

School of Physics Engineering and Computer Science

Title of Programme: MSc Astrophysics

Programme Code: PEAPM

Programme Specification

This programme specification is relevant to students entering:
01 September 2021

Associate Dean of School (Academic Quality Assurance):
Dr Mariana Lilley

Signature



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.

Summary of amendments to the programme

Date	Section	Amendment
25.03.2021	D	6AAD0026 was adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	6PAM1055 was adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	6PAM1056 was adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	6PAM1057 was adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.

25.03.2021	D	6PAM1058 was adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	6PAM1061 was adjusted from 80% exam/ 20% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	6PAM2003 was adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	7ENT1111 was adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	7ENT1158 was adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	7PAM1020 was adjusted from 50% exam/ 50% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	7PAM1027 was adjusted from 80% exam/ 20% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	7PAM1030 was adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	7PAM1033 was adjusted from 50% exam/ 50% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	7PAM1035 was adjusted from 50% exam/ 50% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	7PAM1111 was adjusted from 60% exam/ 40% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.
25.03.2021	D	7PAM2010 was adjusted from 50% exam/ 50% coursework to 100% coursework* in the academic year 2021/22, due to the covid pandemic.

* Learning outcomes for this module will be assessed via coursework using alternative modes of assessment. Alternative modes of assessment include, but are not limited to, take home coursework and online timed assessments.

If you have any queries regarding the changes please email AQO@herts.ac.uk

Programme Specification MSc 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

Awarding Institution/Body	University of Hertfordshire
Teaching Institution	University of Hertfordshire
University/partner campuses	College Lane
Programme accredited by	N/A
Final Award (Qualification)	MSc
All Final Award titles	MSc Astrophysics
(Qualification and Subject)	MSc Astrophysics with Advanced Research MSc Astrophysics (Sandwich)
FHEQ level of award	7
Language of Delivery	English

A. Programme Rationale

Studying astrophysics offers a thorough grounding in fundamental physics while exploring cutting edge topics about the Universe, its constituents and structure, and humanity's place within it. Astrophysics students develop important skills in physics research enquiry and problem solving, critical thinking, scientific writing, communication/presentation, and programming/software application. And in addition to opening up a wide range of career opportunities in STEM areas, such study offers a pathway to PhD and potentially an astrophysics research career.

PAM's Centre for Astrophysics Research is an internationally renowned research group, with teaching and research expertise over a wide range of contemporary topics, and a well trodden path from undergraduate study through to professional research. The University's Bayfordbury Observatory is also a major strength, and is a national leader in the field of astrophysics teaching. The Observatory allows our students to study a wide variety of astrophysical phenomena ranging from extra-solar planets to distant galaxy clusters, and processes across many scales from the orbits of earth-crossing asteroids to the expansion of the universe.

This Astrophysics taught Masters programme offers a learning experience that provides a wide range of intellectual and practical skills through taught modules with substantial content at or informed by the forefront of the field. The degrees include a major component of observational astrophysics at the Bayfordbury Observatory, and a major research project supervised by a research expert in the field. The programme teaches modern astrophysical techniques, as well as concepts and theories associated with cutting edge research ranging from extra-solar planets to dark energy. And the degree structure also offers a wide choice of option modules that can cater for student interests focused in a number of different directions; including galactic astrophysics, extra-galactic evolution and cosmology, space science, and theoretical study.

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 based on the fundamental concepts, techniques, and theories of astrophysics, with studies involving current problems and/or new insights that are at or informed by the forefront of the field.
- develop the ability for practical understanding of how established research techniques and enquiry are used to create and interpret knowledge in the physics and astrophysics field.
- provide training that is suited to the abilities and career aspirations of students and which will help them realise their own potential, preparing them for employment in a wide range of sectors and/or postgraduate research in astrophysics.
- develop the ability to approach problem-solving activities using physical insight and laboratory/observatory skills aided where appropriate, by computer-based techniques.
- develop competence in communicating scientific results to other experts and to non-specialists, including the use of computers and software packages for information retrieval, analysis, and presentation.

