School of Physics and Astronomy

Undergraduate Degree Programmes

www.cardiff.ac.uk/physics
Cardiff University School of Physics and Astronomy

WORLD LEADING research

ACADEMIC excellence

HIGH EMPLOYABILITY

Transferable SKILLS

www.cardiff.ac.uk/physics
90% of our graduates were in employment and/or further study six months after graduating.

Friendly Supportive environment
Modern teaching laboratories

Insider Information – Find out more...
Want to know what life at Cardiff is really like?
Our insiders are real students studying a range of subjects. You can read their blogs, post comments and message them on Facebook and Twitter.
To find out more go to: www.cardiff.ac.uk/insiders
Discover the **Cardiff Experience**

**A leading university . . .**

- You’ll be part of a Russell Group university - one of the UK’s world-class universities.
- You can choose from more than 350 degree programmes. The Cardiff University degree is known and respected worldwide with a substantial number accredited by the professions and other external bodies.
- You’ll benefit from outstanding teaching in a research-led environment - Cardiff is ranked in the UK’s top 5 universities for research quality.
- Staff include a Nobel Laureate and numerous Fellows of the Royal Society and other prestigious institutions.

**in an outstanding city . . .**

- You’ll live in a friendly, compact and safe city with all your study, living and leisure needs within walking distance.
- Your money will go further at Cardiff with capital city attractions at provincial prices - including one of the lowest average costs of living for university cities.²

**with able and motivated students . . .**

- You’ll be at a first choice university where demand for places is strong.
- You’ll be studying in an environment with able and motivated students who have high grades at A-level or equivalent.
- You’ll be at an international university with students from more than 100 countries.
- You can be confident of your future prospects - typically, 90% of our students were employed or had entered further study within six months of completing their studies.²
- You’ll be in demand - Cardiff is among the top 25 universities targeted by employers seeking high calibre graduates.³

**who have excellent career prospects.**

Notes
1. Moneysupermarket.com
   Quality of Living Index 2015 / Complete University Guide 2015
2. HESA Destination of Leavers Survey 2014
3. High Fliers Research
   The Graduate Market 2016
Welcome

The Cardiff University School of Physics and Astronomy and its strong teaching and research programmes are growing rapidly.

These are exciting times in Cardiff. Not only will you discover exciting science at its cutting-edge, but you will also be part of a friendly, approachable School, where staff will do their very best to help you develop the skills and abilities which will allow you to be successful in your future career.

We are proud to be involved in many projects representing the frontiers of physics research, with the recent UK-wide Research Excellence Framework ranking the School as 6th in the UK. We build and operate both small and large lasers and investigate the interface between physics and living systems. We work with nano-scale devices, often at extremely low temperatures, exploiting the thermal, magnetic and quantum properties of materials on these tiny scales and we are applying the latest techniques in high-performance computing, and using a range of large scale telescopes around the globe to observe interstellar activity.

Our Astronomy group is continuing to hit the headlines with its groundbreaking research. You may be aware that we are part of the international research project that recently found evidence for the existence of gravitational waves, a discovery that has confirmed Einstein’s original theory. We carry out a wide range of research on many aspects of astronomy, from detailed analyses of stars forming in our galaxy and beyond, to the origin of structure in the Universe.

In your undergraduate research projects you will have the opportunity to do some work in these exciting areas of physics and astronomy. You may eventually choose to pursue a career in scientific research, or use your valuable and highly sought-after skills in other vital areas of industry, education or any one of a wide range of professions. We aim to provide you with the skills to equip you for a rewarding and adaptable professional life, as well as giving you a real insight into the workings of the Universe on the largest and smallest scales.

Cardiff is a thriving capital city and a vibrant centre for entertainment, sport and the arts. It is a great place, and we hope you will join us to share our scientific adventure.

Professor Matt Griffin
Head of Cardiff University
School of Physics and Astronomy

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This brochure will provide you with more details of our programmes. We hope that they will give you more than just a flavour of what we have to offer you. However, we are always ready to answer any questions you may have, by post, telephone or email, or when you come to Cardiff for a visit. You will find the appropriate contacts at the end of this brochure.

