

School of Physics, Astronomy and Mathematics

Title of Programme: BSc Honours Physics and Astrophysics

Programme Code: EIPHY

## Programme Specification

This programme specification is relevant to students entering:  
01 September 2020

Associate Dean of School (Academic Quality Assurance):  
Stephen Kane

Signature



31 March 2020

A programme specification is a collection of key information about a programme of study (or course). It identifies the aims and learning outcomes of the programme, lists the modules that make up each stage (or year) of the programme, and the teaching, learning and assessment methods used by teaching staff. It also describes the structure of the programme, its progression requirements and any programme-specific regulations. This information is therefore useful to potential students to help them choose the right programme of study, to current students on the programme, and to staff teaching and administering the programme.

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**Summary of amendments to the programme:**

Section	Amendment

If you have any queries regarding the changes, please email [AQO@herts.ac.uk](mailto:AQO@herts.ac.uk)

# Programme Specification BSc (Hons) Physics and Astrophysics

This programme specification (PS) is designed for prospective students, enrolled students, academic staff and potential employers. It provides a concise summary of the main features of the programme and the intended learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the teaching, learning and assessment methods, learning outcomes and content for each module can be found in Definitive Module Documents (DMDs) and Module Guides.

## Section 1

<b>Awarding Institution/Body</b>	University of Hertfordshire
<b>Teaching Institution</b>	University of Hertfordshire
<b>University/partner campuses</b>	College Lane, Bayfordbury Observatory
<b>Programme accredited by</b>	Institute of Physics In line with the Teaching Agency Requirements and Standards
<b>Final Qualification</b>	BSc Hons
<b>All Final Award titles (Qualification and Subject)</b>	<ol style="list-style-type: none"><li>1. BSc (Hons) Physics</li><li>2. BSc (Hons) Astrophysics</li><li>3. BSc (Hons) Physics with a Year Abroad</li><li>4. BSc (Hons) Astrophysics with a Year Abroad</li><li>5. BSc (Hons) Physics (Sandwich)</li><li>6. BSc (Hons) Astrophysics (Sandwich)</li><li>7. BSc (Hons) Physics (Sandwich) with a Year Abroad</li><li>8. BSc (Hons) Astrophysics (Sandwich) with a Year Abroad</li></ol>
<b>FHEQ level of award</b>	6
<b>UCAS code(s)</b>	<ol style="list-style-type: none"><li>1. F300 BSc (Hons) Physics</li><li>2. F501 BSc (Hons) Astrophysics</li><li>3. F301 BSc (Hons) Physics with a Year Abroad</li><li>4. F510 BSc (Hons) Astrophysics with a Year Abroad</li></ol>
<b>Language of Delivery</b>	English

### A. Programme Rationale

The Physics and Astrophysics programme aims to train physicists and astrophysicists to a level commensurate with the requirements of the profession. The modules are designed to reflect the importance of fundamental concepts and ideas that underpin physics and astrophysics. They aim to instill in the student an appreciation of the beauty of the physical world and the remarkable success that analytical, observational and experimental techniques have achieved in predicting and explaining its behaviour. Emphasis is placed on practical work in the laboratories, at the observatory and in computer suites.

The programme endeavours to recruit students with a genuine enthusiasm and interest in the subject area. It seeks to foster a creative spirit in students to help them fulfill their potential, to become creative scientists and to become successful in a wide range of graduate professions where logical and analytical thinking is required.

The common level 4 studies and other core elements, reflect the belief that there is a backbone of physical theory and supporting mathematics which must underpin the whole programme. The final year Physics/Astrophysics Project with Investigative Skills tests a wide variety of skills and brings together various aspects of the course.

Communication skills are addressed directly within the programme through compulsory modules at levels 4 and 5 and are continually supported by requirements for written coursework, individual and team work and a level 6 Project. In particular, electronic communication is introduced at the outset and is used thereafter both in the taught modules and projects. At level 5 students have to study a module that address professional issues relevant to a professional career.

## B. Educational Aims of the Programme

The programme has been devised in accordance with the University's graduate attributes of programmes of study as set out in [UPR TL03](#).

### Additionally this programme aims to:

- offer an education and training based on the core requirements of the Institute of Physics that is suited to the abilities and career aspirations of students and which, by offering choices of study path, will help them realise their own potential and provide the opportunity for postgraduate work in physics and astrophysics
- offer potential postgraduate students a platform which will enable them to embark upon further study in areas such as physics, astrophysics and other related disciplines
- develop competence in communicating scientific results to other experts and to non-specialists, including the use of computers and software packages for information retrieval and presentation;
- develop the ability to approach problem-solving activities using physical insight and laboratory/observatory skills aided where appropriate, by computer-based techniques.

## C. Intended Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills and other attributes in the following areas. The programme outcomes are referenced to the QAA benchmark statements for Physics, Astronomy and Astrophysics and the Frameworks for Higher Education Qualifications of UK Degree-Awarding Bodies (2014) and relate to the typical student. Additionally, the SEEC Credit Level Descriptors for Further and Higher Education (2016) have been used as a guiding framework for curriculum design.

Knowledge and Understanding	Teaching and learning methods	Assessment strategy
A1- the fundamental concepts, ideas and theories of Physics and Astrophysics; to advanced levels in physics for the Physics award, and to advanced levels in astrophysics for the Astrophysics awards.	Acquisition of knowledge and understanding of A1 through to A4 is via a combination of lectures, workshops, problem-based learning, electronic resources, small group tutorials, coursework, directed study, feedback from assessment and practical work at each level, together with an investigation undertaken at level 6.	Knowledge and understanding are assessed through a combination of unseen examinations (A1, A2), practical examinations (A2), in-course assessments (A1-A4) in the form of laboratory reports and logbooks (A2, A3, A4), class tests (A1, A2), coursework assignments (A1-A4), project report (A1-A4), oral and presentation (A1-A4).
A2- the mathematical and computational techniques used to frame and solve physical problems.	Throughout, the learner is encouraged to undertake independent study both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject.	
A3- the techniques of practical work in Physics; to advanced levels in physics for the Physics award.		
A4- the techniques of practical work in Astrophysics; to advanced levels in astrophysics for the Astrophysics awards	Additional support is provided by StudyNet, the Mathematics Drop-In Centre and the in the case of level 4, personal tutors.	

