

Physics



Physics | Astrophysics | Physics with Planetary and Space Physics | Engineering Physics | Mathematical and Theoretical Physics | Space Science and Robotics

TOP 4
IN THE UK
AND 1st IN WALES

*** NSS 2016 ***

FOR STUDENT
SATISFACTION

Department of Physics

Physics has been taught at Aberystwyth ever since the University first opened in 1872. We are committed to small-group and laboratory-based teaching and we place a strong emphasis on project work where you can share our passion for the subject in our specialist areas of space, materials and quantum physics.

Our dedicated staff will ensure you develop your learning and understanding in our superb teaching spaces effectively, and within a caring environment.

Our scientists are some of the UK's leading experts, and are involved in projects ranging from engineering new materials and instruments to planetary missions and ground-breaking studies of the Sun's activity.

OVER 92% OUR GRADUATES WERE IN EMPLOYMENT OR FURTHER STUDY WITHIN 6 MONTHS OF GRADUATION

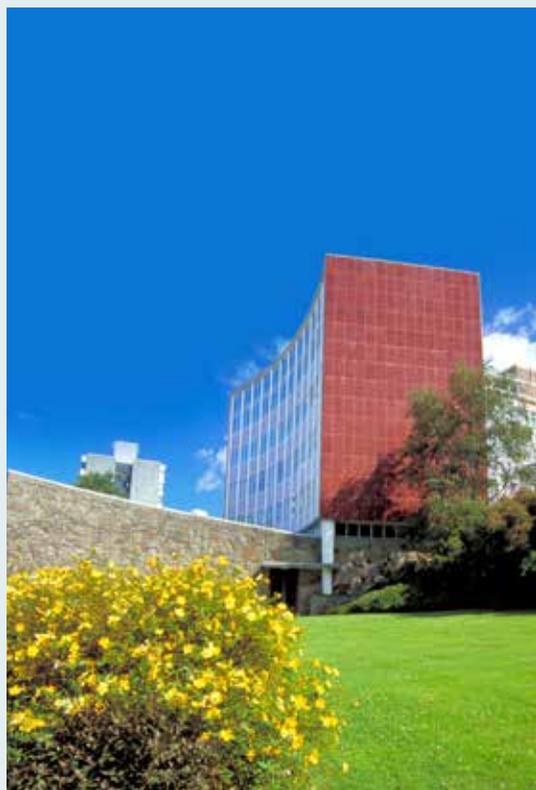
Physics is a brilliant subject to study and the discipline brings rigour and versatility to whatever you do. Simple at heart, physics travels everywhere, feeding all the new sciences and fostering the most modern technology.

Professional Accreditation

Most of our courses are accredited by the Institute of Physics (IOP) to ensure you have a firm grounding in all areas of physics, along with the opportunity to develop your specialist interests.

Facilities

The Department is housed in an architecturally-recognised building that once featured on a postage stamp. Most physics text books and research journals are both available online and conveniently housed in the Physical Science Library, found in the same building as the Physics teaching laboratories, staff rooms and some lecture theatres. We are also proud to house



the Scott-Blair Library which is one of the finest collections of books on fluid mechanics in Britain.

The main University library is the Hugh Owen Library, which houses general reference works, and the National Library of Wales, one of only five copyright libraries in the UK is situated next to the campus.



A DEPARTMENT WITH OVER 140 YEARS OF EXCELLENCE IN TEACHING AND RESEARCH

Our physics laboratories are well-equipped and computers let us control complicated experiments, analyse large data sets, and help us produce virtual models of the real world. The Department deploys considerable computer power as a routine part of its work – this includes a multi-million pound investment in powerful super-computers and advanced visualisation graphics. The University offers you an extensive range of computing facilities. These include a wide range of workstations which provide access to mathematical databases and computer aided learning packages. Workstation rooms are located in the Physical Sciences Building, and in University accommodation.

