Programme Specification[1]

1. Programme Title(s) and Code(s):

Programme Title	*UCAS Code*	*GU Code*
BSc Honours in Physics with Astrophysics		F3F5-2208

2. Academic Session:

2018-19

3. SCQF Level (see Scottish Credit and Qualifications Framework Levels):

10

4. Credits:

480

5. Entrance Requirements:

Please refer to the current undergraduate or postgraduate prospectus at http://www.gla.ac.uk/undergraduate/degrees/physicswithastrophysics/

6. ATAS Certificate Requirement (see Academic Technology Approval Scheme):

ATAS Certificate not required

7. Attendance Type:

Full Time

8. Programme Aims:

Physics involves the experimental and theoretical study of matter and energy and their interactions, ranging from the domain of elementary particles, through nuclear and atomic physics to the physics of solids, and ultimately to the development of the universe itself. The laws of physics form the basis of most branches of science and engineering and are the foundation of modern technology, and astrophysics is the application of those laws to astronomical objects. In the BSc programme we aim to give the student an understanding of the principles and methods

[1] 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 full advantage is taken of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each course can be found in course handbooks and other programme documentation and online at www.gla.ac.uk/

The accuracy of the information in this document is reviewed periodically by the University and may be checked by the Quality Assurance Agency for Higher Education.

of modern physics and astrophysics, and the skills to apply this understanding to a range of theoretical and experimental problems. In order to illustrate this, we draw on a wide variety of research and applications including work performed in the School of Physics & Astronomy.

Specific Aims of the Programme

(1) To present an integrated course of study which provides the student with knowledge and understanding of key principles and methods of modern physics;

(2) To illustrate the application of methods of mathematics and physics in an astrophysical context;

(3) To provide the opportunity to study in depth a choice of topics relevant to current developments in physics and its applications and modern astronomy;

(4) To provide training in the principles and practice of physical measurement techniques, astronomical observation and scientific data analysis, and give the opportunity for the student to apply these in performing extended project work;

(5) To develop the students' ability to work effectively, singly and in small groups, to reinforce their individual responsibility for their own learning and understanding and to develop further their communication skills.

9. Intended Learning Outcomes of Programme:

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas.

Knowledge and Understanding

On completion of the programme students will be able to:

- Understand and apply a range of basic mathematical methods which are useful in solving quantitative problems in physics;
- Demonstrate knowledge and understanding of waves and diffraction, thermal physics, quantum mechanics, solid state physics, nuclear and particle physics, atomic systems, electromagnetism, stellar structure and evolution, high energy astrophysics, instruments for optical and radio astronomy, cosmology;
- Demonstrate more detailed knowledge and understanding of a subset of the following optional material: Numerical Methods, Modern Optics, Medical Imaging, Semiconductor Physics and Devices, Magnetism and Superconductivity, Electronic Signal Transmission, Particle Physics, Nuclear Physics.

Skills and Other Attributes

Subject-specific/practical skills

On completion of the programme students will be able to:

- Programme straightforward procedures in a high level computer language and use computers to solve physical and astrophysical problems;
- Plan and carry out experimental investigations of physical processes using both standard and more advanced laboratory equipment;
- Evaluate random and systematic errors inherent in experimental measurements;
- Analyse and interpret experimental data, and make a critical assessment and draw valid conclusions from the results of experimental investigations.
- Apply computer software to analyse experimental data and to write scientific reports;
- Plan the course of action required to achieve self-defined goals in an open-ended physics project;

- Make an appropriate safety assessment for experimental procedures;
- Use online and journal resources to perform a literature search on a chosen topic of astrophysical interest. Assemble a relevant body of current and review material on this topic, and prepare and give a well-researched scientific presentation on the topic using appropriate audio-visual aids.

Intellectual skills

On completion of the programme students will be able to:

- Describe and analyse quantitatively processes, relationships and techniques related to the areas covered in the contributory courses;
- Write down, and where appropriate either prove or discuss the underlying basis of, physical laws related to topics in these areas;
- Apply ideas and techniques discussed in the courses to solve general classes of problems related to topics included in the course component outlines, which may include straightforward unseen elements;
- Discuss applications of the topics included in the course component outlines, and appreciate their relation to other topics in course components taken.