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 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/learning methods & strategies	Assessment
<p>A1 - A systematic understanding of the fundamental concepts ideas and theories of astrophysics, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of the field.</p>	<p>Acquisition of knowledge and understanding is through a combination of lectures, workshops, problem-based learning, electronic resources, coursework, directed study, feedback from assessment and practical work, as well as project work (A1-A3).</p>	<p>Knowledge and understanding are assessed through a combination of unseen examinations (A1, A2), practical examinations (A3), assessed individual in-course assignments (A1-A5), worked problems (A2, A3), written reports (A1-A4), class tests (A1, A2), project reports (A1-A4), poster/seminar presentations and viva discussion (A1-A4).</p>
<p>A2 - A comprehensive understanding of astrophysical techniques applicable to research investigation and project work.</p>	<p>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.</p>	<p>A6 is assessed by written/verbal reports from the student, the placement organization and the placement tutor.</p>
<p>A3 - A practical understanding of how established research techniques and enquiry, including statistical and computational methods, are used to create and interpret knowledge in the physics and astrophysics field.</p>	<p>A4 is developed across a range of modules including the Masters project.</p> <p>A5 is developed through a variety of L6 option modules.</p> <p>Acquisition of Learning Outcome A6 is through a professional or research placement in a suitable scientific or commercial organization.</p>	
<p>A4 - A conceptual understanding that enables critical evaluation of current areas and methodologies of astrophysics.</p>	<p>Additional support is provided by the Mathematics Drop-In Centre.</p>	

<p>A5 - A systematic understanding of key aspects of additional areas of astrophysics, theoretical physics, optical physics and/or space science, including acquisition of coherent and detailed knowledge, at least some of which is at, or informed by, the forefront of the field.</p> <p>And in the case of placement students.</p> <p>A6 - Contextual knowledge of how to work effectively in a placement environment, alongside professionals or others engaged in scientific or commercial work.</p>		
<p>Intellectual skills:</p>	<p>Teaching/learning methods & strategies</p>	<p>Assessment</p>
<p>B1 - Formulate and tackle problems in astrophysics and related areas, using theory and analysis techniques.</p> <p>B2 – Plan, execute and report the results of an astrophysics/physics experiment or project at a professional level.</p> <p>B3 – Critically discuss the role of uncertainty, approximations, and numerical modelling used in astrophysics.</p> <p>B4 – Critically evaluate arguments, assumptions, abstract concepts and data (that may be incomplete), make judgments, and frame appropriate questions to achieve a solution or identify a range of solutions to a problem.</p> <p>B5 – Effectively and independently explore the scientific literature within a</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 problem solving exercises, workshops, coursework, group-work, laboratory or observatory work and project work.</p> <p>B4 is developed primarily within the Masters Project module.</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), practical examinations (B2, B3), assessed individual in-course assignments (B1), written reports (B2-B4), class tests (B1), project reports (B1-B4), poster/seminar presentations and viva discussion (B1-B4)).</p>

<p>specific area (or areas) and identify the key unanswered questions and the scope of on going research, while critically evaluating the ideas and results at the forefront of the field.</p> <p>B6 – Present and discuss new ideas and established theory in the context of an evolving field of study, while providing good clarity to an audience of scientists in a seminar setting.</p>		
Practical skills:	Teaching/learning methods & strategies	Assessment
<p>C1 - Obtain astronomical data by observation or through database access, reduce the data using appropriate software, and make astrometric/photometric measurements.</p> <p>C2 - Use statistical methods and/or computational techniques to quantify uncertainties and assess measurements.</p> <p>C3 - Interpret measurements through comparison with analytical/modelling predictions.</p> <p>C4 - Produce clear and accurate scientific reports on complex topics.</p> <p>C5 - Make appropriate and effective use of the scientific literature, including peer-reviewed research articles.</p>	<p>Practical skills are developed through a series of observatory practicals at L7 (C1-C5), with additional observatory experience available in L6 optional modules. Practical skills are also developed through the 60 credit project (C2-C5).</p> <p>Throughout, the learner is expected to consolidate their development of practical computing skills by use of appropriate personal computers available in the learning resources centre.</p>	<p>Practical skills are assessed through laboratory reports (C1-C5) and also coursework and assignments (C2, C3).</p> <p>In addition C2-C5 are assessed during the project.</p>
Transferable skills:	Teaching/learning methods & strategies	Assessment
<p>D1 - Retrieve, synthesize, and evaluate information and data from a variety of sources.</p> <p>D2 - Work effectively in a team.</p>	<p>Transferable skills are developed through problem solving workshops (D1, D3), team-work at the observatory (D2), project presentations (D2, D5), individual assignments (D1, D3), practical work and write-ups (D1-D3) and project work (D1, D3-D6).</p>	<p>Transferable skills are assessed through a combination of observatory skill assessment (D2), practical reports (D1-D3), individual assignments (D1, D3), written reports (D1-D3), project posters</p>

