Programme Specification

MPhys Physics with Space Science (Honours) 2017-18

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided.

Awarding Institution	University of Southampton
Teaching Institution	University of Southampton
Mode of Study	Full Time
Duration in Years	4 Years
Accreditation details	Currently accredited by the Institute of Physics
Final award	Master of Physics with Space Science (MPhys)
Name of award	MPhys Physics with Space Science
Interim Exit awards	*BSc (Physics) *Diploma of Higher Education *Certificate of Higher Education
FHEQ level of final award	7
UCAS code	F3FX
QAA Subject Benchmark or other external reference	QAA Subject Benchmark Statement: Physics, Astronomy & Astrophysics, Space Science Institute of Physics Accreditation
Programme Coordinator	Dr Robert Fear
Date specification was written	25 August 2014
Date specification last updated	11 December 2017

* Only available as exit awards under exceptional circumstances. Note that students must meet the standard criteria for progression to these awards before they can be granted. In the case of the CertHE and DipHE, core modules for the BSc Physics are treated as compulsory modules for the purpose of deciding whether progression to these awards has been accomplished. In the case of the BSc (Physics) exit award, all Part III core modules for the MPhys except the dissertation module (PHYS6009) are treated as compulsory modules for the purpose of deciding whether progression to the BSc awards has been accomplished.

Programme Overview

Brief outline of the programme

Physics and astronomy are dynamic subjects which are continually being developed by new discoveries and innovations. In choosing to study physics at Southampton, you will benefit from being taught by research-active physicists who enjoy an outstanding international reputation in all research areas carried out within Physics & Astronomy. We assign a high priority to the continual development and improvement of our teaching methods and curriculum design in order to guarantee students a highly stimulating, as well as enjoyable and fruitful, learning experience.

Space Science embraces an ever-growing range of exhilarating areas of scientific study, which often rapidly develop into novel commercial applications that can change the face of society. Across the campus at Southampton there is a great deal of space activity, and apart from incorporating astronomy courses from Physics and Astronomy we are able to cater for wider space science interests in terms of oceanographic and earth observational themes. We are also fortunate at Southampton in having an active Aeronautical and Astronautical engineering School who provide more technologically based courses in the context of spacecraft design factors, the space environment, orbital mechanics, mission analysis, mission operations and so on. The Physics with Space Science degree provides a solid grounding in a broad range of space disciplines, whilst allowing the students to specialise in areas of personal interest, and to target a wide range of careers from fundamental research to commercial space activities.

Physics & Astronomy recognises the potential diversity of our students both at home and internationally and thus this document has been written in accordance with the University's Diversity Policies and current anti-discrimination legislation.

Please Note: As a research-led University, we undertake a continuous review of our programmes to ensure quality enhancement and to manage our resources. As a result, this programme may be revised during a student's period of registration, however, any revision will be balanced against the requirement that the student should receive the educational service expected. Please read our **Disclaimer** to see why, when and how changes may be made to a student's programme.

Programmes and major changes to programmes are approved through the University's programme validation process which is described in the University's Quality handbook.

Learning and teaching

Core knowledge and understanding is acquired substantially via lectures, supported by tutor-led tutorials, laboratory practical classes, problem classes, as well as guided independent study and research. Some modules may involve field-trips led by academic staff. Students are strongly encouraged to attend all the lectures for the courses on which they are registered and are required to attend all the supporting sessions.

Assessment

Assessment in the first and second year is a mixture of unseen written examinations, marked problem-based coursework and laboratory work. In the third year, assessment is mainly by examination, although laboratory-based, computer-based and dissertation modules will use different assessment methods, as appropriate. In the fourth year of the programme, laboratory work is replaced by a project which involves continuous assessment, written reports and an oral examination.

Educational Aims of the Programme

The aims of the programme are to:

- introduce you to the main branches of physics and space science;
- help you to understand the principles of physics;
- provide you with a solid foundation for a successful career as a physicist, and opportunities to develop skills transferable to a wide range of other careers, and to prepare you for further studies in physics leading to a graduate degree such as a Ph.D.;
- offer you the opportunity to study some of the advanced concepts and techniques of contemporary physics, particularly in astronomy and photonics;
- enable you to develop skills in problem solving and critical and quantitative analysis in physics;
- enable you to develop practical skills in experimentation and measurement;
- provide you with the opportunity for a broader education by studying other subjects in addition to physics;
- provide you with a friendly and supportive environment and enrich your learning experience through interaction with staff engaged in internationally respected research;
- provide you with some of the basic IT and numeracy skills necessary for further study and employment, including word-processing, data analysis and use of the internet. You will also have the opportunity to develop some computer programming skills;
- help you develop key skills: personal organisation and teamwork, finding and using information, written and oral presentation;
- ensure that you become an increasingly independent learner and physicist as you progress through the programme.