Intellectual skills	Teaching and learning methods	Assessment strategy
<p>B1- formulate and tackle problems in physics and astrophysics; to advanced levels in physics for the Physics award, and to advanced levels in astrophysics for the Astrophysics awards.</p> <p>B2- plan, execute and report the results of an experiment or an investigation; to advanced levels in physics for the Physics award, and to advanced levels in astrophysics for the Astrophysics awards.</p> <p>B3- use mathematics and computing to describe the physical world or an investigation.</p> <p>And in the case of sandwich students</p> <p>B4- will have obtained significant practical experience of working in a suitable environment, alongside professionals or others engaged in scientific or commercial work.</p> <p>And in the case of students studying abroad</p> <p>B5 – will have obtained significant practical experience of studying in a foreign country.</p>	<p>Intellectual skills are developed throughout the programme by the methods and strategies outlined in section A above.</p> <p>Learning Outcomes B1-B3 are developed through tutorial exercises, workshops, coursework, group-work, laboratory or observatory work and project work.</p> <p>Acquisition of Learning Outcome B4 is through a professional placement in a suitable scientific or commercial organisation.</p> <p>Acquisition of Learning Outcome B5 is through a studying for a period of time in a foreign country.</p> <p>Throughout, the learner is encouraged to develop intellectual skills further by independent study.</p>	<p>Intellectual skills are assessed through a combination of unseen examinations (B1, B3), practical examinations (B3), assessed individual in-course assignments (B1-B3), laboratory/observatory reports (B2), workbooks and logbooks (B1-B3), class tests (B1,B3), presentations (B1-B3) and final year project report (B1-B3).</p> <p>B4 is assessed by written/verbal reports from the student, the placement organisation and the placement tutor.</p> <p>B5 is assessed through relevant modules studied at an overseas institution.</p>
Practical skills	Teaching and learning methods	Assessment strategy
<p>C1- perform experimental work and draw conclusions.</p> <p>C2- apply appropriate analytical and modelling techniques to physical problems; to advanced levels in physics for the Physics award.</p>	<p>Practical skills are developed through a series of laboratory classes at levels 4 to 5 (C1, C2, C3) and a level 6 project (C2, C3).</p> <p>Throughout, the learner is expected to consolidate their development of practical computing skills by use of</p>	<p>Practical skills are assessed through laboratory reports (C1) and coursework and assignments (C1, C2).</p>

C3- apply appropriate analytical and modeling techniques to astrophysical problems; to advanced levels in astrophysics for the Astrophysics award,	appropriate personal computers available in the Learning Resources Centre.	
<b>Transferable skills</b>	<b>Teaching and learning methods</b>	<b>Assessment strategy</b>
D1- communicate effectively, both orally and in writing.	Transferable skills are developed through problem solving workshops and group presentations (D1-D3), individual assignments (D1, D3), writing practical reports (D1) and project work (D1-D3).	Transferable skills are assessed through a combination of group presentations (D1-D3), individual assignments (D1, D3), written practical reports (D1-D3), project posters and reports) (D1-D3).
D2- work effectively in a team.		
D3- demonstrate time, personal management and IT skills.		

## D. Programme Structures, Features, Levels, Modules, and Credits

The programme is offered in full-time (3 years), sandwich/year abroad (4 years) and part-time (5 or 6 years) modes, and leads to the award of a

1. BSc Hons Degree in Physics
2. BSc Hons Degree in Astrophysics

In addition there are non-honours degrees (BSc degrees) with same titles as for the BSc Honour degrees.

Entry is normally at level 4 (with suitable A-level or equivalent qualifications) but is possible at level 5 or 6 with suitable qualifications (e.g. successful completion of relevant studies at the correct level at another institution).

Part-time students meet with the Programme Leader to agree which core and optional modules are to be studied during each academic year.

### Professional and Statutory Regulatory Bodies

The BSc Physics and Astrophysics awards are accredited by the Institute of Physics and graduates may apply for associate membership of the society.

### Work-Based Learning, including Sandwich Programmes

An award in the sandwich mode is made if at least 36 weeks of approved, supervised work experience is undertaken in addition to the period required for full-time award.

### Erasmus Exchange programme

Erasmus students are permitted to study the course at level 5 and level 6.

### Programme Structure

The programme structure and progression information below (Table 1a and 1b) is provided for the Honours award. Any interim awards are identified in Table 1b. The Programme Learning Outcomes detailed above are developed and assessed through the constituent modules. Table 2 identifies where each learning outcome is assessed.

### Table 1a Outline Programme Structure

**Mode of study** Full time/Part time

**Entry point** Semester A

## Level 4 BSc (Hons) Physics

Module Title	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
<b>Compulsory Modules</b>							
Mathematical Techniques 1	4PAM1034	30	English	50	50	0	AB
Special Relativity and Quantum Physics	4PAM1066	30	English	60	40	0	AB
The Physical Universe	4PAM1013	30	English	60	40	0	AB
Computational Modeling	4PAM1070	15	English	0	100	0	B
Experimental Physics	4PAM1068	15	English	0	100	0	A
Small Group Tutorial (Level 4)	4PAM1072	0	English	0	100	0	AB