D3 - Demonstrate personal time management, as well as taking initiative and responsibility for project work.

D4 - Make decisions in complex and unpredictable situations.

D5 - Communicate effectively, both orally and in writing.

D6 - Continue to advance their knowledge and understanding, and to develop new skills to a high level.

Throughout, the learner is encouraged to develop transferable skills by maintaining a record of evidence and completing a personal development plan.

(D5), and seminars / project viva (D4-D6).

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

The programme is offered in the following modes

- Full-time (1 year), leading to the award of MSc Astrophysics.
- Part-time (2 years), leading to the award of MSc Astrophysics.
- Full-time (2 years), leading to the award of MSc Astrophysics with Advanced Research.
- Full-time (2 years) including a 2nd year work placement in industry, leading to the award of MSc Astrophysics (Sandwich).

The standard 'MSc Astrophysics' degree (1 year full-time or 2 years part-time) is structured to have 90 credits of core level 7 taught modules and a 60 credit level 7 project in semester C (or in year 2 for the part-time route), as well as 30 credits of optional modules at level 6 / level 7.

The 'MSc Astrophysics with Advanced Research' degree (2 years full-time) is structured to have 90 credits of core level 7 taught modules, and a 60 credit level 7 project during year 2. It also includes 60 credits of option modules at level 6 / level 7, and a 30 credit level 7 'Advanced Research Seminars' module that runs in parallel with the project.

The 'MSc Astrophysics (Sandwich)' degree is a 2 year route and includes a work placement which begins in semester C of year 1 and runs through semesters A and B of year 2.

Other (interim) award outcomes are listed in Table 1b. Entry is normally at Masters (7) level (with related qualifications). Intake is normally in semester A (September).

To progress into year 2 of the Sandwich route students must pass their semester A modules in year 1. It is possible to transfer between the Sandwich route and the standard (1 year full-time) route during semester B in year 1, dependent on performance and the arrangement of a placement.

To progress into year 2 of the Advanced Research route students must pass 90 credits in year 1. If they pass 75 credits or less in year 1 they must repeat their failed modules before progressing onto year 2 modules.

On entry into the programme students on all routes have the option to do the 'Data Science Core Skills Boot Camp' module (7PAM2003) to ensure an appropriate level (or offer a revision opportunity) in mathematics, statistics, and Python programming.

On entry into the programme all students will be allocated a personal tutor.

UKVI requirements for over-seas students

The University welcomes international applicants on the programme. The University of Hertfordshire does not typically sponsor students on a student route visa for part-time study. For additional information, please see <https://www.herts.ac.uk/international/new-international-students/coming-to-the-uk>

Professional and Statutory Regulatory Bodies N/A

Work-Based Learning, including Sandwich Programmes

An award in the sandwich mode is made to a student who has successfully completed the requirements for a full-time award, and also successfully completed at least 30 weeks of approved, supervised work experience as defined in UPR AS11. Students are supported by the Careers and Placements Office in finding an industry placement.