FRIENDLY AND CLOSE-KNIT RELATIONSHIPS BETWEEN STAFF AND STUDENTS

Studying through the medium of Welsh

The Department has a long tradition of supporting our students to study physics through the medium of Welsh. Lectures are reinforced by the option of Welsh medium tutorials, workshops, feedback seminars and other Welsh medium experiences. Some modules are offered completely through the medium of Welsh. We work closely with the Coleg Cymraeg Cenedlaethol (CCC) with the aim of expanding and improving the range of Welsh medium education available and some of our course are eligible for the CCC's Scholarships.

Societies

The Aberystwyth Physics Society is one of the biggest and most active academic societies at Aberystwyth University. They hold weekly socials and regular guest lectures, as well as running a yearly trip to various locations.

Our degree schemes

We offer a variety of options for the study of Physics – from the foundation degree, single honours schemes, joint degrees in collaboration with different subject areas, Major/Minor degree schemes and Integrated Masters degrees. Please see our website for the full list of subject combinations available.

Project Work

At Aberystwyth, you will acquire the critical skills of experimentation and data assessment. Project work allows you to undertake experiments using the latest equipment and modelling using advanced computers and can involve working directly with research groups in the Department. Several projects have led to publications in research journals. Recent projects have included observational solar-astrophysics, laser holography, organic solar cells and computer-controlled observation of star clusters.

THE UNIVERSITY WAS THE FIRST TO TEACH PHYSICS IN WALES, AND IT HAS BEEN TAUGHT HERE EVER SINCE

Our degree schemes

Physics

Understanding the laws of physics underpins the whole of modern science and technology. It involves the application of abstract concepts expressed through mathematics to model and predict the behaviour of systems ranging in scale from the sub-atomic to the galactic. Physics at Aberystwyth explores areas as diverse as quantum technology, the theory of relativity, and solid-state physics.

Our research-led teaching staff will provide you with specialist knowledge and practical skills, covering exciting topics such as quantum control, computational physics, advanced materials, nano-science, optics, lasers and instrumentation.

You will be taught through a complementary set of teaching and learning methods and approaches, and a strong emphasis is placed on project work which is linked to active research interests. Our researchers also teach, bringing to the lectures their up-to-date specialist knowledge, along with the advanced instrumentation, modelling and techniques needed for cutting edge research.

You can study Physics for three years to gain a BSc qualification, or choose the four-year MPhys course for a more in-depth exploration of the subject that which provides a broader and deeper exposure to the concepts, methods and phenomena of physics. It has the added benefit that you will be entitled to apply for government funding for the entire duration of your course.

The opportunity to spend a year in industry

The BSc and MPhys Physics courses are also available with an industrial work placement during your third year. This is an excellent opportunity to put what you have learned into practice and gain valuable work experience. Returning to the University for your fourth year, you will undertake a specialist project under the guidance of your personal project supervisor, which will include a review of the scientific literature in your chosen



field, experimental and laboratory work, and the presentation of your findings in written and oral form.

The UCAS code for the 4 year BSc in Physics (including Integrated and Industrial Professional Training) is: F304 and the UCAS code for the 5 year MPhys in Physics (including Integrated and Industrial Professional Training) is: F305. The entry requirements are as per the Key Facts box below.

Key Facts

Degree type: BSc or MPhys

UCAS code: F300 for BSc, F303 for MPhys

Duration: 3 years for BSc or 4 years for MPhys

Entry requirements BSc: BBC with B in Physics and B in Mathematics

Entry requirements MPhys: BBB with B in Physics and B in Mathematics

IB: 28 points with 5 in Higher Level Physics and Mathematics

Available with (joint honours or major) for BSc: Business and Management, Computer Science, Education and Mathematics.



Physics with a Foundation Year

This four-year degree scheme includes a foundation year and is offered to those who may not have the normal entry requirements to immediately enter the three-year BSc Physics course. The foundation year will provide you with a firm grounding in core physical concepts whilst exploring the breadth of Physics through a range of exciting specialist modules. Following the foundation year you can continue your studies on the single honours Physics course or you have the option to transfer to any of our other physics degree schemes.

