2520	1/2 unit	option	option			
The Solid State	PH2710	1/2 unit			core		
Astronomy	PH2900	1/2 unit	option	option		option	
Physics options	x 1/2 unit		6	4	1	3	3
In choosing options you may take no more than a total of 2 level-2 courses in the third year.							

Options taken in the second year may not be taken again in the third year.							
Stage 4							
Major Project	PH4100	1 unit	comp	comp	comp	comp	comp
Research Review	PH4110	1/2 unit	core	core	core	core	core
Math Methods for Theoretical Physics	PH4201	1/2 unit	option	option	option	option	option
Lie Groups and Lie Algebras	PH4205	1/2 unit	option	option	option	option	option
Statistical Mechanics	PH4211	1/2 unit	option	option	option	option	option
Phase Transitions	PH4215	1/2 unit	option	option	option	option	option
Advanced Quantum Theory	PH4226	1/2 unit	option	option	option	option	option
Relativistic Waves & Quantum Fields	PH4242	1/2 unit	option	option	option	option	option
Advanced Quantum Field Theory	PH4245	1/2 unit	option	option	option	option	option
Electromagnetic Theory	PH4261	1/2 unit	option	option	option	option	option
Formation and Evolution of Stellar Clusters	PH4319	1/2 unit	option	option	option	option	option
Atom and Photon Physics	PH4421	1/2 unit	option	option	option	option	option
Advanced Photonics	PH4425	1/2 unit	option	option	option	option	option
Quantum Computation and Communication	PH4427	1/2 unit	option	option	option	option	option
Molecular Physics	PH4431	1/2 unit	option	option	option	option	option
Particle Physics	PH4442	1/2 unit	option	option	option	option	option
Particle Accelerator Physics	PH4450	1/2 unit	option	option	option	option	option
Order and Excitations in Condensed Matter	PH4472	1/2 unit	option	option	option	option	option
Theoretical Treatments of Nano-systems	PH4473	1/2 unit	option	option	option	option	option
Physics at the Nanoscale	PH4475	1/2 unit	option	option	option	option	option
Electronic Structure Methods	PH4476	1/2 unit	option	option	option	option	option
Superfluids, Condensates & Superconductors	PH4478	1/2 unit	option	option	option	option	option
Standard Model Physics and Beyond	PH4501	1/2 unit	option	option	option	option	option
Nuclear Magnetic Resonance	PH4512	1/2 unit	option	option	option	option	option
Computing and Statistical Data Analysis	PH4515	1/2 unit	option	option	option	option	option
String Theory and Branes	PH4534	1/2 unit	option	option	option	option	option
Supersymmetry & Gauge Symmetry	PH4541	1/2 unit	option	option	option	option	option
Stellar Structure and Evolution	PH4600	1/2 unit	option	option	option	option	option
Advanced Cosmology	PH4601	1/2 unit	option	option	option	option	option
Relativity and Gravitation	PH4602	1/2 unit	option	option	option	option	option
General Relativity and Cosmology	PH4604	1/2 unit	option	option	option	option	option
Astroparticle Cosmology	PH4605	1/2 unit	option	option	option	option	option
Planetary Atmospheres	PH4630	1/2 unit	option	option	option	option	option
Solar Physics	PH4640	1/2 unit	option	option	option	option	option
Solar System	PH4650	1/2 unit	option	option	option	option	option
The Galaxy	PH4660	1/2 unit	option	option	option	option	option
Astrophysical Plasmas	PH4670	1/2 unit	option	option	option	option	option
Space Plasma and Magnetospheric Physics	PH4680	1/2 unit	option	option	option	option	option
Extrasolar Planets & Astrophysical Discs	PH4690	1/2 unit	option	option	option	option	option
Environmental Remote Sensing	PH4702	1/2 unit	option	option	option	option	option
Molecular Biophysics	PH4800	1/2 unit	option	option	option	option	option
Theory of Complex Networks	PH4810	1/2 unit	option	option	option	option	option
Equilibrium Analysis of Complex Systems	PH4820	1/2 unit	option	option	option	option	option
Dynamical Analysis of Complex Systems	PH4830	1/2 unit	option	option	option	option	option
Mathematical Biology	PH4840	1/2 unit	option	option	option	option	option
Elements of Statistical Learning	PH4850	1/2 unit	option	option	option	option	option
Physics options	x 1/2 unit		5	5	5	5	5

When choosing option courses you must be sure to satisfy any prerequisites.							