Programme Structure

The programme structure and progression information below (Table 1a and 1b) is provided for the 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

MSc Astrophysics (standard 1 year route)

Mode of study Full-time and Part-time (see year/semester structures in last two columns)

Entry point Semester A

Module Title	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Year and semester for full-time route	Year and semester for part-time route
Compulsory Modules								
From Stars to Planets	7PAM2011	15	English	0	100	0	1A	1A
Statistics and Analysis	7PAM1035	15	English	0	100	0	1A	2A
Relativity and Field Theory	7PAM1027	15	English	0	100	0	1A	1A
Research Techniques in Astrophysics	7PAM2010	15	English	0	100	0	1B	1B
Galaxy Structure and Evolution	7PAM1030	15	English	0	100	0	1B	1B
High Energy Astrophysics	7PAM1020	15	English	0	100	0	1B	2B
Astrophysics Masters Project	7PAM2013	60	English	0	100	0	1C	2AB

Optional Modules

(Choose 15 credits in semester A and 15 credits in semester B. 7PAM2003 is a zero credit option at the point of entry)

Module Titles	Module Code	Credit Points	Language of Delivery	% examination	% coursework	% Practical	Year and semester for full-time route	Year and semester for part-time route
Foundations of Cosmology	6PAM1056	15	English	0	100	0	1A	1A
The Physics of Astronomical Spectra	6PAM1057	15	English	0	100	0	1A	1A
Lagrangian Dynamics	6PAM1061	15	English	0	100	0	1A	1A
Applied Photonics	6PAM2003	15	English	0	100	0	1A	1A
Rocket Performance and Propulsion	6AAD0026	15	English	0	100	0	1A	1A
Space Systems *	7ENT1158	15	English	0	100	0	1A	1A
The Early Universe and Galaxy Formation	6PAM1058	15	English	0	100	0	1B	1B
Star Formation and Evolution	6PAM1055	15	English	0	100	0	1B	1B
General Relativity	7PAM1033	15	English	0	100	0	1B	1B
Space Dynamics	6PAM0027	15	English	0	100	0	1B	1B
Aerospace Aerodynamics	7ENT1111	15	English	0	100	0	1B	1B
Data Science Core Skills Bootcamp	7PAM2003	0	English	0	100	0	1A	1A

* This module will run for the first time in 2023/24.

The award of an 'MSc Astrophysics' degree requires 180 credit points (of which at least 150 credits must be at level 7, and up to 30 credits can be at level 6), and that the 'Astrophysics Masters Project' is passed.

MSc Astrophysics with Advanced Research

Mode of study Full-time

Entry point Semester A

Compulsory Modules	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Year and semester for full-time route
From Stars to Planets	7PAM2011	15	English	0	100	0	1A
Statistics and Analysis	7PAM1035	15	English	0	100	0	1A
Relativity and Field Theory	7PAM1027	15	English	0	100	0	1A
Research Techniques in Astrophysics	7PAM2010	15	English	0	100	0	1B
Galaxy Structure and Evolution	7PAM1030	15	English	0	100	0	1B
High Energy Astrophysics	7PAM1020	15	English	0	100	0	2B
Astrophysics Masters Project	7PAM2013	60	English	0	100	0	2AB
Advanced Research Seminars	7PAM2012	30	English	0	100	0	2AB

Optional Modules

(Choose 15 credits in year 1 semester A, 30 credits in year 1 semester B, and 15 credits in year 2 semester A. 7PAM2003 is a zero credit option at the point of entry)

Module Titles	Module Code	Credit Points	Language of Delivery	% examination	% coursework	% Practical	Year and semester
Foundations of Cosmology	6PAM1056	15	English	0	100	0	1A
Lagrangian Dynamics	6PAM1061	15	English	0	100	0	1A
Rocket Performance and Propulsion	6AAD0026	15	English	0	100	0	1A
The Early Universe and Galaxy Formation	6PAM1058	15	English	0	100	0	1B
Star Formation and Evolution	6PAM1055	15	English	0	100	0	1B
General Relativity	7PAM1033	15	English	0	100	0	1B
Space Dynamics	6PAM0027	15	English	0	100	0	1B
Aerospace Aerodynamics	7ENT1111	15	English	0	100	0	1B
The Physics of Astronomical Spectra	6PAM1057	15	English	0	100	0	2A
Applied Photonics	6PAM2003	15	English	0	100	0	2A
Space Systems *	7ENT1158	15	English	0	100	0	2A
Data Science Core Skills Bootcamp	7PAM2003	0	English	0	100	0	1A

* This module will run for the first time in 2023/24.

