Programme Specification

Title of programme: BSc Physics with Astronomy (Honours)

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	Highfield Campus
Accreditation details	Institute of Physics
Final award	Bachelor of Science – Honours *Diploma of Higher Education *Certificate of Higher Education
Name of award	BSc Physics with Astronomy (Honours)
UCAS code	F3F5
QAA Subject Benchmark or other external reference	Physics, Astronomy and Astrophysics
Programme Leader	Professor M. J. Coe
Date specification was written	March 2004

* 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.

Educational Aims 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. Physics & Astronomy assigns a high priority to the continual development and improvement of its 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 which 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 Physics-with-Astronomy students with an opportunity to carry out observational work at an international professional observatory. We recognises the potential diversity of its students both at home and internationally and thus this document has been written in accordance with the University's Diversity Policies and the Race Relations Amendment Act (2000).

This programme aims to:

1. introduce you to the main branches of physics
2. help you to understand the principles of physics;
3. provide you with a 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.;
4. offer you the opportunity to study some of the advanced concepts and techniques of contemporary physics
5. enable you to develop skills in problem solving and critical and quantitative analysis in physics;

6. enable you to develop practical skills in experimentation and measurement;
7. provide you with the opportunity for a broader education by studying other subjects in addition to physics;
8. provide you with a friendly and supportive environment and enrich your learning experience through interaction with staff engaged in internationally respected research;
9. 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 learn specific programming
10. help you develop key skills: personal organisation and teamwork, finding and using information, written and oral presentation;
11. explain to you the challenges involved in carrying out ground-based and space-based observations of the fundamental parameters of the universe.
12. give you the opportunity to study some advanced concepts in contemporary astrophysics
13. ensure that you become an increasingly independent learner and physicist as you progress through the programme

Knowledge and Understanding

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

1. mathematics required for the description of the physical world;
2. the breakdown of classical (19th century) physics and the revolution in physics at the beginning of the 20th century;
3. special relativity and its application in nuclear physics and high-energy particle scattering;
4. the quantitative description of oscillating systems and wave-motion;
5. Newtonian mechanics and its application to physical systems;
6. quantum theory, both from qualitative and quantitative (quantum mechanics) viewpoints;
7. application of quantum theory to describe the structure of atoms and nuclei;
8. the laws of thermodynamics and their consequences for the behaviour of physical systems;
9. statistical mechanics as a basis for the microscopic description of thermodynamic systems;
10. electricity, magnetism and their unification through the laws of electromagnetism;
11. the application of electromagnetism to the description of electromagnetic waves and optics;
12. planetary, galactic, and extra-galactic astronomy, and cosmology;
13. the design and operation of astronomical detectors across the electromagnetic spectrum;
14. the motion of stars and solar system objects across the night sky throughout the year;

Learning and Teaching Methods

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.

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 Methods

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; 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 independently:

1. apply knowledge of physics to the solution of theoretical and practical physical problems;

2. apply mathematical techniques in algebra, vectors, calculus and differential equations to the solution of physical problems;
3. use computers to assist in the solution of physical problems;
4. interpret data and make decisions taking into account experimental errors.

Learning and Teaching Methods

Problem solving is at the heart of physics, and so it is emphasized throughout the learning and teaching experience, in lectures and problem classes. Research skills are developed through the final year project, in particular.

Assessment Methods

Problem solving and mathematical skills are assessed in both the written examinations and in weekly problem sheets which contribute to the assessment of most core material.

Transferable and Generic Skills

Having successfully completed this programme you will be able to:

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

Learning and Teaching Methods

Written and oral communication forms part of all laboratory and project work. In the second year, you give an assessed presentation on your laboratory work at a mock scientific conference.

Assessment Methods

Reports, essays and laboratory write-ups are included in the assessed coursework of several modules. Supervisors assess the management of projects, in addition to the scientific value of the results and their presentation.

Subject Specific Practical Skills (optional)

Having successfully completed this programme you will be able to:

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

Learning and Teaching Methods

Practical work using up to date equipment is a central part of both the first and second year core material. Computing and Data Handling are taught as self-paced exercises.

Assessment Methods

Laboratory skills are assessed from laboratory notebooks, by the writing of lab papers/reports, and by conference presentations.

Programme Structure

Semester 1	Semester 2

† = **Core module** = a module that must ***be taken and passed*** before progression to the next level or award.
‡ = **Compulsory module** = a module that ***must be taken*** before progression to the next level or award.

