Programme Specification

MPhys Astrophysics with a Year Abroad (Honours) 2018-19

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 (MPhys)
Name of award	MPhys Astrophysics with a Year Abroad (Honours)
Interim Exit awards	*Bachelor of Science (BSc) *Diploma of Higher Education *Certificate of Higher Education
FHEQ level of final award	7 (MPhys)
UCAS code	N/A
QAA Subject Benchmark or other external reference	QAA Subject Benchmark Statement: Physics, Astronomy & Astrophysics Institute of Physics Accreditation
Programme Coordinator	Prof Malcolm Coe
Date specification was written	26 August 2014
Date specification last updated	May 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.

Astronomy is one of the strong research features of Southampton and students greatly benefit from extensive contact with staff involved in cutting-edge research. This is particularly true for final year projects that often involve working with the latest results from international observatories. In addition Southampton has pioneered the award-winning field trip to the Izana Observatory in Tenerife. This provides Astrophysics students with an opportunity to carry out observational work at an international professional observatory.

In the fourth year you spend 30 weeks working in a research laboratory abroad. This will take place in the Harvard-Smithsonian Center for Astrophysics, Boston, USA starting 1 September. During this period of time you will be under the immediate supervision of a local member of staff who will guide you in your work on a previously agreed programme of study. A member of staff from Southampton will visit you during your first 3

months to ensure satisfactory progress. At all stages both the Personal Tutor and Southampton Programme co-ordinator will proactively maintain communication with you.

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 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, second and third year is a mixture of unseen written examinations, marked problem sheets and laboratory work. In their 3rd year in Southampton, the students take all the core material from the 3rd and 4th years of the normal MPhys programme. In the fourth year the students carry out a research project abroad. The aim of the year abroad is to enable first class students to take part in genuine research that will challenge their skills and knowledge in astrophysics. Assessment for this year will be by two reports (one halfway through and one at the end), a viva and a seminar presentation.

Educational Aims of the Programme

The aims of the programme are to:

- introduce you to the main branches of physics;
- help you to understand the principles of physics;
- provide you with a 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 computing and numeracy skills necessary for further study and employment, including word-processing, data analysis and internet-based research;
- enable you to develop computer programming skills and statistical techniques to support data analysis;
- 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.
- explain to you the challenges involved in carrying out ground-based and space-based observations of the fundamental parameters of the universe.
- give you the opportunity to study some advanced concepts in contemporary astrophysics
- 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. planetary, galactic, and extra-galactic astronomy, and cosmology;
A17. the design and operation of astronomical detectors across the electromagnetic spectrum;
A18. the motion of stars and solar system objects across the night sky throughout the year;

Teaching and Learning Methods

The topics listed in skills A1–A18 are taught mainly via lectures, directed reading and laboratory work as part of the core modules associated with this programme. Learning is reinforced via tutorials (in Part I), project work (particularly in the final research year), coursework and problems classes.

Assessment methods

The topics listed in skills A1–A18 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. For the MPhys programmes, assessment in the third year is mainly by examination, although laboratory-based, computer-based and dissertation modules will use different assessment methods, as appropriate. In the fourth year of this programme, a year-long research project is assessed using 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. program and use computers to assist in the solution of physical problems;
B4. carry out a literature search for relevant material for the preparation of dissertations;
B5. assimilate new material independently;
B6. prepare and deliver seminars on specific subjects;
B7. interpret data using statistical techniques and make decisions taking into account experimental errors.

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 in physics core modules in Parts I-III. Computer skills (item B3) are developed via a core Part I computing module (PHYS1201), and part of the core laboratory

module (PHYS2022), later in 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.

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.

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. prepare a scientific report using appropriate computer tools for document preparation, data analysis and graphical display;
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 (for MPhys students) in the dissertation module, which includes a presentation associated with the teamwork component. Skill C4 is covered in laboratory and project work, as well as the dissertation module (for MPhys students). Skill C5 is covered by the final year project, as well as the dissertation module (for MPhys students). Skill C6 is developed especially during the final year project, but also during the dissertation module (for Mphys students). 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 the final year project report, and also in the report for the dissertation module (for MPhys students). Skill C6 is 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 (optional)

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.