The award of an 'MSc Astrophysics with Advanced Research' degree requires 240 credit points (of which at least 180 credits must be at level 7, and up to 60 credits can be at level 6). The 'Astrophysics Masters Project' must be passed, and the 'Advanced Research Seminars' module must also be passed.

MSc Astrophysics (Sandwich)

Mode of study Full-time

Entry point Semester A

Compulsory Modules

Module Title	Module Code	Credit Points	Language of Delivery	% Examination	% Coursework	% Practical	Year and semester
From Stars to Planets	7PAM2011	15	English	0	100	0	1A
Statistics and Analysis	7PAM1035	15	English	0	100	0	1A
Relativity and Field Theory	7PAM1027	15	English	0	100	0	1A
Research Techniques in Astrophysics	7PAM2010	15	English	0	100	0	1B
Galaxy Structure and Evolution	7PAM1030	15	English	0	100	0	1B
High Energy Astrophysics	7PAM1020	15	English	0	100	0	1B
Astrophysics Masters Project	7PAM2013	60	English	0	100	0	2C
Work Placement	7PAM2014	0	English	0	100	0	1C+2AB

Optional Modules

(Choose 15 credits in semester A and 15 credits in semester B. 7PAM2003 is a zero credit option at the point of entry)

Module Titles	Module Code	Credit Points	Language of Delivery	% examination	% coursework	% Practical	Year and semester
Foundations of Cosmology	6PAM1056	15	English	0	100	0	1A
The Physics of Astronomical Spectra	6PAM1057	15	English	0	100	0	1A
Lagrangian Dynamics	6PAM1061	15	English	0	100	0	1A
Applied Photonics	6PAM2003	15	English	0	100	0	1A
Rocket Performance and Propulsion	6AAD0026	15	English	0	100	0	1A
Space Systems *	7ENT1158	15	English	0	100	0	1A
The Early Universe and Galaxy Formation	6PAM1058	15	English	0	100	0	1B
Star Formation and Evolution	6PAM1055	15	English	0	100	0	1B
General Relativity	7PAM1033	15	English	0	100	0	1B
Space Dynamics	6PAM0027	15	English	0	100	0	1B
Aerospace Aerodynamics	7ENT1111	15	English	0	100	0	1B
Data Science Core Skills Bootcamp	7PAM2003	0	English	0	100	0	1A

* This module will run for the first time in 2023/24.

The award of an 'MSc Astrophysics (Sandwich)' degree requires 180 credit points (of which at least 150 must be at level 7), that the 'Astrophysics Masters Project' must be passed, and that at least 30 weeks of approved, supervised work experience at a placement company/institute is successfully undertaken.

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 (normally):	Programme Learning Outcomes developed (see above)
Masters	Astrophysics	180 credit points including at least 150 at level 7	3 Semesters	A1-A5, B1-B4, C1-C5, D1-D6 (see Table 2)
Masters	Astrophysics with Advanced Research	240 credit points including at least 180 at level 7	4 Semesters	A1-A5, B1-B6, C1-C5, D1-D6
Masters	Astrophysics (Sandwich)	180 credit points including at least 150 at	6 Semesters	A1-A5, A6, B1-B4, C1-C5, D1-D6

Interim Award	Award Title	level 7		Programme Learning Outcomes developed (see above)
		Minimum requirements	Available at end of Level	
Postgraduate Diploma	Astrophysics	120 credit points, including at least 90 at level 7	2, 3 Semesters	A1, A2, A3, B1, B2, B3, C1, C2, C4, C5, D1, D2, D3
Postgraduate Certificate	Astrophysics	60 credit points, including at least 45 at level 7	1-2 Semesters	A1, A2, A5, B1, D1

Masters and Diploma awards can be made "with Distinction" or "with Commendation" where criteria as described in [UPR AS14](#), Section D and the students' handbook are met.