Joint Honours Degree programmes with Physics as an equal element

Students take the following courses:			**GFC3 Mathematics and Physics**
Stage 1			
Scientific skills 1	PH1140	1/2 unit	core
Mechanics and Relativity	PH1320	1/2 unit	core
Classical Matter	PH1620	1/2 unit	core
Physics of the Universe	PH1920	1/2 unit	core
Stage 2			
Scientific computing skills	PH2150	1/2 unit	core
Quantum Theory	PH2210	1/2 unit	core
Classical and Statistical Thermodynamics	PH2610	1/2 unit	core
The Solid State	PH2710	1/2 unit	core
Stage 3			
Scientific Skills for MSci	PH3010	1/2 unit	core
Nonlinear Systems and Chaos	PH3160	1/2 unit	core$
Electromagnetic Theory	PH3420	1/2 unit	core*
Optics	PH2310	1/2 unit	core
Atomic & Nuclear Physics	PH2510	1/2 unit	core
$ PH3160 is the same as MT3280 so it may be counted as a Physics or a Maths module			
* PH3420 is the same as MT3240 so it may be counted as a Physics or a Maths module			
Stage 4			
Major Project	PH4100	1 unit	opt %
Research Review	PH4110	1/2 unit	core
Math Methods for Theoretical Physics	PH4201	1/2 unit	option
Lie Groups and Lie Algebras	PH4205	1/2 unit	option
Statistical Mechanics	PH4211	1/2 unit	option
Phase Transitions	PH4215	1/2 unit	option
Advanced Quantum Theory	PH4226	1/2 unit	option
Relativistic Waves & Quantum Fields	PH4242	1/2 unit	option
Advanced Quantum Field Theory	PH4245	1/2 unit	option
Electromagnetic Theory	PH4261	1/2 unit	option
Formation and Evolution of Stellar Clusters	PH4319	1/2 unit	option
Atom and Photon Physics	PH4421	1/2 unit	option
Advanced Photonics	PH4425	1/2 unit	option
Quantum Computation and Communication	PH4427	1/2 unit	option
Molecular Physics	PH4431	1/2 unit	option
Particle Physics	PH4442	1/2 unit	option
Particle Accelerator Physics	PH4450	1/2 unit	option
Order and Excitations in Condensed Matter	PH4472	1/2 unit	option

Theoretical Treatments of Nano-systems	PH4473	1/2 unit	option
Physics at the Nanoscale	PH4475	1/2 unit	option
Electronic Structure Methods	PH4476	1/2 unit	option
Superfluids, Condensates &Superconductors	PH4478	1/2 unit	option
Standard Model Physics and Beyond	PH4501	1/2 unit	option
Nuclear Magnetic Resonance	PH4512	1/2 unit	option
Computing and Statistical Data Analysis	PH4515	1/2 unit	option
String Theory and Branes	PH4534	1/2 unit	option
Supersymmetry & Gauge Symmetry	PH4541	1/2 unit	option
Stellar Structure and Evolution	PH4600	1/2 unit	option
Advanced Cosmology	PH4601	1/2 unit	option
Relativity and Gravitation	PH4602	1/2 unit	option
General Relativity and Cosmology	PH4604	1/2 unit	option
Astroparticle Cosmology	PH4605	1/2 unit	option
Planetary Atmospheres	PH4630	1/2 unit	option
Solar Physics	PH4640	1/2 unit	option
Solar System	PH4650	1/2 unit	option
The Galaxy	PH4660	1/2 unit	option
Astrophysical Plasmas	PH4670	1/2 unit	option
Space Plasma and Magnetospheric Physics	PH4680	1/2 unit	option
Extrasolar Planets & Astrophysical Discs	PH4690	1/2 unit	option
Environmental Remote Sensing	PH4702	1/2 unit	option
Molecular Biophysics	PH4800	1/2 unit	option
Theory of Complex Networks	PH4810	1/2 unit	option
Equilibrium Analysis of Complex Systems	PH4820	1/2 unit	option
Dynamical Analysis of Complex Systems	PH4830	1/2 unit	option
Mathematical Biology	PH4840	1/2 unit	option
Elements of Statistical Learning	PH4850	1/2 unit	option
Physics options	x 1/2 unit		5
% Students must take either PH4100 or MT4000			
When choosing option courses you must be sure to satisfy any prerequisites.			