## Level 5 BSc (Hons) Physics

Module Title	Module Code	Credit Points	Pre-req	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
<b>Compulsory Modules</b>								
Mathematical Techniques 2	5PAM1022	15	4PAM1034	English	80	20	0	A
Career Planning and Development	5PAM1049	0		English	0	100	0	A
Professional Teaching Skills* Programming*	5PAM1025	15		English	0	100	0	A
	5PAM1023	15	4PAM1070	English	0	100	0	A
Quantum Mechanics	5PAM1047	15	4PAM1066	English	60	40	0	B
Thermodynamics	5PAM1046	15		English	60	40	0	B
Optics and Lasers	5PAM1045	15	4PAM1066	English	60	40	0	B
			OR					
Electromagnetism	5PAM1044	15	4PAM1013	English	60	40	0	A
			OR					
			4PAM1066	English	60	40	0	A
			OR					
			4PAM1013	English	60	40	0	A
Small Group Tutorial (Level 5)	5PAM1048	0		English	0	100	0	AB

\*One or both of these modules

Module Title	Module Code	Credit Points	Pre-req	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
<b>Optional Modules (choose 30 or 15 credits)</b>								
Physics of the Solar System	5PAM1050	15	4PAM1013	English	0	100	0	A
Extra-solar Planets	5PAM1051	15	4PAM1013	English	60	40	0	B
Plasma Physics and Fusion Reactors	5PAM1052	15		English	70	30	0	B
Differential Equations	5PAM1032	15	4PAM1034	English	80	20	0	B
Motion and Tensors	5PAM1053	15	4PAM1034	English	70	30	0	B
Numerical Methods	5PAM1029	15	4PAM1034	English	80	20	0	B

## Optional sandwich year

	Module Code	Credit Points	Pre-req	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
<b>Optional Modules</b>								
<b>Module Title</b>								
Professional Placement	6PAM0011	0	-	English	0	100	0	AB
Year Abroad	6PAM0030	0	-	English	0	100	0	AB
Placement with Study Abroad	6PAM1033	0	-	English	0	100	0	AB

## Level 6 BSc (Hons) Physics

	Module Code	Credit Points	Pre-req	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
<b>Compulsory Modules</b>								
<b>Module Title</b>								
Condensed States of Matter	6PAM1050	15	5PAM1047	English	60	40	0	A
The Physics of Elementary Particles	6PAM1051	15	5PAM1022, 5PAM1047	English	60	40	0	B
Physics Project and Investigative Skills	6PAM1052	30		English	0	100	0	AB
Geophysical Fluid Dynamics	6PAM1053	15	5PAM1022	English	60	40	0	B

	Module Code	Credit Points	Pre-req	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
<b>Optional Modules (choose 45 credits)</b>								
<b>Module Title</b>								
Rocket Performance and Propulsion	6AAD0026	15		English	60	40	0	A
Space Dynamics	6PAM0027	15	4PAM1070	English	0	100	0	B
Star Formation and Evolution	6PAM1055	15	5PAM1046	English	60	40	0	B
The Physics of Astronomical Spectra	6PAM1057	15	5PAM1046	English	60	40	0	A
Foundations of Cosmology	6PAM1056	15		English	60	40	0	A
Quantum Optics and Information Theory	6PAM1059	15	5PAM1047	English	0	100	0	B
Applied Optics and Photonics	6PAM1060	15	4PAM1066, 4PAM1013, 5PAM1045, 5PAM1044	English	60	40	0	A
Nonlinear Systems	6PAM1030	15	4PAM1034	English	80	20	0	B
Partial Differential Equations	6PAM1023	15	5PAM1022	English	80	20	0	A
Lagrangian Dynamics	6PAM1061	15	5PAM1022	English	80	20	0	B
Further Numerical Methods	6PAM1027	15	5PAM1029	English	80	20	0	B
Computational Physics	6PAM1004	15	4PAM1070	English	0	100	0	A



## BSc Hons Physics - Programme Review Transition Arrangements

In the 2019-20 academic year the programme will undergo some changes as a result of a Programme Review. In the case that students need to retake a module in 2019-20 (or subsequently) that they failed prior to 2019-20, and this module no longer runs in the programme, the following lists modules in the reviewed programme that can be done in lieu.

Failed module prior to 2019-20	Module/modules that can be done in lieu from 2019-20
<b>Level 4</b>	
Contemporary Physics 4PAM0009	Special Relativity and Quantum Physics 4PAM1066
Contemporary Physics (HIBT) 4PAM0030	Special Relativity and Quantum Physics (HIC) 4PAM1067
Applications of Computing 4PAM1044	Computational Modelling 4PAM1070
Applications of Computing (HIC) 4PAM1045	Computational Modelling (HIC) 4PAM1071
Laboratory Physics 1 4PAM1049	Experimental Physics 4PAM1068
Laboratory Physics 1 (HIC) 4PAM1050	Experimental Physics (HIC) 4PAM1069
Small Group Tutorial 4PAM1027	Small Group Tutorial (Level 4) 4PAM1072 applies for a deferral (normally a fail would lead to FNFA)
Small Group Tutorial (HIC) 4PAM1028	Small Group Tutorial (Level 4) (HIC) 4PAM1073 applies for a deferral (normally a fail would lead to FNFA)
<b>Level 5</b>	
Quantum Physics 5PAM0027	Quantum Mechanics 5PAM1047
Thermal and Condensed matter Physics 5PAM0013	Thermodynamics 5PAM1046 AND Plasma Physics and Fusion Reactors 5PAM1052
Optical Physics and Electromagnetism 5PAM0026	Optics and Lasers 5PAM1045 AND Electromagnetism 5PAM1044
Dynamics 5PAM1024	Motion and Tensors 5PAM1053
Laboratory Physics 2 5PAM0023	Plasma Physics and Fusion Reactors 5PAM1052 * OR Motion and Tensors 5PAM1053 * OR Differential Equations 5PAM1032 OR Numerical Methods 5PAM1029 * provided not being done in lieu of another module
Graduate Skills 5PAM1027	Career Planning and Development 5PAM1049 applies for a deferral (normally a fail would lead to FNFA)
<b>Level 6</b>	
Contemporary Quantum Physics 6PAM1007	Quantum Optics and Information Theory 6PAM1059
Waves & Fluids 6PAM0014	Geophysical Fluid Dynamics 6PAM1053 AND Applied Optics and Photonics 6PAM1060
Physics of Stars 6PAM0015	Star Formation and Evolution 6PAM1055 AND The Physics of Astronomical Spectra 6PAM1057
Dynamics and Geometry 6PAM1026	Lagrangian Dynamics 6PAM1061

In the case that students need to retake "Investigation in Physics" 6PAM1016 in 2019-20 (or subsequently) as a result of failing the module prior to 2019-20, there are two possibilities.