Programme Learning Outcomes

Knowledge and Understanding

Having successfully completed this programme you will be able to demonstrate knowledge and understanding of

A1. mathematics required for the description of the physical world;
A2. the breakdown of classical (19th century) physics and the revolution in physics at the beginning of the 20th century;
A3. special relativity and its application in nuclear physics and high-energy particle scattering;
A4. the quantitative description of oscillating systems and wave-motion;
A5. Newtonian mechanics and its application to physical systems;

A6. quantum theory, both from qualitative and quantitative (quantum mechanics) viewpoints;
A7. application of quantum theory to describe the structure of atoms and nuclei;
A8. the laws of thermodynamics and their consequences for the behaviour of physical systems;
A9. statistical mechanics as a basis for the microscopic description of thermodynamic systems;
A10. electricity, magnetism and their unification through the laws of electromagnetism;
A11. a wide range of physics experimental techniques;
A12. electromagnetic waves and optics;
A13. quantum theory applied to relativistic systems;
A14. advanced classical and quantum mechanics and electromagnetism;
A15. specific topics selected for a dissertation and final year project.
A16. spacecraft design and the planning and implementation of space missions;
A17. specialist knowledge and expertise in a representative range of the key interdisciplinary areas of space science;
A18. the practical problems associated with the development and realisation of modern space projects;
A19. the ability to work as a member of a close-knit international team dedicated to the design of a space science mission;
A20. the potential for exploiting space technology for the benefit of science;

Teaching and Learning Methods

The topics listed in skills A1-A20 are taught mainly via lectures, directed reading and laboratory work as part of the core modules associated with this programme. The programme includes a field trip component in the second year. Learning is reinforced via tutorials (in Part I), project work (particularly in the final year project), coursework and problems classes.

Assessment methods

The topics listed in skills A1-A20 are assessed via a range of assessment methods. Assessment in the first and second year is a mixture of unseen written examinations, marked problem-based coursework and laboratory work. The field trip component is based on continuous assessment of a team exercise. For the MPhys programmes, in the third year assessment is mainly by examination, although laboratory-based, computer-based and dissertation modules will use different assessment methods, as appropriate. In the fourth year of the Mphys programmes, laboratory work is replaced by a project which involves continuous assessment, written reports and an oral examination.

Subject Specific Intellectual and Research Skills

Having successfully completed this programme you will be able to:

B1. apply knowledge of physics to the solution of theoretical and practical physical problems;
B2. apply mathematical techniques in algebra, vectors, calculus and differential equations to the solution of physical problems;
B3. use computers to assist in the solution of physical problems;
B4. interpret data and make decisions taking into account experimental errors.
B5. work in a team to design complex systems

Teaching and Learning Methods

Problem solving (items B1-B3) is at the heart of physics, and so it is emphasized throughout the learning and teaching experience, in lectures, coursework and problem classes. Mathematics skills (item B2) are developed via core maths modules in Part I and the use the techniques learned there in physics core modules in Parts I-III. Computer skills (item B3) are developed via a computing module, which is part of the core laboratory module (PHYS2022) in Part II. They can also be developed via optional modules (e,g, PHYS1202, PHYS6017) and are often developed further and exploited in final year projects. Data analysis, interpretation and associated decision making (item B4) are developed primarily via core laboratory modules in Parts I and II, but usually also developed further in the final year project, which is also core. Team design skills (B5) are developed in PHYS2030~~ and SESA 3025~~.

Assessment methods

Problem solving and mathematical skills (items B1-B2) are assessed mostly via written examinations, but also via assessed coursework, especially in Parts I and II of the programme. Problem-solving (B1), in particular, is also a key aspect of the final year project, which is assessed via supervisor's judgment of research work, a written report and an oral examination. The computing part of the core laboratory (B3) module in Part II is assessed via

practical exercises. Data interpretation and related decision making (B4) are assessed via practical work, vivas and presentations in the Part 1-3 laboratory modules. They are also assessed implicitly in many/most final year projects. Team design skills (B5) are assessed by continuous assessment and assessed presentations.

Transferable and Generic Skills

Having successfully completed this programme you will be able to:

C1. communicate physical ideas in written form;
C2. recognise the value of numeracy in the precise statement of ideas;
C3. prepare and give an oral presentation using visual aids;
C4. display data graphically and undertake basic word processing, including mathematical equations;
C5. use information from a variety of sources including scientific journals, books and the internet;
C6. manage a project with due attention to time and resource management;
C7. work successfully as a team member.

Teaching and Learning Methods

Skill C1 is covered mainly via self-study (with help and feedback available) in the Physics Skills/Physics from Evidence lab modules (via write-ups), in the final year project (which is partly assessed via a written report), and (for the MPhys) the dissertation module. Skill C2 is embedded throughout the curriculum, with practical applications in experimental and project work. Skill C3 is covered the Part II Physics from Evidence laboratory module, which includes a "conference" component, during which students give an assessed presentation on your laboratory work at a mock scientific conference. It is also covered in both PHYS2030 and the dissertation module, which include presentations associated with the teamwork components. Skill C4 is covered in laboratory and project work, as well as the dissertation module. Skill C5 is covered by the final year project, as well as the dissertation module. Skill C6 is developed especially during the final year project, but also during PHYS2030 and the dissertation module. Skill C7 is developed during all lab modules (which typically are done in pairs), during the final year project (again, this is usually done in pairs), and particularly during the dissertation module (which includes a team work component).

Assessment methods

Skill C1 is assessed with written reports on experimental work in laboratory modules, via the written report required for the final year project, and (for the MPhys) via the written report required for the dissertation module. Skill C2 is assessed in a variety of ways throughout the programme – it is an ingredient in everything from formal exams, to oral examinations, to written reports and presentations. Skill C3 is assessed via a presentation students give during a mock scientific conference which is part of the Part II Physics from Evidence laboratory module. Skill C4 is assessed in the marking of all written coursework and reports, such as laboratory and project work, and also the report for the dissertation module (for MPhys students). Skill C5 is assessed as an explicit component in the mark scheme for the final year project report, and also in the report for the dissertation module (for MPhys students). Skill C6 is assessed primarily via the supervisor's mark on the final year project performance, but of course also via the report on the project (and, for MPhys students) the dissertation module. For MPhys students, skill C7 is assessed explicitly via the team work component of the final year project. The mark for this is assigned by the module coordinator, but takes into account team members assessment of each other's contribution. For the final year project, team work can also be a factor in a supervisor's assessment for the final year project.