Single Honours MSci Degree programmes
Part-time

Students take the following courses:			F303 Physics	F321 Theoretical Physics	F510 Astrophysics	F372 Physics with Particle Physics	F313 Experimental Physics
Stage 1a							
Mathematics for scientists 1	PH1110	1/2 unit	comp	comp	comp	comp	comp
Mathematics for scientists 2	PH1120	1/2 unit	comp	comp	comp	comp	comp
Mechanics and Relativity	PH1320	1/2 unit	core	core	core	core	core
Physics of the Universe	PH1920	1/2 unit	core	core	core	core	core
Stage 1a							
Scientific skills 1	PH1140	1/2 unit	core	core	core	core	core
Scientific skills 2	PH1150	1/2 unit	core	core	core	core	core
Fields and Waves	PH1420	1/2 unit	core	core	core	core	core
Classical Matter	PH1620	1/2 unit	core	core	core	core	core
Stage 2a							

Mathematical methods	PH2130	1/2 unit	comp	comp	comp	comp	comp
Quantum mechanics	PH2210	1/2 unit	comp	comp	comp	comp	comp
Atomic and Nuclear Physics	PH2510	1/2 unit	core	core	core	core	core
Classical and Statistical Thermodynamics	PH2610	1/2 unit	core	core	core	core	core
Physics options	x 1/2 unit		0	0	0	0	0
Stage 2b							
Scientific computing skills	PH2150	1/2 unit	core	core	core	core	core
Optics	PH2310	1/2 unit	core	core	core		core
Electromagnetism	PH2420	1/2 unit	core	core	core	core	core
Particle Detectors and Accelerators	PH2520	1/2 unit				core	
The Solid State	PH2710	1/2 unit	core	core		core	core
Astronomy	PH2900	1/2 unit			core		
Stages 3a and 3b							
Scientific Skills for MSci	PH3010	1/2 unit	core	core	core	core	core
Energy	PH3040	1/2 unit	option	option	option	option	option
Further Mathematical Methods	PH3150	1/2 unit	option	core	option	option	option
Nonlinear Systems and Chaos	PH3160	1/2 unit	option	option		option	option
C++ and Object Oriented Programming	PH3170	1/2 unit	option	option	option	option	option
Experimental Design	PH3180	1/2 unit	option	option	option	option	option
Quantum Theory	PH3210	1/2 unit	core	core	core	core	core
Particle Physics	PH3520	1/2 unit	option	option	core	core	option
Semiconductors and Superconductors	PH3710	1/2 unit	option	option		option	core
Modern Topics in Condensed Matter	PH3730	1/2 unit	option	option		option	core
Frontiers of Metrology	PH3810	1/2 unit	option	option		option	core
General Relativity and Cosmology	PH3910	1/2 unit	option	core	core	option	
Stellar Astrophysics	PH3920	1/2 unit	option	option	core	option	option
Particle Astrophysics	PH3930	1/2 unit	option	option	core	core	option
Planetary Geology and Geophysics	GL3510	1/2 unit	option	option	option	option	option
Optics	PH2310	1/2 unit				core	
Particle Detectors and Accelerators	PH2520	1/2 unit	option	option			
The Solid State	PH2710	1/2 unit			core		
Astronomy	PH2900	1/2 unit	option	option		option	
Physics options	x 1/2 unit		6	4	1	3	3
In choosing options you may take no more than a total of 2 level-2 courses in the third year.							
Options taken in the second year may not be taken again in the third year.							
Stages 4a and 4b							
Major Project	PH4100	1 unit	comp	comp	comp	comp	comp
Research Review	PH4110	1/2 unit	core	core	core	core	core
Math Methods for Theoretical Physics	PH4201	1/2 unit	option	option	option	option	option
Lie Groups and Lie Algebras	PH4205	1/2 unit	option	option	option	option	option
Statistical Mechanics	PH4211	1/2 unit	option	option	option	option	option
Phase Transitions	PH4215	1/2 unit	option	option	option	option	option
Advanced Quantum Theory	PH4226	1/2 unit	option	option	option	option	option
Relativistic Waves & Quantum Fields	PH4242	1/2 unit	option	option	option	option	option
Advanced Quantum Field Theory	PH4245	1/2 unit	option	option	option	option	option
Electromagnetic Theory	PH4261	1/2 unit	option	option	option	option	option
Formation and Evolution of Stellar Clusters	PH4319	1/2 unit	option	option	option	option	option
Atom and Photon Physics	PH4421	1/2 unit	option	option	option	option	option
Advanced Photonics	PH4425	1/2 unit	option	option	option	option	option
Quantum Computation and Communication	PH4427	1/2 unit	option	option	option	option	option
Molecular Physics	PH4431	1/2 unit	option	option	option	option	option