1. If they have also failed a Level 5 optional module, they can take "Physics Project and Investigative Skills" 6PAM1052 in lieu of 6PAM1016 and the Level 5 optional module.
2. An Investigation in Physics will be provided in lieu of the previous failed attempt.



## BSc (Hons) Astrophysics

**Mode of study** Full time/Part time

**Entry point** Semester A

### Level 4 BSc (Hons) Astrophysics

Module Title	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
<b>Compulsory Modules</b>							
Mathematical Techniques 1	4PAM1034	30	English	50	50	0	AB
Special Relativity and Quantum Physics	4PAM1066	30	English	60	40	0	AB
The Physical Universe	4PAM1013	30	English	60	40	0	AB
Computational Modeling	4PAM1070	15	English	0	100	0	B
Experimental Physics	4PAM1068	15	English	0	100	0	A
Small Group Tutorial (Level 4)	4PAM1072	0	English	0	100	0	AB

### Level 5 BSc (Hons) Astrophysics

Module Title	Module Code	Credit Points	Pre-req	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
<b>Compulsory Modules</b>								
Mathematical Techniques 2	5PAM1022	15	4PAM1034	English	80	20	0	A
Career Planning and Development	5PAM1049	0		English	0	100	0	A
Professional Teaching Skills*	5PAM1025	15		English	0	100	0	A
Programming*	5PAM1023	15	4PAM1070	English	0	100	0	A
Quantum Mechanics	5PAM1047	15	4PAM1066	English	60	40	0	B
Thermodynamics	5PAM1046	15		English	60	40	0	B
Optics and Lasers	5PAM1045	15	4PAM1066 OR 4PAM1013	English	60	40	0	B
Electromagnetism	5PAM1044	15	4PAM1066 OR 4PAM1013	English	60	40	0	A
Small Group Tutorial (Level 5)	5PAM1048	0		English	0	100	0	AB

\* **One or both of these two**

Module Title	Module Code	Credit Points	Pre-req	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
<b>Optional Modules (choose 30 or 15 credits)</b>								
Physics of the Solar System*	5PAM1050	15	4PAM1013	English	0	100	0	A

Extra-solar Planets*	5PAM1051	15	4PAM1013	English	60	40	0	B
Plasma Physics and Fusion Reactors	5PAM1052	15		English	70	30	0	B
Differential Equations	5PAM1032	15	4PAM1034	English	80	20	0	B
Motion and Tensors	5PAM1053	15	4PAM1034	English	70	30	0	B
Numerical Methods	5PAM1029	15	4PAM1034	English	80	20	0	B

\* One or both of these two

### Optional sandwich year

Module Title	Module Code	Credit Points	Pre-req	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Professional Placement	6PAM0011	0	-	English	0	100	0	AB
Year Abroad	6PAM0030	0	-	English	0	100	0	AB
Placement with Study Abroad	6PAM1033	0	-	English	0	100	0	AB

### Level 6 BSc (Hons) Astrophysics

Module Title	Module Code	Credit Points	Pre-req	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Condensed States of Matter	6PAM1050	15	5PAM1047	English	60	40	0	A
The Physics of Elementary Particles	6PAM1051	15	5PAM1022, 5PAM1047	English	60	40	0	B
Astrophysics Project and Investigative Skills	6PAM1054	30		English	0	100	0	AB
Star Formation and Evolution	6PAM1055	15	5PAM1046	English	60	40	0	B
Foundations of Cosmology	6PAM1056	15		English	60	40	0	A

Module Title	Module Code	Credit Points	Pre-req	Language of Delivery	% Examination	% Coursework	% Practical	Semesters
Rocket Performance and Propulsion	6AAD0026	15		English	60	40	0	A
Space Dynamics	6PAM0027	15	4PAM1070	English	0	100	0	B
The Physics of Astronomical Spectra	6PAM1057	15	5PAM1046	English	60	40	0	A
The Early Universe and Galaxy Formation	6PAM1058	15		English	60	40	0	B
Quantum Optics and Information Theory	6PAM1059	15	5PAM1047	English	0	100	0	B

Applied Optics and Photonics	6PAM1060	15	4PAM1066 4PAM1013, 5PAM1045 5PAM1044	English	60	40	0	A
Nonlinear Systems	6PAM1030	15	4PAM1034	English	80	20	0	B
Partial Differential Equations	6PAM1023	15	5PAM1022	English	80	20	0	A
Lagrangian Dynamics	6PAM1061	15	5PAM1022	English	80	20	0	B
Further Numerical Methods	6PAM1027	15	5PAM1029	English	80	20	0	B
Computational Physics	6PAM1004	15	4PAM1070	English	0	100	0	A

### Programme Review Transition Arrangements

In the 2019-20 academic year the programme will undergo some changes as a result of a Programme Review. In the case that students need to retake a module in 2019-20 (or subsequently) that they failed prior to 2019-20, and this module no longer runs in the programme, the following lists modules in the reviewed programme that can be done in lieu.