Subject Specific Practical Skills

Having successfully completed this programme you will be able to:

D1. use standard laboratory apparatus for physical measurements;
D2. use computers for the acquisition, storage, and analysis of data.

Skill D1 is developed and assessed primarily via the core laboratory modules in Parts I and II. Skill D2 is developed and assessed during the laboratory modules, especially the Part II Physics from Evidence module, which includes a computing component.

Graduate Attributes

Graduate Attributes are the personal qualities, skills and understanding you can develop during your studies. They include but extend beyond your knowledge of an academic discipline and its technical proficiencies. Graduate Attributes are important because they equip you for the challenge of contributing to your chosen profession and may enable you to take a leading role in shaping the society in which you live.

We offer you the opportunity to develop these attributes through your successful engagement with the learning and teaching of your programme and your active participation in University life. The skills, knowledge and personal qualities that underpin the Graduate Attributes are supported by your discipline. As such, each attribute is enriched, made distinct and expressed through the variety of learning experiences you will experience. Your development of Graduate Attributes presumes basic competencies on entry to the University.

There are six Graduate Attributes:

1 Global Citizenship

Global Citizens recognise the value of meaningful contribution to an interconnected global society and aspire to realise an individual's human rights with tolerance and respect.

2 Ethical Leadership

Ethical Leaders understand the value of leading and contributing responsibly to the benefit of their chosen professions, as well as local, national and international communities. Good academic practice is taught and enforced throughout, including automatic checks of plagiarism.

3 Research and Inquiry

Research and Inquiry underpin the formulation of well-informed new ideas and a creative approach to problem resolution and entrepreneurial behaviours

4 Academic

Academic attributes are the tools that sustain an independent capacity to critically understand a discipline and apply knowledge

5 Communication Skills

Communication Skills encompass an individual's ability to demonstrate knowledge, and to express ideas with confidence and clarity to a variety of audiences

6 Reflective Learner

The Reflective Learner is capable of the independent reflection necessary to develop their learning and continuously meet the challenge of pursuing excellence

The following table shows the mapping between the University's Graduate Attributes, and a selected subset of the core*, compulsory+ and optional modules that form or are available during the degree programme.

Code	**Module Title**	1	2	3	4	5	6
		Global citizenship	Ethical leadership	Research and Enquiry	Academic	Communication Skills	Reflective Learner
PHYS1017*	Physics Skills I			●	●	●	●
PHYS1019*	Physics Skills II			●	●	●	●
PHYS1028*	Personal Tutorial	●	●	●	●	●	●
PHYS2022*	Physics from Evidence I			●	●	●	●
PHYS2030*	European Dimension in Space	●	●	●	●	●	

PHYS6006*	Final Year Project		●	●	●	●	●
PHYS6015+	Final Year Synoptic Exam			●	●	●	●
PHYS3019	Communicating & Teaching and The Undergraduate Ambassadors Scheme	●	●			●	●
PHYS3009	Applied Nuclear Physics		●	●	●		
PHYS6009	Dissertation		●	●		●	●

Programme Structure

Typical course content

We offer both Single and Combined Honours degree programmes; the former is a state of the art introduction to modern physics whilst the latter is aimed at students wishing to become professional physicists, either by moving onto a PhD or in Industry. In practice there is considerable flexibility to change from single honours to combined honours and vice versa, especially in the first year of your degree.

All the degree programmes that we offer are based on a core of essential fundamental physics courses supplemented by a range of optional courses. Furthermore, the 'With' programmes are designed to develop a coherent pattern of study in areas in which we have particular strengths either within the School or elsewhere in the University - Space Science is one such area. The optional courses can be chosen over a broad range of topics; you will also have the opportunity to choose optional modules in a wide range of subjects, from Business Skills and Economics to Ethics and Global Health.

The structure of the MPhys with Space Science programmes allows you to exercise choice in 4 modules in the final year of study. You can exercise this choice in a number of ways.

· You can use these modules to further deepen your knowledge of your main subject.

· You can combine additional modules from your main subject with modules from other disciplines or choose from a selection of interdisciplinary modules.

It should be noted that it may not be possible to run some optional modules if the number of students registered on the module is very small. It should also be noted that optional module choice can be restricted by the University Timetable, which varies from year to year: some optional modules may clash with other optional or compulsory modules. Please be aware that many modules are shared between different cohorts; the class size depends on cohort size, which varies from year to year.

Special Features of the programme

Students can transfer easily between this programme and the BSc (Physics) and MPhys (Physics) programmes until the end of Part II. Students can also transfer to the MPhys Physics with Astronomy course until the end of Part I, Part I being common to these two programmes. High-performing students on some programmes are also eligible to apply to one of our "flagship" programmes, which are not available for direct entry. These programmes are:

- MPhys Astrophysics with a Year Abroad
- MPhys Particle Physics with a Year Abroad
- MPhys Physics with a Year of Experimental Research
- MPhys Physics with Industrial Placement

The final year of these programmes (in the case of the MPhys with Industrial Placement, the first semester of the final year) is spent performing a full time research project either in an academic research group or in a local industrial partner. These programmes can only be entered at the end of second year. Space on these programmes is strictly limited, and only students achieving first class marks are eligible to apply for entry onto these programmes. The programmes have their own specifications, which should be consulted for more information.