Important Legal Information

The contents of this brochure relate to the Entry 2017 admissions cycle and are correct at the time of going to press in August 2016. However, there is a lengthy period of time between printing this brochure and applications being made to, and processed by us, so please check our website [www.cardiff.ac.uk] before making an application in case there are any changes to the course you are interested in or to other facilities and services described here. Where there is a difference between the contents of this brochure and our website, the contents of the website take precedence and represent the basis on which we intend to deliver our services to you.

Any offer of a place to study at Cardiff University is subject to terms and conditions, which can be found on our website [www.cardiff.ac.uk/offers/terms] and which you are advised to read before making an application. The terms and conditions set out, for example, when we might make changes to your chosen course or to student regulations. It is therefore important you read them, and understand them.

If you are not able to access information online please contact us:
Email: enquiry@cardiff.ac.uk
Tel: 029 2087 4455

Your degree: Students admitted to Cardiff University study for a Cardiff University degree.
Cardiff: A capital city

“Cardiff is one of Europe’s youngest capital cities – small enough to be friendly and big enough to offer the best of living in a major city.”

The Complete University Guide 2016
Cardiff is a thriving and attractive city, which is widely recognised as an outstanding place in which to live and study. It combines all the advantages of a compact, friendly and inexpensive location, with the cultural and recreational facilities of a modern capital city.

Cardiff offers everything from the excitement of the city to the peace and tranquility of the nearby coast and countryside. With its distinctive character, good quality of life, and growing national and international reputation, it hosts many high-profile cultural and sporting events, including international rugby, soccer, cricket and motor sport.

When it comes to entertainment, Cardiff is well-equipped to satisfy student needs. There is a multitude of cafés, pubs and nightclubs. The city is home to the world-renowned Welsh National Opera, it boasts prestigious concert venues such as the Wales Millennium Centre, St David’s Hall and the Motorpoint Arena, as well as the iconic Principality (Millennium) Stadium, the National Museum Wales, several theatres and the historic Cardiff Castle.

Cardiff is the location for award-winning television productions, including Doctor Who, Sherlock, Torchwood and Casualty, and the Doctor Who Experience in Cardiff Bay is a popular attraction.

The city is one of the UK’s best shopping destinations, with St David’s Dewi Sant retail centre standing alongside pedestrianised shopping streets, indoor and outdoor markets, and a fascinating network of glass-canopied Victorian and Edwardian arcades.

Cardiff also has more urban green space than any other UK city, and offers easy access to the countryside, coast and mountains.

Lively, elegant, confident, cosmopolitan and ambitious are all words readily used to describe modern-day Cardiff. Together, the city and the University provide students with the ‘Cardiff Experience’, a lifestyle our students remember long after graduation.

Don’t just take our word for it . . .
“Cardiff is a popular student city, relatively inexpensive and with a good range of nightlife and cultural venues”
The Times/Sunday Times Good University Guide 2015

Come and see for yourself . . .
Cardiff benefits from excellent road and rail links with Britain’s other major towns and cities. London, for example, is two hours by train, and the M4 links both the West and South of England, as well as West Wales. Travel to the Midlands and to the North is equally convenient. The journey by road from Birmingham, for example, takes only two hours. The main coach and railway stations are both centrally placed, and Cardiff also benefits from an international airport.

“For Cardiff seems to have it all: grand civic architecture in a breezy waterside location, super-smart city bars and venues just a short hop from lovely countryside.”
Guardian University Guide 2016
Cardiff: A leading university

“Cardiff University is one of Britain’s leading teaching and research universities.”

Telegraph Guide to UK Universities
Cardiff University has an international reputation for excellence in teaching and research, built on a history of service and achievement since 1883, and recognised by our membership of the Russell Group of leading research-led universities.