Key Facts

Degree type: BSc

UCAS code: F301

Duration: 4 years

Entry requirements: Available to candidates without formal qualifications who have suitable background education, experience and motivation

TOP 10 IN THE UK FOR STUDENT SATISFACTION FOR PHYSICS AND ASTRONOMY NATIONAL STUDENT SURVEY 2016

100% STUDENT SATISFACTION
FOR OUR ASTROPHYSICS
DEGREE SCHEME NATIONAL STUDENT SURVEY 2016

Astrophysics

The Astrophysics degree at Aberystwyth incorporates current topics in astronomy alongside a core of fundamental physics to explore the interaction of energy and matter in the near and far universe.

The degree studies areas which include the formation and evolution of the solar system, gas giant and terrestrial worlds, planetary interiors and surfaces, planetary atmospheres, the solar wind, the Sun as a star, comets, red giants, white dwarfs, neutron stars, black holes, galaxies, quasars and cosmology.

Our lecturers are also researchers working at the cutting edge of their respective fields, so you can be confident that your learning experience will be informed by the latest specialist knowledge along with advanced instrumentation, modelling and techniques.

You can choose to study Astrophysics for three years to gain a BSc qualification, or select the four-year MPhys course, which offers broader and more specialist modules, enabling you to develop your interest in a specific field at Masters level. It has the added benefit that you will be entitled to apply for government funding for the entire duration of your course.

Key Facts

Degree type: BSc or MPhys

UCAS code: F510 for BSc, F511 for MPhys

Duration: 3 years for BSc or 4 years for MPhys

Entry requirements BSc: BSc: BBC with B in Physics and B in Mathematics

Entry requirements MPhys: BBB with B in Physics and B in Mathematics

IB: 28 points with 5 in Higher Level Physics and Mathematics

Astrophysics with a Foundation Year

This four-year degree scheme includes a foundation year and is offered to those who may not have the normal entry requirements to immediately enter the three-year BSc Astrophysics course. The foundation year will provide you with a firm grounding in core physical concepts whilst exploring the breadth of Physics through a range of exciting specialist modules. Following the foundation year you can continue your studies on the single honours Astrophysics course or you have the option to transfer to any of our other physics degree schemes. This course is designed for students who have a general interest in astronomy, who may not wish to confine themselves to one particular area. With foundations in the key areas

of physics and astronomy you will develop the essential core and transferable skills required by employers in this discipline that include education, business, and industry.

Key Facts

Degree type: BSc

UCAS code: F512

Duration: 4 years

Entry requirements: Available to candidates without formal qualifications who have suitable background education, experience and motivation

Physics with Planetary and Space Physics

Physics is the fundamental science that underpins our knowledge of how matter and energy interact in the universe. This degree scheme provides you with a core of physics alongside a detailed exploration of the physics of the solar system.

You will cover quantum mechanics, thermal physics and atmospheric physics, and be guided through a range of relevant modules in areas such as the evolution of the solar system, planetary interiors and surfaces, the sun as a star, comets and red giants amongst others.

Our expertise in studying the elegant physical processes of the coupled Solar System informs our teaching, with courses taught by some of the leading researchers in their fields, meaning that you learn about new developments as they happen.

You can choose to study Physics with Planetary and Space Physics for three years to gain a BSc qualification, or opt for the four-year MPhys course which gives you the unique opportunity to spend a semester at UNIS on Svalbard to study atmospheric and space physics in the high arctic. It has the added benefit that you will emerge with a Masters degree and be entitled to apply for government funding for the entire duration of your course.

Key Facts

Degree type: BSc or MPhys

UCAS code: F364 for BSc, F366 for MPhys

Duration: 3 years for BSc or 4 years for MPhys

Entry requirements BSc: BBC with B in Physics and B in Mathematics

Entry requirements MPhys: BBB with B in Physics or Computer Science and B at Mathematics

IB: 28 points with 5 in Higher Level Physics and Mathematics, or Physics and Computer Science

Study on Svalbard

An archipelago of islands spanning latitudes from about 74°N to 81°N far within the Arctic Circle, the island of Svalbard is one of the few unspoilt wilderness areas left on the planet. MPhys students studying Physics with Planetary and Space Physics have the option of spending the entire second semester of their final year studying at Norway's international university in the town of Longyearbyen.