Programme details

The information in this programme specification is accurate at the time of writing, but may change in minor ways from year to year due to staff availability or other factors. Some of these modules are subject to pre-requisites and exclusions that, for brevity, are not given here; this information is available in the module specifications on the Physics & Astronomy Undergraduate Teaching website.

The module requirements for each programme are shown for each Part below; modules are either core (must be taken and passed), compulsory (must be taken) or optional (may be taken).

MPhys with Space Science - Programme Structure

Part 1

Semester 1		ECTS	FHEQ		Semester 2		ECTS	FHEQ	
PHYS1015	†	5	4	Motion and relativity	PHYS1011	†	5	4	Waves, light & quanta
PHYS1017	†	5	4	Physics Skills 1	PHYS1013	†	5	4	Energy & matter
PHYS1022	†	5	4	Electricity and Magnetism	PHYS1019	†	5	4	Physics Skills 2
MATH1006	†	7.5	4	Introduction to Mathematical Methods	MATH1007	†	7.5	4	Mathematical Methods for Physical Science
OPTION		7.5	4/5	1 option module	PHYS1005	†	7.5	4	Intro to Astronomy and Space Science

Part 2

Semester 1		ECTS	FHEQ		Semester 2		ECTS	FHEQ	
PHYS2003	†	7.5	5	Quantum Physics	PHYS2001	†	7.5	5	Electromagnetism
PHYS2022	†	7.5	5	Physics from Evidence 1	PHYS2006	†	7.5	5	Classical Mechanics
PHYS2023	†	7.5	5	Wave Physics	PHYS2024	†	7.5	5	Quantum Physics of Matter
SESA2024	†	7.5	5	Astronautics	PHYS2030	†	7.5	5	European Dimension in Space

Part 3

Semester 1		ECTS	FHEQ		Semester 2		ECTS	FHEQ	
PHYS3004	†	7.5	6	Crystalline Solids	PHYS3002	†	7.5	6	Nuclei & Particles
PHYS3008	†	7.5	6	Atomic Physics	PHYS3007	†	7.5	6	Theories of Matter, Space and Time
PHYS6009	‡	7.5	7	Dissertation	PHYS6008 or	‡	7.5	7	Physics from Evidence 2
					PHYS6017	‡	7.5	7	Computer Techniques
SESA3025	†	7.5	6	Spacecraft Systems	PHYS6004	†	7.5	7	Space Plasma Physics

Part 4

Semester 1		ECTS	FHEQ		Semester 2		ECTS	FHEQ	
PHYS6006	†	15	7	MPhys Project (continues through semester 2)					
OPTION		7.5	7	1 option module	SESA6076	‡	7.5	7	Spacecraft Orbital Mechanics and Control
OPTION		7.5	7	1 option module	PHYS6015	‡	7.5	7	MPhys Synoptic Exam
OPTION		7.5	6/7	1 option module	OPTION		7.5	6/7	1 option module

FHEQ levels for options are illustrative, other configurations are possible, but must meet university regulations on forward/back-tracking, and final ECTS accumulation for award (http://www.calendar.soton.ac.uk/sectionIV/cats.html)

Status † Core module - must be taken and passed before progression to next level or award

‡ Compulsory module - must be taken before progression to next level or award

MPhys with Space Science - Programme Structure

Part 1

Semester 1		ECTS	FHEQ		Semester 2		ECTS	FHEQ	
PHYS1015	†	5	4	Motion and relativity	PHYS1011	†	5	4	Waves, light & quanta
PHYS1017	†	5	4	Physics Skills 1	PHYS1013	†	5	4	Energy & matter
PHYS1022	†	5	4	Electricity and Magnetism	PHYS1019	†	5	4	Physics Skills 2
MATH1006	†	7.5	4	Introduction to Mathematical Methods	MATH1007	†	7.5	4	Mathematical Methods for Physical Science
OPTION		7.5	4/5	1 option module	PHYS1005	†	7.5	4	Intro to Astronomy and Space Science

Part 2

Semester 1		ECTS	FHEQ		Semester 2		ECTS	FHEQ	
PHYS2003	†	7.5	5	Quantum Physics	PHYS2001	†	7.5	5	Electromagnetism
PHYS2022	†	7.5	5	Physics from Evidence 1	PHYS2006	†	7.5	5	Classical Mechanics
PHYS2023	†	7.5	5	Wave Physics	PHYS2024	†	7.5	5	Quantum Physics of Matter
SESA2024	†	7.5	5	Astronautics	PHYS2030	†	7.5	5	European Dimension in Space

Part 3

Semester 1		ECTS	FHEQ		Semester 2		ECTS	FHEQ	
PHYS3004	†	7.5	6	Crystalline Solids	PHYS3002	†	7.5	6	Nuclei & Particles
PHYS3008	†	7.5	6	Atomic Physics	PHYS3007	†	7.5	6	Theories of Matter, Space and Time
PHYS6009	‡	7.5	7	Dissertation	PHYS6008 or	‡	7.5	7	Physics from Evidence 2
					PHYS6017	‡	7.5	7	Computer Techniques
SESA3039	†	7.5	6	Advanced Astronautics	PHYS6004	†	7.5	7	Space Plasma Physics