With attractive and compact campuses, excellent student accommodation, and a hugely popular Students’ Union, all within easy walking distance of each other in a thriving city, it is not surprising that Cardiff is a university of first choice among well-prepared applicants.

We admit approximately 5,000 undergraduate entrants each year, the majority of whom are school and college leavers, and have high grades at A-level or equivalent. While competition for entry is strong, Cardiff is an inclusive university with a good record on widening participation and fair access, and we welcome applications, irrespective of background, from everyone with the potential to succeed at Cardiff University.

The University’s Cathays Park Campus is located in and around the impressive Portland stone buildings, parks and wide tree-lined avenues that form Cardiff’s attractive civic centre. The majority of academic schools are located here - just a few minutes’ walk from the city centre. The three academic schools offering healthcare courses (excluding Optometry and Pharmacy) are based at the Heath Park Campus, approximately one mile away, which is also home to the University Hospital of Wales.

Although dating from 1883, Cardiff is focused on the 21st century, and has modern state-of-the-art buildings and facilities. The University has invested substantially in its estate in recent years and continues to do so today. Most academic schools have benefited from major refurbishment, including new and well-equipped laboratories, lecture theatres, libraries and computing facilities.

International opportunities are available via our Global Opportunity Centre. These include study, work and volunteering placements in 27 EU countries as well as international exchange opportunities. All students also have the opportunity to study a language, in addition to their degree, through the University’s Languages For All programme.

The University takes its environmental, safety and security responsibilities very seriously. It has comprehensive policies in place which are making great savings in energy consumption and, to support the safety and security of all members of the University community and their property, there is 24-hour security cover throughout the campus.

What the Guides say...

“The University is as confident and forward-looking as the city it’s located in, and has an excellent reputation for the quality of its teaching and research.”
Guardian University Guide 2016

“Cardiff is the perennial choice as the Sunday Times best Welsh University. It is the Principality’s only member of the Russell Group of research-led universities and its sole representative in the top 200 of the world rankings.”
The Times/Sunday Times Good University Guide 2015-2016
Living in Cardiff

As a fast developing capital city, Cardiff is a great place to be a student. It’s large enough to offer you an exciting variety of activities and entertainment, but small enough for you to feel comfortable in.
Accommodation

Cardiff offers guaranteed University accommodation, good quality and value, and a range of residences to suit individual preferences and budgets. All undergraduates who accept their offer of a place from Cardiff, on a firm basis, are guaranteed a single occupancy place in University residences during their first year of study.

Please see our website for full details of our accommodation guarantee and associated deadlines: [www.cardiff.ac.uk/residences](http://www.cardiff.ac.uk/residences)

The University is continually investing in its student residences, and the views of students are taken into account at the design stage. Unusually for a civic university, most of our residences are within easy walking distance of lecture theatres, libraries, laboratories, the Students’ Union and city centre.

There are 15 different residences, providing more than 5,500 study bedrooms and students can apply for the residences which best suit their preferences, interests and budgets. Some 70% have en-suite shower and toilet facilities and all halls of residence have computer network connection points and access to Wi-Fi.

Fees depend on the facilities included and whether catered, part-catered or self-catered, but prices compare very favourably with those of other UK universities. Besides managing University property, the Residences Office maintains close links with the private sector and provides assistance to students seeking to rent or share houses or flats.

Student Life

The Students’ Union

Cardiff Students’ Union is one of the biggest, best and most active in Britain. A multi-million pound investment has been made in Union facilities in recent years, which has included a new venue called Y Plas, which at night becomes a nightclub.

Hosting live music, club nights, stand-up comedy, fashion shows and awards ceremonies, there’s lots to keep you entertained from your first day to your last.

Other facilities include a new food court, a bank, a print shop, a hair salon and a bookshop. The Lounge offers IT and Skype facilities, meeting rooms and a “chillout” area, as well as snooker tables and multi-faith prayer room. The Union also has its own letting agency and an Advice and Representation centre. In addition, it is home to CU TV and Xpress Radio (the students’ own TV and radio stations) and more than 200 cultural, political, religious, social, sporting societies and clubs.