Svalbard is the ideal place to study atmospheric, ionospheric and space physics and students from across the world meet to study advanced courses in polar science. At high latitudes dramatic phenomena occur which are inaccessible elsewhere, such as the stratospheric polar-night vortex, ozone depletion, and the connection of the planet's magnetic field to interplanetary space via the open field lines found at polar latitudes, which produce the famous Northern Lights.

This is an unparalleled opportunity to study physics amidst a dramatic landscape of snow-covered mountains, glaciers, fjords, spectacular aurorae, the midnight sun, and wildlife including polar bears, reindeer, walrus, seals and arctic foxes.



Engineering Physics*

**subject to approval*

Engineering Physics is the application of physical principles and techniques to engineering and technology. This degree provides the knowledge and skills that are required for producing engineering solutions in real-world situations.

The course has a strong practical and IT element and an opportunity to gain expertise in specialist topics such as micro- and nano- electronics, applied photonics, materials design and production, quantum technology, robotics, solar energy and space instrumentation.

Our specialist facilities enable further exploration and experimentation, and will enable you to put what you have learned into practice. You will have use of mechanical, electronics and robotics workshops, materials fabrication and characterisation, optical and space instrumentation and planetary terrain.

You can choose to study Engineering Physics for three or four years to gain a BEng qualification, or opt for the five-year MEng course. Masters level modules allow you to develop your scientific and professional skills in specialist areas. The compulsory year in employment is crucial for gaining practical experience of applying the skills acquired in the first years of study. It has the added benefit that you will be entitled to apply for government funding for the entire duration of your course.

Key Facts

Degree type: BEng or MEng

UCAS code: 179H for BEng, 168F for MEng

Duration: 3 or 4 years for BEng or 5 years for MEng

Entry requirements BEng: BBC with B in Physics and B in Mathematics

Entry requirements MEng: BBB with B in Physics and B in Mathematics

IB: 28 points with 5 in Higher Level Physics and Mathematics



Interdisciplinary schemes

Mathematical and Theoretical Physics

This course will develop your understanding of a wide range of theories and processes in Mathematics and Physics and will teach you to apply the techniques you have learnt in order to solve problems and explore research questions.

The Mathematical and Theoretical Physics degree scheme is designed to cultivate transferable skills including numeracy, problem-solving, reasoning, analysing data, organisational skills, teamwork, and communication skills, to ensure that our graduates are attractive to employers in a wide range of fields.

You can choose to study Mathematical and Theoretical Physics for three years to gain a BSc qualification, or the four-year MMath course for a more in-depth exploration of the subject that provides an ideal basis for embarking on a research

career. It has the added benefit that you will be entitled to apply for government funding for the entire duration of your course.

Key Facts

Degree type: BSc or MMath

UCAS code: F340 for BSc, F341 for MMath

Duration: 3 years for BSc or 4 years for MMath

Entry requirements BSc: ABC with A in Maths and B in Physics, or BBB with B in Physics and B in Mathematics

IB BSc: 28-30 points with 4-5 points in Physics and Mathematics at Higher Level

Entry requirements MMath: ABB with A in Mathematics and B in Physics

IB MMath: 34 points with 6 in Mathematics and 5 in Physics at Higher Level

Space Science and Robotics

Unmanned exploration of the solar system has been one of the outstanding successes of the space age. Most of these spacecraft, orbiters, landers and rovers have been either fully command-controlled from the Earth or have been controlled by on-board programmes. Future missions, and particularly rovers, landing on Mars and more distant planets and moons, will require an ability to act independently of command-control and to adapt their behavior to their surroundings.

This degree scheme will expose you to the foundations of space exploration and will equip you with the skills that meet the requirements and challenges of the space industry. This course combines expertise in solar system and space physics with the space robotics and artificial intelligence of the Department of Computer Science to consider the challenges to be met in robotic exploration of the solar system and their solutions. You will be exposed to the foundations of space exploration. We will equip you with the skills that meet the requirements and challenges of the space industry, as well as the planning and development of future space physics and astrophysics missions.