Part 4

Semester 1		ECTS	FHEQ		Semester 2		ECTS	FHEQ	
PHYS6006	†	15	7	MPhys Project (continues through semester 2)					
OPTION		7.5	7	1 option module	SESA6076	‡	7.5	7	Spacecraft Orbital Mechanics and Control
OPTION		7.5	7	1 option module	PHYS6015	‡	7.5	7	MPhys Synoptic Exam
OPTION		7.5	6/7	1 option module	OPTION		7.5	6/7	1 option module

FHEQ levels for options are illustrative, other configurations are possible, but must meet university regulations on forward/back-tracking, and final ECTS accumulation for award (http://www.calendar.soton.ac.uk/sectionIV/cats.html)

Status † Core module - must be taken and passed before progression to next level or award
‡ Compulsory module - must be taken before progression to next level or award

Additional Costs

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each

programme of study. Costs that students registered for this programme typically also have to pay for are included in Appendix 2.

Progression Requirements

These programmes follow the University's regulations for ***Progression, Determination and Classification of Results: Undergraduate and Integrated Masters Programmes*** as set out in the University Calendar, except where explicitly indicated otherwise in the ***Academic Regulations specific to the BSc (Physics)*** or ***MPhys*** programmes, which are also listed in the University Calendar.

Intermediate exit points (where available)

You will be eligible for an interim exit award if you complete part of the programme but not all of it, as follows:

Qualification	Minimum overall credit in ECTS credits	Minimum ECTS Credits required at level of award
BSc (Physics)*	at least 180	45
Diploma of Higher Education	at least 120	45
Certificate of HE	at least 60	45

* Only available for students who have completed Part III of the MPhys programme.

Exit awards are available only under exceptional circumstances. Note that students must meet the standard criteria for progression to these awards before they can be granted. In the case of the CertHE and DipHE, core modules for the BSc Physics are treated as compulsory modules for the purpose of deciding whether progression to these awards has been accomplished. In the case of the BSc (Physics) exit award, all Part III core modules for the MPhys except the dissertation module (PHYS6009) are treated as compulsory modules for the purpose of deciding whether progression to the BSc awards has been accomplished.

Support for student learning

There are facilities and services to support your learning some of which are accessible to students across the University and some of which will be geared more particularly to students in your particular Faculty or discipline area.

The University provides:

- library resources, including e-books, on-line journals and databases, which are comprehensive and up-to-date; together with assistance from Library staff to enable you to make the best use of these resources
- high speed access to online electronic learning resources on the Internet from dedicated PC Workstations onsite and from your own devices; laptops, smartphones and tablet PCs via the Eduroam wireless network. There is a wide range of application software available from the Student Public Workstations. Students can also access SVE (Southampton Virtual Environment), a virtual Windows University of Southampton desktop that can be accessed from personal devices such as PCs, Macs, tablets and smartphones from any location.

- computer accounts which will connect you to a number of learning technologies for example, the Blackboard virtual learning environment (which facilitates online learning and access to specific learning resources)
- standard ICT tools such as Email, secure filestore and calendars.
- access to key information through the MySouthampton Student Mobile Portal which delivers timetables, Module information, Locations, Tutor details, Library account, bus timetables etc. while you are on the move.
- Central IT support is provided through a comprehensive website, telephone and online ticketed support and a dedicated helpdesk in the Hartley Library foyer
- Enabling Services offering assessment and support (including specialist IT support) facilities if you have a disability, dyslexia, mental health issue or specific learning difficulties
- the Student Services Centre (SSC) to assist you with a range of general enquiries including financial matters, accommodation, exams, graduation, student visas, ID cards
- Career Destinations, advising on job search, applications, interviews, paid work, volunteering and internship opportunities and getting the most out of your extra-curricular activities alongside your degree programme when writing your CV
- a range of personal support services : mentoring, counselling, residence support service, chaplaincy, health service
- a Centre for Language Study, providing assistance in the development of English language and study skills for non-native speakers.

The Students' Union provides:

- an academic student representation system, consisting of Course Representatives, Academic Presidents, Faculty Officers and the Vice-President Education; SUSU provides training and support for all these representatives, whose role is to represent students' views to the University.
- opportunities for extracurricular activities and volunteering
- an Advice Centre offering free and confidential advice including support if you need to make an academic appeal
- Support for student peer-to-peer groups, such as Nightline.

Associated with your programme you will be able to access:

- All students have a personal tutor, with whom they meet regularly, particularly during the first year where small group tutorials are used to discuss the core physics courses and associated coursework/problem sheets. Tutors offer help on both academic matters, such as choice of option courses, and on pastoral matters.
- The Year Directors of Studies, the Director of Programmes, as well as the Senior Tutor are available to give help and advice as required.
- One of the primary functions of the Faculty Office is student support and guidance. The Faculty Office is able to provide information on wide range of topics, including programme regulations, special consideration procedures, appeals, and much more.
- The student physics society Physoc organizes a "parenting" scheme in which all new arrivals are looked after by senior physics students. Physoc also runs an academic mentoring scheme that aims to provide academic tutoring, help and advice for students by students.
- In the first and second year, each core module has an associated compulsory problems class where demonstrator provide individual help on the course material and/or coursework;
- Students normally work in pairs on final year projects, which are supervised by a member of academic staff who is likely to be an internationally respected expert.
- Most modules provide printed lecture notes that are either distributed or are available online.
- Key transferable skills are embedded throughout our courses, particularly those which contain coursework or laboratory work.
- Provision is made for any student who specifically wishes to consult a female member of staff.
- We are proud of the friendly atmosphere in Physics & Astronomy. Members of staff are happy to be approached for help. The Faculty Office also provides support for students throughout their programmes.