The fundamentals for skill D2 are introduced in a core Part I module (PHYS1201) and assessed via coursework. 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	●	●	●	●	●	●
PHYS2007	Medical Physics		●		●		
PHYS2015	Introduction to Energy & the Environment	●	●		●		
PHYS2022*	Physics from Evidence I			●	●	●	●
PHYS3019	Communicating & Teaching and The Undergraduate Ambassadors Scheme	●	●			●	●
PHYS3009	Applied Nuclear Physics		●	●	●		
PHYS6013*	Astrophysics research project	●	●	●	●	●	

Programme Structure

The following structure assumes entry via the MPhys with Astronomy programme, having taken the by-invitation module PHYS2011 in Part II.

MPhys Astrophysics with a Year Abroad 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
PHYS1005	†	7.5	4/5	Introduction to Astronomy and Space Science	PHYS1201	†	7.5	4	Physical Skills Prog & Data Analysis

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
PHYS2013	†	7.5	5	Galaxies	PHYS2011	†	7.5	5	Design and Observation in Astronomy

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
PHYS6005	‡	7.5	7	Cosmology	PHYS3010	†	7.5	6	Stellar Evolution
PHYS3011	†	7.5	6	Photons in Astrophysics	PHYS6017	‡	7.5	7	Computer Techniques

Part 4

Semester 1		ECTS	FHEQ		Semester 2		ECTS	FHEQ	
PHYS6013	†	60	7	Astrophysics Research Project 1 (continues in semester 2)					

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

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).

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.

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 academic 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

University Commitment

The University will at all times seek to operate admissions regulations that are fair and are in accordance with the law of the United Kingdom, and the University's Charter, Statutes, Ordinances and Regulations.

This includes specific compliance with legislation relating to discrimination (e.g. Equality Act 2010) and the University's Equal Opportunities Policy Statement. This includes a commitment that the University will:

- actively assist groups that experience disadvantage in education and employment to benefit from belonging to the University

- actively seek to widen participation to enable students that do not traditionally participate in Higher Education to do so;

- ensure that admission procedures select students fairly and appropriately according to their academic ability and that the procedure is monitored and regularly reviewed.

Entry Requirements

Admission to this programme is restricted to current students registered on the MPhys-with-Astronomy programme. Invitation to participate is based upon overall second year performance. It is only extended to the best students who have achieved, at least, a First Class grade in their second year and have attended the Tenerife Field Trip (PHYS2011). Performance at this level is also required in their third year for participation to be confirmed. Practical considerations currently set a limit of 5 students for this programme.

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 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 Haley Gomez
Institution: Cardiff University

Parts III and IV
Name: Professor Simon Cornish
Institution: Durham 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 - core and compulsory modules

		Knowledge and Understanding																		Subject Specific Intellectual Skills				Transferable/Key Skills							Practical Skills	
Module Code	**Module Title**	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	B1	B2	B3	B4	C1	C2	C3	C4	C5	C6	C7	D1	D2
PHYS1005	Intro to Astronomy												•				•	•	•	•	•				•			•				
PHYS1015	Motion & Relativity		•	•	•	•														•	•			•	•							
PHYS1017	Physics Skills I											•													•		•		•	•	•	
PHYS1022	Introduction to Electromagnetism										•									•	•			•	•							
MATH1006	Introduction to Mathematical Methods	•																							•							
PHYS1011	Waves, Light and Quanta		•				•													•	•			•	•							
PHYS1013	Energy & Matter								•											•	•			•	•							
PHYS1019	Physics Skills II											•											•		•		•		•	•	•	•
PHYS1201	Physics Skills – Programming and Data Analysis	•																				•	•				•		•			•
MATH1007	Mathematical Meths for Physical Science	•																							•							
PHYS2006	Classical Mechanics					•														•	•			•	•							
PHYS2022	Physics from Evidence I											•										•	•		•	•	•		•	•	•	•
PHYS2023	Wave Physics	•			•		•													•	•			•	•							

PHYS2001	Electromagnetism									•		•						•	•			•	•								

Programme Learning Outcome Mapping - core and compulsory modules (Contd)