Particle Physics	PH4442	1/2 unit	option	option	option	option	option
Particle Accelerator Physics	PH4450	1/2 unit	option	option	option	option	option
Order and Excitations in Condensed Matter	PH4472	1/2 unit	option	option	option	option	option
Theoretical Treatments of Nano-systems	PH4473	1/2 unit	option	option	option	option	option
Physics at the Nanoscale	PH4475	1/2 unit	option	option	option	option	option
Electronic Structure Methods	PH4476	1/2 unit	option	option	option	option	option
Superfluids, Condensates & Superconductors	PH4478	1/2 unit	option	option	option	option	option
Standard Model Physics and Beyond	PH4501	1/2 unit	option	option	option	option	option
Nuclear Magnetic Resonance	PH4512	1/2 unit	option	option	option	option	option
Computing and Statistical Data Analysis	PH4515	1/2 unit	option	option	option	option	option
String Theory and Branes	PH4534	1/2 unit	option	option	option	option	option
Supersymmetry & Gauge Symmetry	PH4541	1/2 unit	option	option	option	option	option
Stellar Structure and Evolution	PH4600	1/2 unit	option	option	option	option	option
Advanced Cosmology	PH4601	1/2 unit	option	option	option	option	option
Relativity and Gravitation	PH4602	1/2 unit	option	option	option	option	option
General Relativity and Cosmology	PH4604	1/2 unit	option	option	option	option	option
Astroparticle Cosmology	PH4605	1/2 unit	option	option	option	option	option
Planetary Atmospheres	PH4630	1/2 unit	option	option	option	option	option
Solar Physics	PH4640	1/2 unit	option	option	option	option	option
Solar System	PH4650	1/2 unit	option	option	option	option	option
The Galaxy	PH4660	1/2 unit	option	option	option	option	option
Astrophysical Plasmas	PH4670	1/2 unit	option	option	option	option	option
Space Plasma and Magnetospheric Physics	PH4680	1/2 unit	option	option	option	option	option
Extrasolar Planets & Astrophysical Discs	PH4690	1/2 unit	option	option	option	option	option
Environmental Remote Sensing	PH4702	1/2 unit	option	option	option	option	option
Molecular Biophysics	PH4800	1/2 unit	option	option	option	option	option
Theory of Complex Networks	PH4810	1/2 unit	option	option	option	option	option
Equilibrium Analysis of Complex Systems	PH4820	1/2 unit	option	option	option	option	option
Dynamical Analysis of Complex Systems	PH4830	1/2 unit	option	option	option	option	option
Mathematical Biology	PH4840	1/2 unit	option	option	option	option	option
Elements of Statistical Learning	PH4850	1/2 unit	option	option	option	option	option
Physics options	x 1/2 unit		5	5	5	5	5
When choosing option courses you must be sure to satisfy any prerequisites.							

In Stages 3 and 4 students may choose, with advice, which courses they take in which years. This is largely a matter of personal choice, although a balance of courses between the first and second terms must be ensured. The topic of the Major Project PH4100 will be related to the specific degree programme.

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Progression and award requirements

The progression and award requirements are essentially the same across all Honours Degree programmes at Royal Holloway. Students must pass units to the value of at least three units on each stage of the programme. In the Physics department students must pass PH1110 Mathematics for Scientists 1 and PH1120 Mathematics for Scientists 2 in order to progress. On some programmes there may be a requirement to pass specific courses in order to progress to the next stage, or to qualify for a particular degree title. In particular students must pass PH2130 Mathematical Methods and PH2210 Quantum Mechanics and at least four other half course units at the first attempt in order to progress to Stage 3 of the MSci. At the end of Stage 2 students must achieve an average of at least 50% in order to proceed to Stage 3. At the end of Stage 3 students must achieve a weighted average of at least 55% in order to proceed to Stage 4. Students are considered for the award and classified on the basis of a weighted average. This is calculated from marks gained in courses taken in stages two, three and four, and gives twice the weighting to marks gained in stages three and four. In order to qualify for the award, students must pass courses to the value of at least twelve units, three of which must be taken in stage four and at

least one of which must have been taken in respect of project work, and also gain a weighted average of at least 35%.