Jobshop

Jobshop is the Union’s own student employment service and provides casual, clerical and catering jobs around the University to hundreds of students.

What the Guides say . . .

Cardiff is ranked 3rd amongst the UK’s top cities for quality of life. Research by moneysupermarket examined factors such as cost of living, average disposable income and life satisfaction in the UK’s twelve biggest cities.

Moneysupermarket.com – Quality of Living Index 2015

“The cost of living for a student in Cardiff is generally lower than elsewhere in the UK.”

The Independent A-Z University Guide 2015

“Cardiff has one of the biggest, best and most active students’ unions in the UK and is currently benefiting from a multi-million investment.”

The Complete University Guide 2016
Physicists play a vital role in research and development, pushing forward the frontiers of knowledge and providing the basis for the innovations which revolutionise our world. The contribution of Physics to industry is so fundamental that Physics graduates enjoy almost unrivalled job prospects in terms of variety and availability.

Cardiff University has a large and successful School of Physics and Astronomy. There are 41 members of academic staff who are able to provide for a wide spectrum of interests and specialist subjects. The School recently ranked 6th in the UK for quality in the 2014 Research Excellence Framework (REF). Current research projects attract multi-million pound funding from numerous sources, the most important of which are from government and international physical science space agencies.

The School is part of the multi-million pound Queen’s Buildings complex which also houses The School of Engineering, and the School of Computer Science and Informatics. It has modern well-equipped laboratories, lecture theatres, computing facilities, conference suites, and a project resource centre. Trevithick Library has been completely redesigned to offer a variety of functional yet innovative learning spaces.

There are independent first, second and third year undergraduate Physics laboratories which allow students to gain experience with a variety of experimental methods and equipment. In their final year, when undertaking an independent research project, students are encouraged to work with one of our research groups on a project of their choosing.

The School currently has a total of 365 undergraduate students, recruiting around 100-120 each year. Students are engaged within the learning environment of the School from the outset, and the student-staff panel, weekly tutorials and student questionnaires are ways in which undergraduates feed back their suggestions and experiences to staff. In the latest National Student survey, 96% of our students expressed overall satisfaction with their course, making us one of the best performing Physics departments in the Russell Group, and the UK as a whole. There is a dynamic Physics and Astronomy Society (known as ‘Chaos!’) whose activities and social events contribute to the friendly atmosphere and good staff-student relations.

Flexible degree programmes reflect the breadth and depth of staff members’ research activities. Students can study for a BSc or MPhys degree, choosing from several single and joint honours programmes of three, four or five years’ duration. Preliminary year studies are available as well as professional placements. The core modules of the first and second years give way to a range of options in the later years.

The courses are designed to provide access to applicants with varied educational backgrounds and to be relevant to the wide range of careers pursued by our students following graduation. All of our courses have been accredited by the Institute of Physics.

Studying Physics and Astronomy at Cardiff

Physics is the basic science which lies at the heart of all technology and engineering. Physics and Astronomy degrees are for those who would like to discover the science behind the universe and, at the same time, develop the problem solving skills so valued by employers.
Teaching, Learning and Assessment

Teaching and learning techniques reflect the most up-to-date research about effective methods. Traditional lectures, tutorials and laboratory work are complemented by computer, project and skills-based modules. Learning opportunities also extend beyond the campus with opportunities to attend residential courses in mid-Wales. In addition, you may opt to spend time abroad at other European universities or in a professional placement.

Assessment is thorough and varied, taking into account different learning styles and needs. Assessment may be by exam or based on coursework, presentations, teamwork exercises, written reports or a combination of the above.

Our external examiner reports regularly confirm the robustness of our assessment procedures as evidence of the programmes’ overall quality.

Lectures

A significant part of the teaching is provided by the staff through lectures, typically 8-10 hours weekly. The subject matter is supported by course handouts, summaries and worked examples. Course material is also made available electronically through Cardiff University’s Virtual Learning Environment, ‘Learning Central.’