Failed module prior to 2019-20	Module/modules that can be done in lieu from 2019-20
<b>Level 4</b>	
Contemporary Physics 4PAM0009	Special Relativity and Quantum Physics 4PAM1066
Contemporary Physics (HIBT) 4PAM0030	Special Relativity and Quantum Physics (HIC) 4PAM1067
Applications of Computing 4PAM1044	Computational Modelling 4PAM1070
Applications of Computing (HIC) 4PAM1045	Computational Modelling (HIC) 4PAM1071
Laboratory Physics 1 4PAM1049	Experimental Physics 4PAM1068
Laboratory Physics 1 (HIC) 4PAM1050	Experimental Physics (HIC) 4PAM1069
Small Group Tutorial 4PAM1027	Small Group Tutorial (Level 4) 4PAM1072 applies for a deferral (normally a fail would lead to FNFA)
Small Group Tutorial (HIC) 4PAM1028	Small Group Tutorial (Level 4) (HIC) 4PAM1073 applies for a deferral (normally a fail would lead to FNFA)
<b>Level 5</b>	
Quantum Physics 5PAM0027	Quantum Mechanics 5PAM1047
Optical Physics and Electromagnetism 5PAM0026	Optics and Lasers 5PAM1045 AND Electromagnetism 5PAM1044
Dynamics 5PAM1024	Motion and Tensors 5PAM1053
Laboratory Physics 2 5PAM0023	Plasma Physics and Fusion Reactors 5PAM1052 * OR Motion and Tensors 5PAM1053 * OR Differential Equations 5PAM1032 OR Numerical Methods 5PAM1029 * provided not being done in lieu of another module
Solar System Physics 5PAM0025	Physics of the Solar System 5PAM1050 AND Extra-Solar Planets 5PAM1051
Graduate Skills 5PAM1027	Career Planning and Development 5PAM1049 applies for a deferral (normally a fail would lead to FNFA)
<b>Level 6</b>	
Contemporary Quantum Physics 6PAM1007	Quantum Optics and Information Theory 6PAM1059
Waves & Fluids 6PAM0014	Geophysical Fluid Dynamics 6PAM1053 AND Applied Optics and Photonics 6PAM1060

Physics of Stars 6PAM0015	Star Formation and Evolution 6PAM1055 AND The Physics of Astronomical Spectra 6PAM1057
Cosmology and Large-Scale Structure 6PAM1001	Foundations of Cosmology 6PAM1056 AND The Early Universe and Galaxy Formation 6PAM1058
Dynamics and Geometry 6PAM1026	Lagrangian Dynamics 6PAM1061

In the case that students need to retake “Investigation in Physics” 6PAM1016 in 2019-20 (or subsequently) as a result of failing the module prior to 2019-20, there are two possibilities.

1. If they have also failed a Level 5 optional module, they can take “Physics Project and Investigative Skills” 6PAM1052 in lieu of 6PAM1016 and the Level 5 optional module.
2. An Investigation in Physics will be provided in lieu of the previous failed attempt.

Progression to level 5 requires a minimum of 90 credits. The maximum study rate in such an instance would be 150 credits and students would be expected to remedy any failed modules from level 4 in the first instance.

Progression to non-honours level 5 with 75 credits may be permissible. The maximum study rate in such an instance would normally be 120 credits and students would be expected to remedy any failed modules from level 4 in the first instance

Progression to level 6 requires 210 credits. The maximum study rate in such an instance would be 150 credits and students would be expected to remedy any failed modules from level 5 in the first instance.

Progression to non-honours level 6 with 180 credits may be permissible. The maximum study rate in such an instance would normally be 120 credits and students would be expected to remedy any failed modules from level 5 in the first instance.

The award of an Honours degree in Physics or Astrophysics requires 360 credit points passed with a minimum of at least 120 at level 6 including Physics/Astrophysics Project and Investigative Skills (6PAM1052 / 6PAM1054).

#### Honours classification

The University has approved structure and assessment regulations common to all programmes. Full details are provided in [UPR AS14](#), Section D.

#### Table 1b Final and interim awards available

The programme provides the following final and interim awards:

Final Award	Award Title	Minimum requirements	Available at end of Level	Programme Learning Outcomes developed (see above)
BSc (Hons)	Physics	360 credit points including 240 at level 6/5 of which 120 must be at level 6	6	A1, A2, A3, B1, B2, B3, C1, C2, D1, D2, D3
BSc (Hons)	Astrophysics	360 credit points including 240 at level 6/5 of which 120 must be at level 6	6	A1, A2, A4, B1, B2, B3, C1, C2, D1, D2, D3
BSc (Hons)	Physics (Sandwich)	360 credit points including 240 at level 6/5 of which 120 must be at level 6. Minimum of a 36 week approved and supervised placement plus have must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A3, B1, B2, B3, B4, C1, C2, D1, D2, D3
BSc (Hons)	Astrophysics (Sandwich)	360 credit points including 240 at level 6/5 of which 120 must be at	6	A1, A2, A4, B1, B2, B3, B4, C1, C2, D1, D2, D3

		level 6. Minimum of a 36-week approved and supervised placement plus have must perform satisfactorily as assessed by the Professional Training Certification Panel.		
BSc (Hons)	Physics with a Year Abroad	360 credit points including 240 at level 6/5 of which 120 must be at level 6. With one academic year of study at an approved institution in Europe or world-wide and must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A3, B1, B2, B3, B5, C1, C2, D1, D2, D3
BSc (Hons)	Astrophysics with a Year Abroad	360 credit points including 240 at level 6/5 of which 120 must be at level 6. With one academic year of study at an approved institution in Europe or world-wide and must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A4, B1, B2, B3 , B5, C1, C2, D1, D2, D3
BSc (Hons)	Physics (Sandwich) with Study Abroad	360 credit points including 240 at level 6/5 of which 120 must be at level 6. Minimum of an 18 week approved and supervised placement plus half of one academic year of study at an approved institution in Europe or world-wide and must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A3, B1, B2, B3, B4, B5, C1, C2, D1, D2, D3
BSc (Hons)	Astrophysics (Sandwich) with Study Abroad	360 credit points including 240 at level 6/5 of which 120 must be at level 6. Minimum of an 18-week approved and supervised placement plus half of one academic year of study at an approved institution in Europe or world-wide and must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A4, B1, B2, B3, B4, B5, C1, C2, D1, D2, D3