Programme-specific assessment regulations

The programme is compliant with the University's academic regulations (in particular, [UPR AS11](#), [UPR AS12/UPR AS13](#) and [UPR AS14](#)) with the exception of those listed below, which have been specifically approved by the University
None

Further points of clarification and interpretation relevant to this specific programme are given below:

- To be eligible for any of the above awards a student must attain pass grades in the compulsory modules listed in Table 1a.
- In the case of the 'MSc Astrophysics (Sandwich)' degree, students must perform satisfactorily during the placement as assessed by the Professional Training Certification Panel.

E. Management of Programme & Support for student learning

Management

The programme is managed and administered through:

- A Programme Leader, who has overall responsibility for the effective operationalization of the programme, and ensuring that academic standards are maintained and an effective student learning experience is provided. The Programme Leader also has overall responsibility for the quality assurance and enhancement of the programme providing advice and guidance to programme staff as appropriate. In addition the Programme Leader advises students about programme structure and regulations.
- A Programme Team led by the Programme Leader to assist with the operationalization of the programme and maintaining academic standards and student learning experience. The Programme Team includes Principal Technical Officers at Bayfordbury and a Level 7 Year Tutor (who also monitors student special needs issues and attendance).
- Project Supervisors who in addition to supervising the 60 credit 'Astrophysics Masters Project' module also provide personal tutoring (academic and pastoral support) to their supervised student/s.
- A designated Programme Administrator.
- An Admissions Tutor with specific responsibility for open days and selection.
- Placement Tutors to oversee students on the "MSc Astrophysics (Sandwich)" degree, while they are undertaking their industrial/research placement.
- Module Leaders to advise students about module-specific issues.
- Student representatives and advocates who are members of a Programme Committee.
- A Student Handbook and Programme Canvas site, to explain the programme, the student support services that are available, and to provide a calendar describing the time-line of the programme within the academic year.
- Head of Department.

- Associate Dean (AQA).
- Associate Dean (L&T).
- Dean of School.

Support

Students are supported by:

- An Induction week at the beginning of each new academic session.
- An Overseas Orientation Programme at the beginning of each new academic session, including English language support.
- Module delivery information given out at the commencement of each module.
- Technical support and supervision in the physics laboratories.
- Technical and practical support and advice at the Bayfordbury Observatory.
- The Physics, Astronomy & Mathematics (PAM) Industrial Training Placements Officer.
- Computing laboratories.
- StudyNet, a versatile on-line inter-active intranet and learning environment.
- Guided student-centred learning through the use of StudyNet.
- Access to extensive digital and print collections of information resources.
- Attractive modern study environment in Learning Resources Centres.
- Help Desks in both the Learning Resources Centres.
- A Mathematics Support Service.
- A Department Equality Committee.
- A Careers and Employment Service for all current students and graduates to advise on opportunities for industrial placement, further study and employment.
- A substantial Student Centre that provides advice on issues such as finance, University regulations, legal matters, accommodation, international student support including visas etc.
- A Student Counseling Service that offers counseling and advice, runs workshops to help with examination worries and other concerns, and sets up Study Needs Agreements to help students with special-needs related study issues.
- Office of Dean of Students, incorporating Chaplaincy, Counseling and Nursery.
- The University Medical Centre.
- The University Disability Advisors.
- The Students' Union.
- On-campus accommodation, University head-tenancy accommodation, on-site catering and entertainment facilities, permits for on-site parking (limited) and a Day Nursery for pre-school children.

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>

G. Entry requirements

The normal entry requirements for the programme are:

- A good (2.1 or above) Honours degree (or equivalent) in physics, astrophysics, or a closely related subject, where the degree is accredited by a Professional Statutory Regulatory Body such as the IoP (or a body of equivalent standing in a related subject or overseas).

Students who wish to join the course with a 2.2 may be considered on a case-by-case basis, where entry may be possible based on additional information and/or an interview.

It is not possible for students who have already obtained the MPhys (Physics) degree (PMMPHY) or MPhys (Astrophysics) degree (PMMPHYAP) to register on the Astrophysics MSc.

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).