Laboratory Work

Practical classes of four-hours per week form a key part of all our Physics and Astronomy courses. In the first year, the emphasis is on basic techniques, simple but accurate recording of observations and re-enacting some classic physics experiments. In later years, students progress to substantial experiments requiring planning, analysis and interpretation of results, and reporting to a professional standard. In the final year of both BSc and MPhys courses, you will undertake a major research project within one of our research groups. Particular emphasis is placed on these projects as they enable students to develop their investigative skills and to experience the excitement of ‘real-life’ science research at first hand. Students are able to choose the project that suits them from the wide range of leading edge work within the school. Recent projects have included ‘Extracting gravitational wave signals from noisy data,’ ‘Measurement of radioactivity in small volume samples,’ ‘Herschel observations of exploding stars’ and ‘Electron states in a semiconductor super lattice (Kronig-Penny model), to name just a few.

Information Technology

Information technology is an integral part of the Physics and Astronomy degree programmes. Undergraduates are taught how to use the latest software, develop computational models and to analyse data. All of this is taught on-site within our dedicated undergraduate computing suite.

Small Group Teaching and Tutorials

Small group tutorials and one-to-one meetings with staff provide you with the opportunity to discuss coursework, receive feedback on your work, talk through various career options, and engage in deeper learning about the role of Physics and Astronomy in the wider context of daily life and society. In addition to your academic tutor, you will be assigned a personal tutor, who is a member of the academic staff. Personal tutors are there to advise you on academic, non-academic and personal matters in a confidential and informal manner. As well as having a personal tutor, in your first year you will be partnered with a student mentor. Typically a second year student in the School of Physics and Astronomy, they will guide you through the first few weeks as you settle into University.

Student-Staff Panels

The Student-Staff Panel is the liaison between the School of Physics and Astronomy teaching staff and the undergraduate students. It meets twice a year. Two undergraduate student representatives are appointed from each year group and each subject area to represent the views of the student cohort. The aim of the panel is to allow all students, via their rep, a forum in which to raise any problems they might be experiencing on their course or to bring to the meeting anything positive that the School can incorporate into “best practice” policy.

Your First Year at Cardiff

Your first year at university is an important period - it is a year in which you discover a new way of life and a different and exciting way of learning. We recognise that it is not always easy to decide exactly what degree option best suits your interests. Therefore, we have adopted a flexible first year structure with an essential set of core modules that are common to most courses. This allows a lot of freedom in swapping between most degree programmes by the end of the first year.

The range of modules offered in the first year is designed to stimulate your interest in Physics, whilst giving you a sound foundation to build upon in subsequent years. You will develop scientific, mathematical and computing skills that are at the heart of Physics, as well as acquiring more general attributes such as communication and presentational abilities that are essential in all professional careers.
You can choose to study Physics in depth through one of our Single Honours degrees or take advantage of the link with Mathematics via the Joint Honours programme. All of our Single Honours courses have a common framework in the first year of study allowing you to change your choice of degree should you wish. In the first year you have the opportunity to study a “free-standing” module from another School in the university e.g. you might choose a foreign language, literature or business studies. All of the degree programmes are modular with the equivalent of six modules taken in each of the Spring and Autumn semesters. Most of the modules will contain some element of continual assessment.

Weekly tutorials and exercise classes related to the module content ensure that students have a high level of support within their first year at Cardiff. The second year of the programmes continues to build on the core physics material and extends the range of choice available through optional modules.

The final years of our degrees allow students to specialise and study selected topics in depth. The majority of the modules taken at this stage are optional. A research project forms an important part of the teaching in both years. Both third and fourth year projects are linked to the research work of the school and provide the opportunity for students to work alongside world leading scientists in cutting edge research. The research projects will provide you with important skills for your future career such as presentation skills, report writing and information management.

Courses with a Placement Year
If you choose one of our courses which includes a placement year, then your third year is spent on a professional placement in industry, commerce, government, or another relevant placement provider approved by the University. It is designed to help you further develop your problem solving skills, to enhance your employability, and to gain valuable practical work experience.