Transferable/key skills

On completion of the programme students will be able to:

- Give an oral account of experimental work performed and conclusions drawn from it;
- Prepare a detailed written report on an experimental investigation;
- Apply logical analysis to problem solving;
- Write a report containing a full description of the aims, methods, outcomes and conclusions of a piece of project work;
- Prepare and present audio-visual presentations and posters summarizing the results of a project;
- Appreciate open problems typical of business situations;
- Interact positively with colleagues in a group context;
- Apply team-working skills to address a complex physical or astrophysical problem and contribute significantly to the work of a group tackling such a problem, combining individual work constructively with the work of others;
- Contribute to the management of a group engaged in project work.

10. Typical Learning and Teaching Approaches:

Knowledge and understanding:

- Lectures and class tutorials
- Small group supervisions
- Laboratory and project work
- Private study

Intellectual skills:

- Lectures and class tutorials
- Small group supervisions
- Laboratory work, including IT laboratory
- Astronomy project work
- Private study

Subject-specific/practical skills:

- Laboratory work, including IT laboratory
- Individual and group project work
- Astronomy seminar project

Transferable/key skills:

- Skills workshop
- Group project work
- Extended physics project
- Small group supervisions

11. Typical Assessment Methods:

Knowledge and understanding:

- Written examinations
- Verbal and written reports of laboratory and IT work
- Multiple choice questions

Intellectual skills:

- Written examinations
- Verbal and written reports of laboratory and IT work
- Reports on astronomy project work
- Multiple choice questions

Subject-specific/practical skills:

- Verbal and written reports of laboratory and IT work
- Verbal, written and poster presentations of project work

Transferable/key skills:

- Verbal and written reports of laboratory and IT work
- Oral and written presentations of group project work.
- Written presentations of project work, and assessment by supervisors

12. Programme Structure and Features:

The B.Sc. Honours programme in Physics lasts 4 years and contains a minimum of 480 credits, as required by the regulations of the College of Science and Engineering, set out in the University Calendar.

A minimum of 120 credits must be taken in Years 1 to 4. The courses which can be taken in years 3 and 4 are subject to timetabling constraints and to students having taken prerequisite courses in an earlier semester or year. In the sample degree programme listed below, all compulsory courses are taken as soon as possible.

Year 1

Physics 1 [PHYS1001] (40 credits)

Mathematics 1R [MATHS1001] or 1X [MATHS1004] and Mathematics 1S [MATHS1002], or 1Y [MATHS1005] (20 credits each)

Astronomy 1 [ASTRO1001] (40 credits)

Year 2

Physics 2 [PHYS2001] (60 credits)
Mathematics 2A, 2B and 2D [MATHS2001, 2004 AND 2006] (10 credits each)
Additional classes (30 credits).

Year 3

120 credits of compulsory courses as listed:

P301H Mathematical Methods 1 [PHYS4011] (10 credits),
P302H Waves & Diffraction [PHYS4031] (10 credits),
P303H Circuits & Systems [PHYS4003] (10 credits),
P304H Quantum Mechanics [PHYS4025] (10 credits),
P305H Thermal Physics [PHYS4030] (10 credits),
P306H Electromagnetic Theory 1 [PHYS4004] (10 credits),
P3LABH Honours Physics Laboratory [PHYS4009] (20 credits).
AA01H Stellar Structure & Evolution [ASTRO4011] (15 credits, alternate years, starting 2009-10),
AA02H High Energy Astrophysics [ASTRO4009] (15 credits, alternate years, starting 2009-10),
AB01H Instruments for Optical & Radio Astronomy [ASTRO4010] (15 credits, alternate years, starting 2008-09),
AB02H Cosmology [ASTRO4006] (15 credits, alternate years, starting 2008-09)
Astronomy Lab Project 1 [ASTRO4001P] (10 credits)

Year 4

100 credits of compulsory courses as listed:

P401H Solid State Physics [PHYS4028] (10 credits),
P402H Nuclear & Particle Physics [PHYS4015] (10 credits),
P403H Atomic Systems [PHYS4002] (10 credits),
P4GPWH General Physics Workshop [PHYS4007] (10 credits),
P4PR30H Physics Project [PHYS4023P] (20 credits).
AA01H Stellar Structure & Evolution [ASTRO4011] (15 credits, alternate years, starting 2009-10),
AA02H High Energy Astrophysics [ASTRO4009] (15 credits, alternate years, starting 2009-10),
AB01H Instruments for Optical & Radio Astronomy [ASTRO4010] (15 credits, alternate years, starting 2008-09),
AB02H Cosmology [ASTRO4006] (15 credits, alternate years, starting 2008-09)
Astro Lab 2 [ASTRO4002P] (10 credits)