If you would like this information in an alternative format please contact:
Hutton Hub Student Administration Services hhaq@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

MSc 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	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	D1	D2	D3	D4	D5	D6	
From Stars to Planets	7PAM2011	x	x					x									x	x	x		x				
Research Techniques in Astrophysics	7PAM2010	x	x	x				x	x	x				x	x		x	x	x	x	x				
Statistics and Analysis	7PAM1035			x						x					x				x						
Galaxy Structure and Evolution	7PAM1030	x	x					x										x							
Relativity and Field Theory	7PAM1027	x						x																	
High Energy Astrophysics	7PAM1020	x		x				x	x					x	x		x	x	x	x	x				
Astrophysics Masters Project	7PAM2013	x	x	x	x			x	x	x	x					x	x	x	x		x	x	x	x	
Foundations of Cosmology	6PAM1056		x	x		x		x	x					x	x	x	x	x	x	x	x				
The Early Universe and Galaxy Formation	6PAM1058		x			x		x																	
The Physics of Astronomical Spectra	6PAM1057		x			x		x																	
Star Formation and Evolution	6PAM1055		x	x		x		x	x					x	x	x	x	x	x	x	x				
Lagrangian Dynamics	6PAM1061					x		x																	
General Relativity	7PAM1033					x		x																	
Applied Photonics	6PAM2003			x		x		x	x						x	x	x	x	x		x				
Space Dynamics	6PAM0027					x		x									x	x					x		
Rocket Performance and Propulsion	6AAD0026					x		x																	
Aerospace Aerodynamics	7ENT1111					x		x																	
Space Systems	7ENT1158					x		x																	
Data Science Core Skills Bootcamp	7PAM2003			x				x							x										

MSc Astrophysics with Advanced Research

Master's Programme Specification / November 2020/
AS Review Date June 2021

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	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	D1	D2	D3	D4	D5	D6
From Stars to Planets	7PAM2011	x	x					x									x	x	x		x			
Research Techniques in Astrophysics	7PAM2010	x	x	x				x	x	x				x	x		x	x	x	x	x			
Statistics and Analysis	7PAM1035			x						x					x				x					
Galaxy Structure and Evolution	7PAM1030	x	x					x										x						
Relativity and Field Theory	7PAM1027	x						x																
High Energy Astrophysics	7PAM1020	x		x				x	x					x	x		x	x	x	x	x			
Astrophysics Masters Project	7PAM2013	x	x	x	x			x	x	x	x					x	x	x	x		x	x	x	x
Advanced Research Seminars	7PAM2012	x	x	x	x					x	x	x	x					x			x	x	x	x
Foundations of Cosmology	6PAM1056		x	x		x		x	x					x	x	x	x	x	x	x	x			
The Early Universe and Galaxy Formation	6PAM1058		x			x		x																
The Physics of Astronomical Spectra	6PAM1057		x			x		x																
Star Formation and Evolution	6PAM1055		x	x		x		x	x					x	x	x	x	x	x	x	x			
Lagrangian Dynamics	6PAM1061					x		x																
General Relativity	7PAM1033					x		x																
Applied Photonics	6PAM2003			x		x		x	x						x	x	x	x	x		x			
Space Dynamics	6PAM0027					x		x									x	x						x
Rocket Performance and Propulsion	6AAD0026					x		x																
Aerospace Aerodynamics	7ENT1111					x		x																
Space Systems	7ENT1158					x		x																
Data Science Core Skills Bootcamp	7PAM2003			x				x							x									

MSc Astrophysics (Sandwich)