Methods for evaluating the quality of teaching and learning

You will have the opportunity to have your say on the quality of the programme in the following ways:

- Completing student evaluation questionnaires for each module of the programme

- Acting as a student representative on various committees, e.g. Staff: Student Liaison Committees, Faculty Programmes Committee OR providing comments to your student representative to feed back on your behalf.
- Serving as a student representative on Faculty Scrutiny Groups for programme validation
- Taking part in programme validation meetings by joining a panel of students to meet with the Faculty Scrutiny Group

The ways in which the quality of your programme is checked, both inside and outside the University, are:

- Annual module and programme reports which are monitored by the Faculty
- Programme validation, normally every five years.
- External examiners, who produce an annual report
- Regular inspections and accreditation by the Institute of Physics
- A national Research Excellence Framework (our research activity contributes directly to the quality of your learning experience)
- Higher Education Review by the Quality Assurance Agency

Criteria for admission

The University's Admissions Policy applies equally to all programmes of study. The following are the typical entry criteria to be used for selecting candidates for admission. The University's approved equivalencies for the requirements listed below will also be acceptable.

Undergraduate programmes

Qualification	Grades	Subjects required	Subjects not accepted	EPQ Alternative offer (if applicable)	Contextual Alternative offer (if applicable)
GCE A level	AAA	A in Physics and Maths			
GCSE	C	English, Maths			
BTEC					
International Baccalaureate		BSc - 36 points overall with 18 at Higher Level including 6 in Maths and Physics at Higher level			
European Baccalaureate		BSc – Minimum 85% overall with 85% in both Maths and Physics			

Postgraduate programmes

Qualification	Grade/GPA	Subjects requirements	Specific requirements
Bachelor's degree			
Master's degree			

Mature applicants
Applications from mature students (over 21 years in the October of the year of entry) are welcome. Applications will be considered on an individual basis.

English Language Proficiency

Overall	Reading	Writing	Speaking	Listening

6.5	5.5	5.5	5.5	5.5

Career Opportunities

Careers Support

We believe in helping our students gain the necessary experience for a future career, along with the skills to identify opportunities and make the most of them. At Southampton, you will have the opportunity to broaden your options by meeting employers, getting involved in volunteering activities, work placements and much more.

We work hard to help our students enter exciting careers. Our Academic Careers Team, supported by our student society (PHYSOC), put on over 40 hours a year of careers advice ranging from helping you write your CV, to advice on how to set up a small business, to mock interviews supported by real companies. We work with our students to find them placements and internships, which will help them to gain valuable work experience, preparing them for employment when they graduate. In 2012, 86% of our students began a career within six months of graduating.

We offer our top performing students to chance to join one of our flagship programmes, which allows them to work at research centres in leading Universities overseas, such Harvard University, or for world renowned research centres such as CERN, where scientists recently discovered the Higgs Boson. One of the flagship programmes, the MPhys with Industrial Placement, provides students with the opportunity to spend a full semester working on physics-related topics in a company.

We are part of South East Physics Network (SEPNet), who we work with to organise eight-week paid internships for our students during the summer vacation. In previous years, students have been placed with a wide range of organisations, including The National Physical Laboratory, BMW, The Met Office, SELEX Galileo, QinetiQ, the Culham Centre for Fusion Energy. As well as offering employment opportunities, these companies offer advice to our students about how to become more competitive in the work place.

SEPNet has a dedicated Careers Adviser who our students can liaise with. We work with SEPNet to offer our students the chance to attend 'meet the employer' days as well as careers talks with speakers from industry.

External Examiners(s) for the programme

Parts I and II
Name: Professor Simon Cornish
Institution: Durham University

Parts III and IV
Name: Professor Andrew Norton
Institution: The Open University

Students must not contact external examiners directly, and external examiners have been advised to refer any such communications back to the University. Students should raise any general queries about the assessment and examination process for the programme with their Course Representative, for consideration through Staff: Student Liaison Committee in the first instance. Student representatives on Staff: Student Liaison Committees will have the opportunity to consider external examiners' reports as part of the University's quality assurance process.

External examiners do not have a direct role in determining results for individual students, and students wishing to discuss their own performance in assessment should contact their personal academic tutor in the first instance.

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided. More detailed information can be found in the programme handbook (or other appropriate guide) or online at http://www.fpse.soton.ac.uk/student_handbook.