MPhys or BSc?
Whether you decide to study for the three-year BSc or the four-year MPhys will depend on the depth to which you wish to study your chosen field and the career that you wish to pursue upon graduation. The final decision as to which degree type you follow can be taken up to the end of your second year, and it is based on your personal aspirations as well as academic performance. The MPhys course gives you the opportunity of studying six modules in greater depth than the BSc course and also to undertake a major research project which will be based in one of the school’s research groups. This is an exciting way of contributing to real research and developing the skills that will enable you to become an effective research scientist in your own right.

Foundation Programme
For those students who do not have the required qualifications or subjects at A-level you might like to undertake a foundation year programme.
Our School of Engineering offers a Foundation Programme which will give you the basic knowledge to enable you to enter a Physics or Engineering degree programme. On successful completion of this programme you will be offered a place on your chosen Physics degree course.

**Entry Requirements**

A typical offer would include three A-levels in the range AAA to ABB. Subjects should include Physics and Maths (not General Studies or Critical Thinking).

For those sitting the International Baccalaureate, we require 34 points overall and scores of 6 in Physics and Maths at higher level.

We welcome applications from those with alternative qualifications. Each application will be assessed individually.

More information is available on our website at: [www.cardiff.ac.uk](http://www.cardiff.ac.uk)

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The Cardiff School of Physics and Astronomy offers a wide range of degree programmes:

- **MPhys Hons Physics (4 years)**: F303
- **MPhys Hons Physics with Astronomy (4 years)**: F3FM
- **MPhys Hons Astrophysics (4 years)**: F510
- **BSc Hons Physics (3 years)**: F300
- **BSc Hons Physics with Astronomy (3 years)**: F3F5
- **BSc Hons Astrophysics (3 years)**: F511
- **BSc Hons Theoretical and Computational Physics (3 years)**: F340
- **BSc Hons Physics with Medical Physics (3 years)**: F350
- **BSc Hons Physics with Professional Placement (4 years)**: F302
- **BSc Hons Physics with Astronomy with Professional Placement (4 years)**: F3FN
- **BSc Joint Hons Mathematics and Physics (3 years)**: FG31
- **MPhys Hons Physics with a Professional Placement (5 years)**: F304
- **MPhys Hons Physics with Astronomy with a Professional Placement (5 years)**: F5F3

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[www.cardiff.ac.uk/physics](http://www.cardiff.ac.uk/physics)
The Physics degree programme starts with the common core of physics modules in the first year and then leads into a selection of modules. The course is designed to give you a broad physics education and in addition supply you with a wide range of mathematical and computational skills.

The MPhys course is designed for those students who have a clear intention of studying Physics to a greater depth than the three year course will allow.

During the first two years, you will study the same selection of core modules as for the BSc then in the third and fourth years you will study a range of core and optional modules. In your fourth year half of your time is spent on a project, which gives you a chance to undertake an extended piece of research work in conjunction with one of the research groups within the School. This is an exciting and challenging way to build upon the experience of project work gained in your third year, to strengthen your confidence to tackle independent research and to develop the skills necessary to explain your work to others both by giving talks and in writing scientific reports.

The large range of project topics available reflects the research interests of the School and run the gamut from computer modelling of complex protein interactions to the characterisation of quantum dot lasers for ultra high speed internet systems. And if you can’t find a project to fire your imagination, you can always develop your own in consultation with the academic staff.
Physics with Medical Physics BSc

(UCAS code: F350)

Advances in modern medicine flow from developments in the underpinning scientific disciplines. In this respect, the contributions of Physics are just as important as those of Biology and Chemistry. Medical Physics is concerned with the application of physical principles to the diagnosis and treatment of human injury, illness and disease. This often finds expression as developments in technology, which includes both instruments and techniques. Examples of the former range from the humble stethoscope (for listening to internal body sounds) and sphygmomanometer (for measuring blood pressure), to sophisticated magnetic resonance scanners (for producing cross-sectional body images) and linear accelerators (for treating cancer with ionising radiation).