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	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	D1	D2	D3	D4	D5	D6
From Stars to Planets	7PAM2011	x	x					x									x	x	x		x			
Research Techniques in Astrophysics	7PAM2010	x	x	x				x	x	x				x	x		x	x	x	x	x			
Statistics and Analysis	7PAM1035			x						x					x				x					
Galaxy Structure and Evolution	7PAM1030	x	x					x										x						
Relativity and Field Theory	7PAM1027	x						x																
High Energy Astrophysics	7PAM1020	x		x				x	x					x	x		x	x	x	x	x			
Astrophysics Masters Project	7PAM2013	x	x	x	x			x	x	x	x					x	x	x	x		x	x	x	x
Work Placement	7PAM2014						x													x	x			
Foundations of Cosmology	6PAM1056		x	x		x		x	x					x	x	x	x	x	x	x	x			
The Early Universe and Galaxy Formation	6PAM1058		x			x		x																
The Physics of Astronomical Spectra	6PAM1057		x			x		x																
Star Formation and Evolution	6PAM1055		x	x		x		x	x					x	x	x	x	x	x	x	x			
Lagrangian Dynamics	6PAM1061					x		x																
General Relativity	7PAM1033					x		x																
Applied Photonics	6PAM2003			x		x		x	x						x	x	x	x	x		x			
Space Dynamics	6PAM0027					x		x									x	x						x
Rocket Performance and Propulsion	6AAD0026					x		x																
Aerospace Aerodynamics	7ENT1111					x		x																
Space Systems	7ENT1158					x		x																
Data Science Core Skills Bootcamp	7PAM2003			x				x							x									

KEY TO PROGRAMME LEARNING OUTCOMES

Knowledge and Understanding

- A1. A systematic understanding of the fundamental concepts ideas and theories of astrophysics, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of the field.
- A2. A comprehensive understanding of astrophysical techniques applicable to research investigation and project work.
- A3. A practical understanding of how established research techniques and enquiry, including statistical and computational methods, are used to create and interpret knowledge in the physics and astrophysics field.
- A4. A conceptual understanding that enables critical evaluation of current areas and methodologies of astrophysics.
- A5. A systematic understanding of key aspects of additional areas of astrophysics, theoretical physics, optical physics and/or space science, including acquisition of coherent and detailed knowledge, at least some of which is at, or informed by, the forefront of the field.
- A6. Contextual knowledge of how to work effectively in a placement environment, alongside professionals or others engaged in scientific or commercial work.

Intellectual Skills

- B1. Formulate and tackle problems in astrophysics and related areas, using theory and analysis techniques.
- B2. Plan, execute and report the results of an astrophysics/physics experiment or project at a professional level.
- B3. Critically discuss the role of uncertainty, approximations, and numerical modelling used in astrophysics.
- B4. Critically evaluate arguments, assumptions, abstract concepts and data (that may be incomplete), make judgments, and frame appropriate questions to achieve a solution or identify a range of solutions to a problem.
- B5. Effectively and independently explore the scientific literature within a specific area (or areas) and identify the key unanswered questions and the scope of on going research, while critically evaluating the ideas and results at the forefront of the field.
- B6. Present and discuss new ideas and established theory in the context of an evolving field of study, while providing good clarity to an audience of scientists in a seminar setting.

Practical Skills

- C1. Obtain astronomical data by observation or through database access, reduce the data using appropriate software, and make astrometric/photometric measurements.
- C2. Use statistical methods and/or computational techniques to quantify uncertainties and assess measurements.
- C3. Interpret measurements through comparison with analytical/modelling predictions.
- C4. Produce clear and accurate scientific reports on complex topics.
- C5. Make appropriate and effective use of the scientific literature, including peer-reviewed research articles.

Transferable Skills

- D1. Retrieve, synthesize, and evaluate information and data from a variety of sources.
- D2. Work effectively in a team.
- D3. Demonstrate personal time management, as well as taking initiative and responsibility for project work.
- D4. Make decisions in complex and unpredictable situations.
- D5. Communicate effectively, both orally and in writing.
- D6. Continue to advance their knowledge and understanding, and to develop new skills to a high level.

Section 2

Programme management

Relevant QAA subject benchmarking statements	Physics
Type of programme	Taught Postgraduate
Date of validation/last periodic review	February 21
Date of production/ last revision of PS	February 21
Relevant to level/cohort	Level 7 entering September 2021
Administrative School	School of Physics Engineering and Computer Science

Table 3 Course structure

Course details		
Course code	Course description	HECOS
PEAPM	MSc Astrophysics	100415 (75%), 100425 (10%), 100116 (10%), 100426 (5%)
PEAPARM	MSc Astrophysics with Advanced Research	100415 (75%), 100425 (10%), 100116 (10%), 100426 (5%)
PEAPM	MSc Astrophysics (Sandwich)	100415 (75%), 100425 (10%), 100116 (10%), 100426 (5%)