Interim Award	Award Title	Minimum requirements	Available at end of Level	Programme Learning Outcomes developed (see above)
University Certificate		45 credit points at level 4	4	See UPR AS11, section 13: <a href="http://sitem.herts.ac.uk/secreg/upr/AS11.htm">http://sitem.herts.ac.uk/secreg/upr/AS11.htm</a>
Certificate of Higher Education		120 credit points at level 4	4, 5	<i>For named awards, list all relevant learning outcomes, e.g. A1, A3, A4, B1, B2, C1, C5, D1, D2, D3</i> <b>OR</b> <i>For untitled awards: See UPR AS11, section 13:</i>

				<a href="http://sitem.herts.ac.uk/secreg/upr/AS11.htm">http://sitem.herts.ac.uk/secreg/upr/AS11.htm</a>
Diploma of Higher Education		240 credit points including at least 120 at level 5	5, 6	<i>For named awards, list all relevant learning outcomes, e.g. A1, A3, A4, B1, B2, B6, C1, C5, D1, D2, D3, D6</i> <b>OR</b> <i>For untitled awards: See UPR AS11, section 13:</i> <a href="http://sitem.herts.ac.uk/secreg/upr/AS11.htm">http://sitem.herts.ac.uk/secreg/upr/AS11.htm</a>
BSc	Physics	300 credit points including 180 at level 6/5 of which 60 must be at level 6	6	A1, A2, A3, B1, B2, B3, C1, C2, D2
BSc	Astrophysics	300 credit points including 180 at level 6/5 of which 60 must be at level 6	6	A1, A2, A4, B1, B2, B3, C1, C2, D2
BSc	Physics (Sandwich)	300 credit points including 180 at level 6/5 of which 60 must be at level 6. Minimum of a 36-week approved, and supervised placement plus have must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A3, B1, B2, B3, B4, C1, C2, D2
BSc	Astrophysics (Sandwich)	300 credit points including 180 at level 6/5 of which 60 must be at level 6. Minimum of a 36-week approved, and supervised placement plus have must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A4, B1, B2, B3, B4, C1, C2, D2
BSc	Physics with a Year Abroad	300 credit points including 180 at level 6/5 of which 60 must be at level 6. With one academic year of study at an approved institution in Europe or world-wide and must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A3, B1, B2, B3, B5, C1, C2, D2
BSc	Astrophysics with a Year Abroad	300 credit points including 180 at level 6/5 of which 60 must be at level 6. With one academic year of study at an approved institution in Europe or world-wide and must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A4, B1, B2, B3, B5, C1, C2, D2
BSc	Physics (Sandwich) with Study Abroad	300 credit points including 180 at level 6/5 of which 60 must be at level 6. Minimum of an 18-week approved and supervised placement plus half of one academic year of study at an approved institution in Europe or world-wide and must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A3, B1, B2, B3, B4, B5, C1, C2, D2



BSc	Astrophysics (Sandwich) with Study Abroad	300 credit points including 180 at level 6/5 of which 60 must be at level 6. Minimum of an 18-week approved and supervised placement plus half of one academic year of study at an approved institution in Europe or world-wide and must perform satisfactorily as assessed by the Professional Training Certification Panel.	6	A1, A2, A4, B1, B2, B3, B4, B5, C1, C2, D2
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## Programme-specific assessment regulations

The programme complies with the University's academic regulations (in particular, [UPR AS11](#), [UPR AS12/UPR AS13](#) (*delete as applicable*) and [UPR AS14](#)) with the exception of those listed below, which have been approved by the University:

As specified by the Institute of Physics (accrediting body), students enrolling on the BSc (Hons) Physics and BSc (Hons) Astrophysics degrees are subject to the following classification algorithms:

Course Code	Course Instance	Award Title	Modules	Must be included in Award degree algorithm
EIPHY	PHY3F, PHY4S, PHYP5P, PHYP6P	<b>BSc (Hons) Physics</b>	All (non-elective) level 5 and level 6 modules to be included in the degree classification calculation at a ratio of 25% level 5 and 75% level 6	yes

Course Code	Course Instance	Award Title	Modules	Must be included in Award degree algorithm
EIPHYAP	AST3F, AST4S, ASTP5P, ASTP6P	<b>BSc (Hons) Astrophysics</b>	All (non-elective) level 5 and level 6 modules to be included in the degree classification calculation at a ratio of 25% level 5 and 75% level 6	yes

Further programme-specific regulations (requiring School-level approval) are given below:

- Progression from one level to the next depends on meeting the pre-requisite requirements of specific chosen modules as detailed in Table 1a to 1d and 1e above.
- To be eligible for any of the above awards a student must attain pass grades in compulsory courses listed in Table 1a to 1d.
- Attendance at all scheduled learning and teaching sessions is normally required on this programme. To pass a module, a student must normally have attended 75% of the learning and teaching sessions at which attendance is required.

If attendance falls below 75% and the student has not obtained at least 30% in either coursework or examination, the student will normally be deemed to have failed the module at the first attempt and will not be permitted to undertake referred assessment in the module.

Students who have a disability which might impact on their attendance should consult with their disability advisor and Year Tutor.

- In the case of a Sandwich or Year Abroad award, students must also perform satisfactorily in the professional training year, as assessed by the Placement Tutor.
- The maximum length of time that a student can remain registered on the programme is: 5 years for Full-time, 6 years for Sandwich and 6 years for Part-time.

### Sandwich Placement

Students must normally satisfactorily complete all requirements of progression to the level 6 honours programme. The placement must be approved by the relevant Placement Tutor before the student is permitted to progress to the sandwich year.