Plus 20 credits of elective courses chosen from the following list:

P307H Modern Optics [PHYS4014] (10 credits),
P308H Medical Imaging [PHYS4013] (10 credits),
P309H Numerical Methods [PHYS4017] (10 credits),
P404H Particle Physics [PHYS4018] (10 credits),
P405H Nuclear Physics [PHYS4016] (10 credits),
P406H Semiconductor Physics [PHYS4027] (10 credits),
P407H Magnetism & Superconductivity [PHYS4010] (10 credits),
P408H Electronic Signals Transmission [PHYS4005] (10 credits),
P409H Mathematical Methods 2 [PHYS4012] (10 credits),
P416H Energy & the Environment [PHYS4006] (10 credits)

P417H Physics Education & Communication [PHYS4034] (10 credits)
P418H Quantum Theory [PHYS4026] (10 credits)
P422H Peer to Peer Teaching & Learning in Physics [PHYS4045] (10 credits)

Assessment

The programme is assessed on the basis of performance in compulsory and elective courses taken in years 3 and 4.

The programme includes 220 compulsory credits at H-level and at least 20 credits of elective courses at H-level. If a greater number of elective courses is taken than required, the performance in elective courses will be based on the best combination of elective courses meeting the minimum requirement.

The classification of marks for each course is made according to the University Code of Assessment and the programme assessment is based on the average mark of all contributing courses, weighted according to the number of credits for each course.

Lecture Course assessment: 60 minute written paper for each 10-credit lecture course; 90 minute written paper for each 15-credit lecture course.

The P4GPWH General Physics Workshop course: 60 minute written paper, weighted 2/3, and continuous assessment, weighted 1/3.

P3LABH Honours Physics Laboratory and P4PR20H Physics Project; AstroLab 1 and AstroLab 2: continuous assessment. In each case, this will include assessment of a written report on each experiment or project carried out.

For P4PR20H the weighting will also include an explicit component of 45 % assessment of the project work, by the project supervisor(s). For P4PR20H an additional 15 % of the assessment weighting will derive from an oral and poster presentation, assessed by a panel of three staff members (including the project co-ordinators).

Progress Requirements

In addition to Science Faculties general progress requirements :

Year 1 to Year 2: Physics 1, Astronomy 1, Mathematics 1R or 1X and Mathematics 1S, or 1Y normally all at grade D3 or better;

Year 2 to Year 3: Physics 2 at C3 or better, plus Mathematics 2A, 2B and 2D at an average of D3 or better, all normally at first diet of examination;

Year 3 to Year 4: An average grade of D3 or better over all 3rd year courses.

Marks which define progression are awarded in accordance with the University Code of Assessment.

Exit Awards

At the end of Year 3, students who satisfy the University requirements, may graduate with a Designated Degree in Physics, or in Physics with Astrophysics.

13. Programme Accredited By:

Institute of Physics

14. Location(s):

Glasgow

15. College:

College of Science and Engineering

16. Lead School/Institute:

Physics and Astronomy [REG30600000]

17. Is this programme collaborative with another institution:

No

18. Awarding Institution(s):

University of Glasgow

19. Teaching Institution(s):

20. Language of Instruction:

English

21. Language of Assessment:

English

22. Relevant QAA Subject Benchmark Statements (see Quality Assurance Agency for Higher Education) and Other External or Internal Reference Points:

This Programme Specification is informed by the QAA Benchmark Statement for Physics, Astronomy and Astrophysics which can be found at:
http://www.qaa.ac.uk/Publications/InformationAndGuidance/Documents/Physics08.pdf

The Programme Specification also addresses the requirements of the "Core of Physics" programme identified by the Institute of Physics (IoP).

23. Additional Relevant Information (if applicable):

Support for students is provided by the Postgraduate/Undergraduate Adviser(s) of Studies supported by University resources such LEADS (www.gla.ac.uk/myglasgow/leads/), Counselling & Psychological Services (www.gla.ac.uk/services/counselling/), the Disability Service (www.gla.ac.uk/services/studentdisability/) and the Careers Service (www.gla.ac.uk/services/careers/).

Further information for intending students is available on the School of Physics and Astronomy Website at http://www.gla.ac.uk/schools/physics/

24. Online Learning:

No

25. Date of approval:	09/06/2017