Appendix 1:

Programme Learning Outcome Mapping – Knowledge and understanding

The following table shows the mapping of core and compulsory modules to programme learning outcomes:

Module Code	Module Title	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20
PHYS1005	Intr. Astro and Space																	●			●
PHYS1015	Motion & Relativity		●	●	●	●															
PHYS1017	Physics Skills I											●									
PHYS1022	Intr. to Electromag										●										
MATH1006	Mathematical Methods	●																			
PHYS1011	Waves, Light and Quanta		●				●														
PHYS1013	Energy & Matter								●												
PHYS1019	Physics Skills II											●									
MATH1007	Mathematical Methods	●																			
PHYS2006	Classical Mechanics					●															
PHYS2022	Physics from Evidence I											●									
PHYS2023	Wave Physics	●			●		●														
SESA2024	Astronautics																●		●	●	

PHYS2001	Electromagnetism										●		●								
PHYS2003	Quantum Physics						●	●													
PHYS2024	Quantum Physics of Matter									●											
PHYS2030	European dim in Space																●	●	●	●	
PHYS3004	Crystalline Solids									●											
PHYS3008	Atomic physics							●													
PHYS6009	Dissertation															●					
SESA30392 5	Spacecraft Systems																●				
PHYS3002	Nuclei and Particles			●			●	●													
PHYS3007	Matter, Space & Time			●			●				●		●	●	●						
PHYS6008	Physics from Evidence II											●									
PHYS6017	Computer Techniques																				
SESA6076	Spacecraft Orbital Mechanics																●	●	●		●
PHYS6004	Space Plasma Physics																	●			●
PHYS6015	MPhys Synoptic Exam	●	●	●	●	●	●	●	●	●	●										
PHYS6006	MPhys Final Year Project															●					

Programme Learning Outcome Mapping – Subject-specific and Transferable/Key Skills

Module Code	Module Title	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	C6	C7
PHYS1005	Intr. Astro and Space										●		
PHYS1015	Motion & Relativity	●	●				●	●					
PHYS1017	Physics Skills I							●		●		●	●
PHYS1022	Intr. to Electromag	●	●				●	●			●		
MATH1006	Mathematical Methods							●					
PHYS1011	Waves, Light and Quanta	●	●				●	●					
PHYS1013	Energy & Matter	●	●				●	●					
PHYS1019	Physics Skills II				●			●		●		●	●
MATH1007	Mathematical Methods for Physical Science							●					
PHYS2006	Classical Mechanics	●	●				●	●					
PHYS2022	Physics from Evidence I			●	●			●	●	●		●	●
PHYS2023	Wave Physics	●	●				●	●					
SESA2024	Astronautics	●	●				●	●					

PHYS2001	Electromagnetism	●	●				●	●					
PHYS2003	Quantum Physics	●	●				●	●					
PHYS2024	Quantum Physics of Matter	●	●				●	●					
PHYS2030	European dim in Space					●	●	●	●		●	●	●
PHYS3004	Crystalline Solids	●	●				●	●					
PHYS3008	Atomic physics	●	●				●	●					
PHYS6009	Dissertation	●			●		●	●	●	●	●	●	●
SESA30392 5	Spacecraft Systems	●	●	●		●	●	●	●			●	●
PHYS3002	Nuclei and Particles	●	●				●	●					
PHYS3007	Matter, Space & Time	●	●				●	●					
PHYS6008	Physics from Evidence II				●		●	●		●		●	●
PHYS6017	Computer Techniques			●			●	●		●		●	
SESA6076	Spacecraft Orbital Mechanics	●	●				●	●					
PHYS6004	Space Plasma Physics	●	●				●	●					
PHYS6015	MPhys Final Year Synoptic Exam	●	●				●	●					
PHYS6006	MPhys Final Year Project	●	●	●	●	●	●	●		●	●	●	●

Assessment

Module Code	Module Title	Coursework 1	Coursework 2	Coursework 3	Coursework 4	Coursework 5	Exam
PHYS1015	Motion and Relativity	Problem Sheets (20%)	Mid Semester Test (10%)				Examination (70%)
PHYS1017	Physics Skills 1	Laboratory Work (100%)					No exam
PHYS1022	Electricity and Magnetism	Mastering Physics Exercise (20%)	Mid Semester Test (10%)				Examination (70%)
MATH1006	Intro to Mathematical Methods	Problem Sheets (10%)	Mid Semester coursework (10%)				Examination (80%)
PHYS1011	Wave Light and Quanta	Problem Sheets (20%)	Mid Semester Test (10%)				Examination (70%)
PHYS1013	Energy and Matter	Problem Sheets (20%)	Mid Semester Test (10%)				Examination (70%)
PHYS1019	Physics Skills 2	Laboratory Work (100%)					No exam
PHYS1005	Intro to Astronomy & Space Sci	Problem Sheets (20%)	Multichoice Test 1 (40%)	Multichoice Test 2 (40%)			No exam
MATH1007	Mathematical Methods for physics scientists	Problem sheets (20%)					Examination (80%)
PHYS2003	Quantum Physics	Problem sheets (20%)					Examination (80%)
PHYS2022	Physics from Evidence I	Computing Coursework (35%)	Laboratory Work (55%)	Conference Pres (10%)			No exam
PHYS2023	Wave Physics	Problem sheets (20%)					Examination (80%)
SESA2024	Astronautics	Case study (10%)					Examination (90%)
PHYS2001	Electromagnetism	Problem sheets (20%)					Examination (80%)
PHYS2006	Classical Mechanics	Problem Sheets (20%)					Examination (80%)
PHYS2024	Quantum Physics of Matter	Problem sheets (20%)					Examination (80%)