You can choose to study Space Science and Robotics for three years to gain a BSc qualification, or opt for the four-year MPhysath course for a more in-depth exploration of the subject, with the opportunity to undertake a major final year project linked to current space research. It has the added benefit that you will be entitled to apply for government funding for the entire duration of your course.

Key Facts

Degree type: BSc or MPhys

UCAS code: FH56 for BSc, FH5P for MPhys

Duration: 3 years for BSc or 4 years for MPhys

Entry requirements BSc: BBC with B in Physics or Computer Science and B in Mathematics

IB BSc: 28-30 points with 4-5 points in Physics and Mathematics at Higher Level

Entry requirements MPhys: BBB with B in Physics or Computer Science and B in Mathematics

IB MPhys: 28 points with 5 points in Higher Level Physics and Mathematics, or Physics and Computer Science



Scholarships, Bursaries and Awards

We offer a valuable package of Scholarships and Bursaries for all undergraduate applicants. Our awards provide valuable financial support to ensure that students of all backgrounds can enjoy the benefits of higher education. Further information can be found online: www.aber.ac.uk/scholarships or you can contact the Scholarship Team on: 01970 622065, or by email: marketing@aber.ac.uk.

We also offer Departmental Scholarships worth up to £500 a year. For further details please contact: phys@aber.ac.uk

Open Days and Visiting Days

During the year the University hosts several Open Days, where you can visit all parts of the University. For more information, including dates and registering to attend an Open Day visit our website www.aber.ac.uk/openday phone us on: 01970 622065, or email: openday@aber.ac.uk.

Once you've applied for a place at Aberystwyth, you will automatically be invited to attend a Visiting Day. These visits focus specifically on the course you're interested in, and the Department that is home to that course. You'll have a chance to speak in more depth with our tutors and current students, as well as having a tour of the Department, some of the University's accommodation, and the town.

Important information

The programme information published in this brochure is regularly reviewed and may be subject to change. Prospective students are advised to check the definitive programme information available on our website before making an application, to ensure that the programme meets their needs.





Postgraduate opportunities at Aberystwyth

We are accredited by the STFC for space physics and are partners in an EPSRC Doctoral Training Centre in Diamond Science and Technology.

We offer a range of taught and research degrees which are offered in consultation with three main research groups:

Materials Physics

This group studies the properties of materials at various length scales from the macroscopic to the quantum, using advanced experiments (including central x-ray and neutron facilities) and theory (including High Performance Computing), exploring 3D, 2D materials, 1D nanowires and 0D quantum dots. Specialist sensitive instruments have been designed and built at Aberystwyth to make these exotic structures and to measure their unique properties.

Quantum Structures and Control

This group aims to take the techniques developed for controlling classical systems and extend them to quantum systems. It is widely believed that the main innovations in 21st Century technology will occur at the quantum level, and the Aberystwyth group has made several pioneering contributions to Quantum Information and Quantum Control, especially in quantum complexity, network controllability and quantum coherent feedback control. Our research is interdisciplinary and is at the boundary of mathematical and theoretical physics, engineering and mathematical analysis.

Solar System Physics

This group studies the energy and matter which emerge from the Sun and flow through our heliosphere, interacting with planetary atmospheres and surfaces, and powering many of the processes which shape our world and define the planetary environment we live in. Recent highlights include leading roles in missions to the Moon, Mars and Jupiter. Our four main research themes are Solar Physics, Solar Wind and Heliosphere, planetary Magnetospheres and Ionospheres, and Planetary Surfaces and Robotic Exploration.



- Coastal, campus university
- Guaranteed first year accommodation
- Valuable scholarships and bursaries available
- State-of-the-art, subject specific facilities

For further information contact:

Department of Physics
Physical Sciences Building
Penglais Campus
Aberystwyth University
SY23 3BZ

Tel: 01970 622802

Email: phys@aber.ac.uk

www.aber.ac.uk/en/phys