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Student support and guidance

- Personal Tutors: All students are allocated a personal tutor who meets with them regularly through the programme. The tutor's role is to advise on academic, pastoral and welfare issues. Students work closely with their personal tutors during the first year in tutorial groups of 3-5. There are similar sized tutorials in the second year. In the final year, academic matters are usually discussed with the Project supervisor in the first instance.
- Senior tutor: provides a back-up system of academic, pastoral and welfare advice.
- Induction programme for orientation and introduction to study skills.
- Representation on the Staff-Student Committee.
- All staff available and accessible through open-door policy / dedicated office hours system.
- Detailed student handbook and course resources, much of which is available on electronically.
- Dedicated Departmental study/resource room, with computers, text-books and collection of articles and resources supporting teaching and learning.
- Dedicated Departmental computing facilities and teaching laboratories.
- Extensive supporting materials and learning resources in College libraries and computer centre.
- College Careers Service.
- Access to all College and University support services, including Student Counselling Service, Health Centre and the Education Support Unit for students with special needs.

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Admission requirements

The Department's standard conditional offer is available on the Course Finder web page. However, the Department also has considerable flexibility in its admissions and offers policy and strongly encourages applications from non-standard applicants. Students whose first language is not English may also be asked for a qualification in English Language at an appropriate level. It may also be helpful to contact the Admissions Office for specific guidance on the entrance requirements for particular programmes.

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Further learning and career opportunities

The MSci is the degree of choice for those intending a professional scientific career. Students are provided with training in a range of subject-specific and transferable skills that prepare them for further study in physics or for entry into a wide range of both scientific and non-vocational careers. Students with appropriate degree classes will be well qualified to apply for entry to Ph.D. research programmes here and elsewhere. The Physics Department offers Ph.D. places in Particle Physics, Low Temperature Physics, Nanophysics, Condensed Matter Physics and other areas. Career opportunities for graduates include such areas as telecommunications, the IT industry, teaching, the civil service, industrial R&D.

Employers' needs are identified mainly from information provided by the Institute of Physics and its Professional Standards Committee. We also maintain contacts with alumni in various commercial companies.

For further details please refer to the Careers Service.

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Indicators of quality and standards

The Department performs well in the various published league tables. In the 2013 National Student Survey we obtained a score of 100% in the category of 'Overall Student Satisfaction'.

Royal Holloway's position as one of the UK's leading research-intensive institutions was confirmed by the results of the most recent Research Assessment Exercise (RAE 2008) conducted by the Higher Education Funding Council (HEFCE). In the Physics department 90% of research has been judged to be of international quality, of which 55% is internationally excellent or world leading.

In 2012 all MSci teaching programmes in the Department were accredited by the Institute of Physics (IoP) for the purpose of fully meeting the educational requirement for becoming a Chartered Physicist.

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List of programmes with details of awards, degree titles, accreditation and teaching arrangements

All the programmes are taught entirely by staff at Royal Holloway, University of London, or (in the case of stage four courses) by staff of the University of London Intercollegiate MSci Physics Consortium, and lead to awards of the University of London. All single honours programmes are accredited by the Institute of Physics and the aims and outcomes reflect its Graduate Skills Base. The QAA subject benchmark statement in Physics describes the general features which one might expect from Honours Degree programmes in the subject, and can therefore be used as a point of reference when reading this document (see www.qaa.ac.uk). UCAS codes are given in parentheses (see www.ucas.ac.uk).

Single Honours MSci Degree programmes in Physics

MSci Physics (F303)	Available full- or part-time
MSci Experimental Physics (F313)	Available full- or part-time
MSci Theoretical Physics (F321)	Available full- or part-time
MSci Astrophysics (F510)	Available full- or part-time
MSci Physics with Particle Physics (F372)	Available full- or part-time

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