PHYS2030	European Dimension in Space	Mission essay (25%)	Mission report (30%)	Field trip contin. (25%)	Mission pres (10%)	Field trip pres (10%)	No exam
PHYS3004	Crystalline Solids	Problem sheets (10%)					Examination (90%)
PHYS3008	Atomic Physics	Problem sheets (10%)					Examination (90%)
SESA3039	Advanced astronautics						Examination (100%)
PHYS6009	Dissertation	Team work abstract (15%)	Dissertation report (60%)	Conference pres (25%)			No exam
PHYS3002	Nuclei & Particles	Problem Sheets (10%)					Examination (90%)
PHYS3007	Theories of Matter Space & Time	Problem sheets (10%)					Examination (90%)
PHYS6008	Physics from Evidence II	Micro project (16%)	4 scripted experiments (64%)	Poster pres (20%)			No exam
PHYS6017	Computer Techniques in Physics	Project report 1 (50%)	Project report 2 (50%)				No exam
SESA 6076	Spacecraft Orbital Mechanics						Examination (100%)
PHYS6006	MPhys Project	Progress report (5%)	Supervisor report (35%)	Examiner reports (30%)	Presentation (12%)	Viva (18%)	No exam
PHYS6004	Space Plasma Physics	Groupwork (10%)					Examination (90%)
PHYS6015	MPhys Final Year Synoptic Exam	Project (20%)					Examination (80%)

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Appendix 2:

Additional Costs

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each programme of study. In addition to this, students registered for this programme typically also have to pay for the items listed in the table below.

In some cases you'll be able to choose modules (which may have different costs associated with that module) which will change the overall cost of a programme to you. Details of such costs will be listed in the Module Profile. Please also ensure you read the section on additional costs in the University's Fees, Charges and Expenses Regulations in the University Calendar available at www.calendar.soton.ac.uk.

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
Approved Calculators		Candidates may use calculators in the examination room only as specified by the University and as permitted by the rubric of individual examination papers. The University approved models are Casio FX-570 and Casio FX-85GT Plus. These may be purchased from any source and no longer need to carry the University logo.
Stationery		You will be expected to provide your own day-to-day stationary items, e.g. pens, pencils, notebooks, etc). Any specialist stationery items will be specified under the Additional Costs tab of the relevant module profile.
T**extbooks**		Where a module specifies core texts these should generally be available on the reserve list in the library. However due to demand, students may prefer to buy their own copies. These can be purchased from any source.

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
		Some modules suggest reading texts as **optional** background reading. The library may hold copies of such texts, or alternatively you may wish to purchase your own copies. Although not essential reading, you may benefit from the additional reading materials for the module.
Equipment and **Materials** **Equipment**	Art Equipment and Materials: Drawing paper; painting materials; sketchbooks	
	Art Equipment and Materials: Fabric, Thread, Wool	
	Design equipment and materials:	
	Excavation equipment and materials:	
	Field Equipment and Materials:	
	Laboratory Equipment and Materials:	
	Medical Equipment and Materials: Fobwatch; stethoscopes;	
	Music Equipment and Materials	
	Photography:	
	Recording Equipment:	

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
IT	Computer Discs	
	Software Licenses	
	Hardware	
Clothing	Lab Coats	
	Protective Clothing: Hard hat; safety boots; hi-viz vest/jackets;	
	Fieldcourse clothing:	
	Wet Suits?	
	Uniforms?	
Printing and Photocopying Costs		In the majority of cases, coursework such as essays; projects; dissertations is likely to be submitted on line. However, there are some items where it is not possible to submit on line and students will be asked to provide a printed copy.
Fieldwork: logistical costs	Accommodation:	
	Insurance	
	Travel costs	

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
	Immunisation/vaccination costs	
	Other:	**PHYS2030:** The one-week field trip component takes place within the Easter break, at the premises of the University of La Laguna, Tenerife. While the field trip is heavily subsidised by the faculty, a student contribution to the costs is required. Flight costs, all local travel costs in Spain, and all hotel accommodation costs are included. The only unavoidable costs students will incur in Spain are food costs during the day. Any student who genuinely cannot afford to pay the student contribution for some reason should contact the course co-ordinator to discuss this privately. For students taking this module in AY 2016/17, the cost will be £275.
Placements (including Study Abroad Programmes)	Accommodation	
	Insurance	
	Medical Insurance	
	Travel costs	
	Immunisation/vaccination costs	
	Disclosure and Barring Certificates or Clearance	
	Translation of birth certificates	
	Other	

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
Conference expenses	Accommodation	
	Travel	
Optional Visits (e.g. museums, galleries)		
Professional Exams		
Parking Costs		
Anything else not covered elsewhere		

Revision History

1. New format based on revisions approved by Senate 19 June 2013 as part of new programme validation process. Minor changes made to form guidance on completion of Intended Learning Outcomes, and Learning outcomes and Assessment Mapping document template, for clarity; and changes to wording of support for student learning section, altering to second person throughout – agreed with the Chair and to be reported to UPC October 2013
2. Converted existing programme specifications for BSc (Physics) and MPhys to new format, along with minor updates and changes. CK20140812
3. Space Science programme version created based on Mphys template. AJB20140825,AJB21041004
4. Update to Programme Overview (CMA Changes) – 24 August 2015
5. Update to Programme Overview (CMA Changes) – 14 September 2015
6. Update to Additional Cost Table – 12 October 2015
7. Updated for 16/17 (FPC) – 24 February 2016
8. Updated Additional Costs – 26 July 2016
9. Updated optional module viability – 07 December 2016
10. Updated for 17/18 (FPC) – 8 March 2017
11. FPC approved optional module size caveat – CQA Team 11 December 2017