Medical Physics techniques vary widely and utilise a range of physical phenomena including electricity, magnetism, ultrasound, radioactivity and the whole spectrum of electromagnetic radiation. In all these applications, precise and accurate measurement is often of great importance and developments have, in large part, been enabled by the startling growth in computing power over the past few decades.

Our course is provided in conjunction with the Cardiff & Vale and Velindre NHS Trusts with the specialised modules being taught by professional medical physicists. It is designed to give you a thorough grounding in Physics and a broad introduction to the major topics in medical physics.

The theoretical and computational modules provide a solid foundation for further theoretical work and enable the use of computers to model complex physical phenomena. This leads to computational models which can be used to simulate a wide range of conditions and processes.

The final year projects are hospital based (mostly at the University Hospital of Wales), and the course provides an excellent basis for a range of careers. Many of our graduates are successful in obtaining places on the UK-wide training scheme for clinical medical physicists run by the Institute of Physics and Engineering in Medicine, while others have undertaken medical physics research or found employment with international medical equipment companies.

Theoretical and Computational Physics BSc

(UCAS code: F340)

This course is aimed at those who want to study Physics but with rather more emphasis on computational physics. The course combines core Physics material with specialist theoretical/computational modules.

Career opportunities in theoretical and computational physics are numerous and exciting. Theoretical physicists often work in close collaboration with experimental physicists. They may spend much of their time developing and experimenting with computer models of systems that are too complicated to model in any other way. Good examples are the Earth’s atmosphere and the modelling of weather systems, areas in which interest has grown rapidly over the last few years. The School has a large and varied group of physicists undertaking theoretical and computational research.

This ranges from the modelling of light-matter interactions in quantum structures, to the numerical simulation of star and galaxy formation. Researchers regularly use super-computers or the School’s state-of-the-art parallel processor.
An astronomy-based course is the ideal degree programme if you are interested in fundamental questions about our Universe and also want to attain a good grounding in Mathematics and Physics, two subjects that should continue to be valuable passports into good graduate careers. At Cardiff, you will be studying in one of the UK’s largest Astronomy groups, putting you in touch with the latest astronomical discoveries. At the same time you will be learning fundamental scientific skills and all the core physics required by the Institute of Physics.

As well as being fascinating, Astrophysics will allow you to use your mathematics and physics skills in situations very different from the ones in which they were originally presented in the lecture theatre – very useful in our rapidly changing world. On graduating you will be fully equipped, either to proceed to astronomical research or to enter any of the fields open to mainstream Physics students.

The Astrophysics degrees are intended for those who want to concentrate on astronomy and provide the opportunity to study the subject in detail and gain a deeper insight through theoretical as well as observational and instrumentation work.

During your first year you will study the core modules listed in this brochure, and in later years you will choose from a selection of modules reflecting our specialised research areas. The MPhys is a four-year degree designed for those students who already know they want to study Astrophysics in more depth than is possible in the three years.

In the first three years you will study most of the same modules as the students involved in the BSc courses. In the final year you will specialise in Astrophysics, spending half of your time completing taught modules and half working on a research project. Your project may involve analysing data from our internationally - or space-based telescopes, trying to understand the physics of the Universe using computer modelling, or maybe detecting extrasolar planets.

The Physics with Astronomy courses are designed for those students who want to obtain a solid grounding in physics, in particular in the techniques of experimental physics, but who are also interested in astronomy.

You will take many of the same modules as the Astrophysics students (a mixture of physics, astrophysics and mathematics), but there is a greater emphasis on work in the laboratory and on practical project work. For those choosing the four-year MPhys course, a combination of modules can be selected from those available to Physics and Astrophysics MPhys students. The same types of final-year projects are available to Physics with Astronomy as to Astrophysics students.