Placements will normally be a minimum of 36 weeks (including employer's statutory holidays). This will normally be in one establishment but may be split into two consecutive half-yearly placements in different establishments. Assessment of the placement year will be considered at a meeting of the appropriate Module Board of Examiners.

Satisfactory completion of the sandwich placement is mandatory for a sandwich award; however, the assessment has a credit point rating of zero and will not contribute to the honours classification. Assessment will take into account initiative and effort and will include a substantial written report

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## E. Management of Programme & Support for student learning.

### Management

The programme is managed and administered through:

- The Physics and Astrophysics (P&A) Programme Leader, who has overall responsibility for the effective operationalisation of the programme and ensuring that academic standards are maintained, and an effective student learning experience is provided. The P&A Programme Leader also has overall responsibility for the quality assurance and enhancement of the programme providing advice and guidance to programme staff as appropriate.
- Three Year Tutors, one per level, as a first point of contact for students needing academic/pastoral support/advice.
- An Admissions Tutor with specific responsibility for open days and selection.
- A designated Student Administrator.
- Personal Tutors to provide academic and pastoral support.
- Placement Tutors to oversee students on sandwich or undertaking a year abroad.
- Project Tutors to guide students through their final year Project.
- Student representatives on programme committee.
- Dean of School.
- Associate Dean (AQA).
- Associate Dean (L&T).
- A programme committee, the membership of which includes; Physics and Astrophysics Programme Leader, Mathematics Programme Leader, 4 P&A Year Tutors (one each for Levels 4, 5, 6, and 7), 3 Mathematics Year Tutors (one each for Levels 4, 5, and 6), Dean of School, Associate Dean of School (AQA), Associate Dean of School (L&T), student representatives, academic staff teaching modules. This Programme Committee is jointly chaired by the P&A Programme Leader and the Mathematics Programme Leader.

### Support

Students are supported by:

- An induction week at the beginning of each new academic session.
- Overseas Orientation.
- English language support.
- Module option talks, which provide students with the opportunity to receive information relating to modules on offer for the following academic year.

- Module delivery information given out at the commencement of each module.
- Computing laboratories
- Industrial Training Placements Office.
- StudyNet, a versatile on-line inter-active intranet and learning environment.
- Access to extensive digital and print collections of information resources.
- Attractive modern study environment in Learning Resources Centres.
- A substantial Student Centre that provides advice on issues such as finance, University regulations, legal matters, accommodation, international student support, etc.
- Office of Dean of Students, incorporating Chaplaincy, Counselling and Nursery.
- Medical Centre.
- A Mathematics Support Service.
- A Disabled Student Coordinator.
- An Equality Office
- The Students' Union.
- Guided student-centered learning through the use of StudyNet.
- Careers Enterprise and Employment Services

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## F. Other sources of information

In addition to this Programme Specification, the University publishes guidance to registered students on the programme and its constituent modules:

- A Programme (or Student) Handbook;
- A Definitive Module Document (DMD) for each constituent module;
- A Module Guide for each constituent module.

The [Ask Herts](#) website provides information on a wide range of resources and services available at the University of Hertfordshire including academic support, accommodation, fees, funding, visas, wellbeing services and student societies.

As a condition of registration, all students of the University of Hertfordshire are required to comply with the University's rules, regulations and procedures. These are published in a series of documents called 'University Policies and Regulations' (UPRs). The University requires that all students consult these documents which are available on-line, on the UPR web site, at: <http://www.herts.ac.uk/secreg/upr/>. In particular, [UPR SA07](#) 'Regulations and Advice for Students' Particular Attention - Index' provides information on the UPRs that contain the academic regulations of particular relevance for undergraduate and taught postgraduate students.

In accordance with section 4(5) of the Higher Education and Research Act 2017 (HERA), the UK Office for Students (OfS) has registered the University of Hertfordshire in the register of English higher education providers. The Register can be viewed at: <https://www.officeforstudents.org.uk/advice-and-guidance/the-register/the-ofs-register/>. Furthermore, the OfS has judged that the University of Hertfordshire delivers consistently outstanding teaching, learning and outcomes for its students. It is of the highest quality found in the UK. Consequently, the University received a Gold award in the 2018 Teaching Excellence and Student Outcomes (TEF) exercise. This award was made in June 2018 and is valid for up to 3 years. The TEF panel's report and conclusions can be accessed at: <https://www.officeforstudents.org.uk/advice-and-guidance/teaching/tef-outcomes/#/provider/10007147>

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## G. Entry requirements

The normal entry requirements for the programme are:

For current entry tariff point requirements, please refer to the relevant page for the Course on the University website or on the online prospectus.

The programme is subject to the University's Principles, Policies and Regulations for the Admission of Students to Undergraduate and Taught Postgraduate Programmes (in [UPR SA03](#)), along with associated procedures. These will take account of University policy and guidelines for assessing accredited prior certificated learning (APCL) and accredited prior experiential learning (APEL).

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If you would like this information in an alternative format, please contact:  
Maria Aristidou (m.aristidou@herts.ac.uk)

If you wish to receive a copy of the latest Programme Annual Monitoring and Evaluation Report (AMER) and/or the External Examiner's Report for the programme, please email a request to [aqo@herts.ac.uk](mailto:aqo@herts.ac.uk)

## BSc (Hons) Physics and BSc (Hons) Astrophysics

Table 2: Development of Intended Programme Learning Outcomes in the Constituent Modules

This map identifies where the programme learning outcomes are assessed in the constituent modules. It provides (i) an aid to academic staff in understanding how individual modules contribute to the programme aims (ii) a checklist for quality control purposes and (iii) a means to help students monitor their own learning, personal and professional development as the programme progresses.