Part 1	
PHYS1005 † Introduction to Astronomy and Space Science PHYS1015 † Motion & Relativity PHYS1017 † Physics Skills I PHYS1022 † Intro. to Electromagnetism MATH1006† Intro. to Mathematical Methods	PHYS1008 † Physics of the Solar System PHYS1011 † Waves, Light & Quanta PHYS1013 † Energy & Matter PHYS1019 † Physics Skills II MATH1007† Mathematical Methods for Physical Science

Part 2	
PHYS2006 † Classical Mechanics PHYS2013 † Galaxies PHYS2022 † Physics from Evidence I PHYS2023 † Wave Physics	PHYS2001 † Electromagnetism PHYS2003 † Quantum Physics PHYS2024 † Quantum Physics of Matter **1 Module Option**

Part 3	
PHYS3004 ‡ Crystalline Solids PHYS3008 ‡ Atomic physics PHYS3011 † Photons in Astrophysics PHYS3018 † BSc Final Year Project	PHYS3002 ‡ Nuclei and Particles PHYS3010 † Stellar Evolution PHYS3017 ‡ BSc Final Year Synoptic Exam **1 Module Option**
The final year project is normally an Astronomy project	

General Regulations - Progression, Determination and Classification of Results

http://www.calendar.soton.ac.uk/sectionIV/progression-regs.html

Academic Regulations - Faculty of Physical and Applied Sciences
School of Physics and Astronomy

http://www.calendar.soton.ac.uk/sectionXII/sectXII-index.html

Support for student learning

Support within the Academic Unit (Physics & Astronomy)

- 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 Physoc (physics Society) 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.

University Support for Student Learning addresses both academic and pastoral matters in support of learning and is provided through:

- Library services;
  http://www.soton.ac.uk/library/

- Computer workstations, including some in the physics building;

- University Study Skills website;
  http://www.southampton.ac.uk/sais/virtualservices/studyskills.html

- Student Services Centre, providing advice on topics including accommodation, halls, id cards,
  http://www.soton.ac.uk/sais/ssc/index.shtml

- Careers Advisory Service;
  http://www.soton.ac.uk/careers/

- Enabling Services, provding support for students who have disabilities, mental health issues or specific learning difficulties"; also change website to http://www.southampton.ac.uk/edusupport/

- Dyslexia Support
  http://www.southampton.ac.uk/edusupport/ldc/

- Assistive Technologies Service, for anyone who may need assistance to gain more equal access to the academic curriculum
  http://www.southampton.ac.uk/edusupport/ats/

- University Counselling Services
  http://www.southampton.ac.uk/edusupport/counselling/

- Nursery;
  http://www.southampton.ac.uk/studentservices/earlyyearscentre/nursery.html#

- Financial Matters including fees, student loans, financial assistance,
  https://www.soton.ac.uk/undergraduate/tuition_fees/index.shtml#.UBvTDiPcalg
  http://www.southampton.ac.uk/sais/sfo/

- The Student Resources Network (SRN) is your gateway to all the help and support you need as a student at the University of Southampton:
  http://www.soton.ac.uk/sais/virtualservices/index.html

Methods for evaluating the quality of teaching and Learning

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

- Student evaluation questionnaires for each module of the programme
- Physics & Astronomy Staff Student Liaison Committee and provides a forum where any aspect of the teaching programme can be discussed. The Chair of the committee undertakes to take forward suggestions or any matters requiring action and provides feedback to student representatives;
- Student representation on Faculty Programme Committee
- Informal discussions with your personal tutor, your Year Director of Studies, the Senior Tutor, the Director of Programmes and/or the Faculty Education Manager
- Meeting in confidence with either your personal Tutor, the Senior Tutor, the Director of Programmes and/or the Faculty Education Manager

The quality of your programme is assured and enhanced, both inside and outside the University, by:

- External Examiners, who moderate assessment and submit reports which are considered by Physics & Astronomy and the wider University;
- Consideration of statistical data on examinations by the Examination Board;
- Periodic in-depth module and programme reviews;
- External inspection by the Quality Assurance Agency for Higher Education, England;
- Quinquennial accreditation review by the Institute of Physics
- All academic staff regularly undergo observation of their teaching by colleagues.

Criteria for admission

This programme is not open for new admissions.

Contact details:

Admissions Administrator	Ms Kim Lange	Tel	+44 (0)23 8059 2068
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		Email	fpas-ugapply@soton.ac.uk

Revision History

1. Minor revisions July 2009
2. New Brand added July 2009
3. Revised August 2012