		Knowledge and Understanding																	Subject Specific Intellectual Skills				Transferable/Key Skills								
Module Code	**Module Title**	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	A17	A18	B1	B2	B3	B4	C1	C2	C3	C4	C5	C6	C7	D1	D2
PHYS2003	Quantum Physics						•	•												•	•			•	•							
PHYS2024	Quantum Physics of Matter									•										•	•			•	•							
PHYS3004	Crystalline Solids									•										•	•			•	•							
PHYS3008	Atomic physics							•												•	•			•	•							
PHYS3010	Stellar Evolution																•	•	•													
PHYS3011	Photons in Astro																•	•	•													
PHYS6009	Dissertation															•				•			•	•	•	•	•	•	•	•		
PHYS3002	Nuclei and Particles			•			•	•												•	•			•	•							
PHYS3007	Theories of Matter, Space & Time			•			•				•		•	•	•					•	•			•	•							
PHYS6008	Physics from Evidence II												•										•	•	•		•		•	•		
PHYS6017	Computer Techniques																					•		•	•		•		•		•	•
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 (70.0 %)
PHYS1013	Energy and Matter	Problem Sheets (20%)	Mid Semester Test (10%)				Examination (70.0 %)
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
PHYS1201	Physics Skills - Programming and Data Analysis	Assignment (20%)	Assignment (60%)	Continuous (20%)			No exam
MATH1007	Mathematical Methods for physics scientists	Problem sheets (20%)					Examination (80%)
PHYS2003	Quantum Physics	Problem sheets (20%)					Examination (80.0 %)
PHYS2022	Physics from Evidence I	Computing Coursework (35%)	Laboratory Work (55%)	Conference Pres (10%)			No exam
PHYS2023	Wave Physics	Problem sheets (20%)					Examination (80%)
PHYS2013	Galaxies	Problem sheets (25%)					Examination (75%)

PHYS2001	Electromagnetism	Problem sheets (20%)					Examination (80%)
PHYS2006	Classical Mechanics	Problem Sheets (20%)					Examination (80%)
PHYS2011	Design and Observation in Astronomy	Module1 contin. (25%)	Module2 contin. (25%)	Module3 report (25%)	Module1 pres (10%)	Module3 poster (15%)	No exam
PHYS2024	Quantum Physics of Matter	Problem sheets (20%)					Examination (80%)
PHYS3004	Crystalline Solids	Problem sheets (10%)					Examination (90%)
PHYS3008	Atomic Physics	Problem sheets (10%)					Examination (90%)
PHYS6005	Cosmology & Early Universe						Examination (100%)
PHYS3011	Photons in Astrophysics						Examination (100%)
PHYS3002	Nuclei & Particles	Problem Sheets (10%)					Examination (90%)
PHYS3007	Theories of Matter Space & Time	Problem sheets (10%)					Examination (90%)
PHYS6017	Computer Techniques in Physics	Project report 1 (50%)	Project report 2 (50%)				No exam
PHYS3010	Stellar Evolution	Coursework (20%)	Presentation (10%)				Examination (70%)
PHYS6013	Research Thesis - astrophysics	Semester report (20%)	Final report (40%)	Oral exam (20%)	Presentation (20%)		No exam

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.

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
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.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:	

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
	Recording Equipment:	
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:	

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
	Insurance	
	Travel costs	
	Immunisation/vaccination costs	
	Other:	**PHYS2011:** The field trip component takes place over two consecutive weeks within the Easter break, at the premises of the University of La Laguna, Tenerife and at the Observatorio del Teide, Tenerife. While the field trip is heavily subsidised by the faculty, a student contribution to the costs is required; in academic year 2016-17, this is £450 per student. Flight costs, all local travel costs in Spain, and all hotel accommodation costs during the week in La Laguna, all costs of staying at the residencia at the observatory, as well as all food costs during week 2 at the observatory are included. The only unavoidable additional costs students will incur in Spain are food costs during the day in the first week. Any student who genuinely cannot afford to pay the student contribution for some reason should contact the course co-ordinator to discuss this privately.
Placements (including Study Abroad Programmes)	Accommodation	**PHYS6013:** For AY 2016/17 onwards: The stay at Harvard will typically be for 9 months. Rentable home accommodation is available, and tuition fees will be charged at 15% of the standard level. A £500 Southampton Opportunity scholarship will be awarded to help cover for the difference in living costs between Southampton and Boston and the purchase of at least one return flight.
	Insurance	
	Medical Insurance	
	Travel costs	
	Immunisation/vaccination costs	
	Disclosure and Barring Certificates or Clearance	

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
	Translation of birth certificates	
	Other	
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. Checks and edits. AJB20140914
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. Update to Additional Costs – 23 June 2016
9. Update to Additional Costs – 26 July 2016
10. Update to programme structure – optional module viability (CQA) – 07 December 2016
11. Updated for 17/18 (FPC) – 8 March 2017