		Programme Learning Outcomes (as identified in section 1 and the following page)																															
		Knowledge & Understanding								Intellectual Skills								Practical Skills								Transferable Skills							
Module Title	Module Code	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	C7	C8	D1	D2	D3	D4	D5	D6	D7	D8
Level 4	Mathematical Techniques 1	4PAM1034		x								x																					
	Special Relativity and Quantum Physics	4PAM1066	x							x								x	x														
	The Physical Universe	4PAM1013	x		x						x							x															
	Computational Modelling	4PAM1070										x																					
	Small Group Tutorial (Level 4)	4PAM1072	x	x						x	x								x														
	Experimental Physics	4PAM1068			x						x							x									x						
Level 5	Mathematical Techniques 2	5PAM1022		x								x																					
	Career Planning and Development	5PAM1049																								x	x	x					
	Physics of the Solar System	5PAM1050	x			x				x								x	x														
	Extra-solar Planets	5PAM1051	x			x				x								x	x														
	Electromagnetism	5PAM1044	x															x	x														
	Optics and Lasers	5PAM1045	x															x	x														
	Thermodynamics	5PAM1046	x							x								x	x														
	Quantum Mechanics	5PAM1047	x							x																							
	Plasma Physics and Fusion Reactors	5PAM1052	x							x											x					x							
	Differential Equations	5PAM1032		x								x																					
	Programming	5PAM1023		x								x																x					
	Motion and Tensors	5PAM1053		x								x																					
	Numerical Methods	5PAM1029		x								x																					
	Small Group Tutorial (Level 5)	5PAM1048	x	x						x	x								x														
	Professional Teaching Skills	5PAM1025																								x	x	x					

Level 6

		Programme Learning Outcomes (as identified in section 1 and the following page)																															
		Knowledge & Understanding								Intellectual Skills								Practical Skills								Transferable Skills							
Module Title	Module Code	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	C6	C7	C8	D1	D2	D3	D4	D5	D6	D7	D8
Placement Year	6PAM0011														x																		
Year Abroad	6PAM0030															x																	
Placement with Study Abroad	6PAM1033														x	x																	
Condensed States of Matter	6PAM1050	x		x						x	x							x	x							x							
The Physics of Elementary Particles	6PAM1051	x								x																							
Foundations of Cosmology	6PAM1056	x			x					x	x							x	x							x							
The Early Universe and galaxy Formation	6PAM1058	x			x					x	x							x	x							x							
Nonlinear Systems	6PAM1030		x									x																					
Geophysical Fluid Dynamics	6PAM1053	x		x														x	x														
Star Formation and Evolution	6PAM1055	x			x					x	x							x	x							x							
The Physics of Astronomical Spectra	6PAM1057	x			x					x	x							x	x							x							
Space Dynamics	6PAM0027		x							x									x							x	x	x					
Computational Physics	6PAM1004		x									x							x														
Further Numerical Methods	6PAM1027		x									x																					
Quantum Optics and Information Theory	6PAM1059	x	x							x									x							x							
Rocket Performance and Propulsion	6AAD0026		x									x							x														
Partial Differential Equations	6PAM1023		x									x																					
Physics/Astrophysics Project and Investigative Skills	6PAM1052 / 6PAM1054																									x		x					
Lagrangian Dynamics	6PAM1061		x									x																					
Applied Optics and Photonics	6PAM1060	x		x						x	x							x	x							x							



## KEY TO PROGRAMME LEARNING OUTCOMES

### Knowledge and Understanding

- A1. The fundamental concepts, ideas and theories of Physics and Astrophysics; to advanced levels in physics for the Physics award, and to advanced levels in astrophysics for the Astrophysics awards.
- A2. The mathematical and computational techniques used to frame and solve physical problems
- A3. The techniques of practical work in Physics; to advanced levels in physics for the Physics award.
- A4. The techniques of practical work in Astrophysics; to advanced levels in astrophysics for the Astrophysics awards.

### Intellectual Skills

- B1. Formulate and tackle problems in physics and astrophysics; to advanced levels in physics for the Physics award, and to advanced levels in astrophysics for the Astrophysics awards.
- B2. Plan, execute and report the results of an experiment or an investigation; to advanced levels in physics for the Physics award, and to advanced levels in astrophysics for the Astrophysics awards.
- B3. Use mathematics and computing to describe the physical world or an investigation.
- B4. Will have obtained significant practical experience of working in a suitable environment,
- B5. Will have obtained significant practical experience of studying in a foreign country

### Practical Skills

- C1. Perform experimental work and draw conclusions.
- C2. Apply appropriate analytical and modelling techniques to physical problems; to advanced levels in physics for the Physics award.
- C3. Apply appropriate analytical and modeling techniques to astrophysical problems; to advanced levels in astrophysics for the Astrophysics award,

### Transferable Skills

- D1. Communicate effectively, both orally and in writing.
- D2. Work effectively in a team.
- D3. Demonstrate time, personal management and IT skills.

## Section 2

### Programme management

<b>Relevant QAA subject benchmarking statements</b>	Physics, Astronomy and Astrophysics
<b>Type of programme</b>	Undergraduate
<b>Date of validation/last periodic review</b>	October 18
<b>Date of production/ last revision of PS</b>	March 2019
<b>Relevant to level/cohort</b>	September 2020
<b>Administrative School</b>	School of Physics, Astronomy and Mathematics

Table 3 Course structure

Course details		
Course code	Course description	HECOS
EIPHY	BSc/BSc (Hons) Physics and Astrophysics (Physics)	100425

### Programme management

<b>Relevant QAA subject benchmarking statements</b>	Physics, Astronomy and Astrophysics
<b>Type of programme</b>	Undergraduate
<b>Date of validation/last periodic review</b>	October 18
<b>Date of production/ last revision of PS</b>	March 2020
<b>Relevant to level/cohort</b>	September 2020
<b>Administrative School</b>	School of Physics, Astronomy and Mathematics

Course details		
Course code	Course description	HECOS
EIPHYAP	BSc/BSc (Hons) Physics and Astrophysics (Astrophysics)	100415