As with the Physics degree programme there is also the possibility of extending the BSc Physics with Astronomy programme by the addition of a professional placement year, in your third year. You will normally be assigned a tutor from the Astrophysics group, who will be an active research astronomer and will keep you in touch with the latest developments in astronomy. On graduating you will be equipped either to proceed to astrophysical research or to enter any of the fields open to other Physics graduates.
Joint Honours courses are designed for the student who wants a broader science base than can be offered by just one School. They give you the opportunity to study half of your course in another School, where you will come across further, more diverse examples of the excellent research carried out at the University. Prospective employers often view the interdisciplinary nature of the joint degree as a positive advantage, since many areas of work require knowledge in different disciplines.

The normal entry requirements are AAB grades at A-level, including A in Mathematics and B in Physics and one other subject (excluding General Studies and Critical Thinking).

Please see our School website at: www.cardiff.ac.uk/physics for further details.

For further information on the modules studied please see pages 18 and 19.
The degree programmes are designed to give you a thorough grounding in the fundamental aspects of Physics and Astronomy and to enable you to exercise as much choice as possible in your course content.

### Year One Programmes – 2016-2017

<table>
<thead>
<tr>
<th>Module code</th>
<th>Module title</th>
<th>Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PX1121</td>
<td>Mechanics and Matter (20-credit Autumn)</td>
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<td>20</td>
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<tr>
<td>PX1122</td>
<td>Mathematical Methods for Physicists I</td>
<td>A</td>
<td>10</td>
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<td>PX1123</td>
<td>Experimental Physics I</td>
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<td>PX1124</td>
<td>The Universe from Particles to Galaxies</td>
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<td>PX1125</td>
<td>Mathematical Practice for Physical Sciences</td>
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<td>PX1126</td>
<td>Engaging Physics (Free-Standing Module run by PHYSX)</td>
<td>A</td>
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</tr>
<tr>
<td>PX1221</td>
<td>Electricity, Magnetism and Waves (20-credit Spring)</td>
<td>S</td>
<td>20</td>
</tr>
<tr>
<td>PX1222</td>
<td>Mathematical Methods for Physicists II</td>
<td>S</td>
<td>10</td>
</tr>
<tr>
<td>PX1223</td>
<td>Experimental Physics II</td>
<td>S</td>
<td>10</td>
</tr>
<tr>
<td>PX1224</td>
<td>Computational Skills for Problem Solving</td>
<td>S</td>
<td>10</td>
</tr>
<tr>
<td>PX1226</td>
<td>How the Human Body Works</td>
<td>S</td>
<td>10</td>
</tr>
<tr>
<td>PX1227</td>
<td>Planet Earth</td>
<td>S</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Free-Standing Module (only available if Autumn FSM not taken)</td>
<td>S</td>
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### Year Two Programmes – 2016-2017

<table>
<thead>
<tr>
<th>Module code</th>
<th>Module title</th>
<th>Semester</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PX2131</td>
<td>The Physics of Fields and Flows (20-credit Autumn)</td>
<td>A</td>
<td>20</td>
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<tr>
<td>PX2132</td>
<td>Introductory Quantum Mechanics</td>
<td>A</td>
<td>10</td>
</tr>
<tr>
<td>PX2133</td>
<td>Intermediate Practical Physics I</td>
<td>A</td>
<td>10</td>
</tr>
<tr>
<td>PX2134</td>
<td>Structured programming</td>
<td>A</td>
<td>10</td>
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<tr>
<td>PX2135</td>
<td>Electronic Instrumentation</td>
<td>A</td>
<td>10</td>
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<tr>
<td>PX2136</td>
<td>The Sun and Stars</td>
<td>A</td>
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<tr>
<td>PX2137</td>
<td>Electricity in the Human Body</td>
<td>A</td>
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<tr>
<td>PX2138</td>
<td>Engaging Physics (Free Standing Module run by PHYSX)</td>
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<td></td>
<td>Free Standing Module</td>
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<tr>
<td>PX2231</td>
<td>Thermal and Statistical Physics (20-credit Spring)</td>
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<td>20</td>
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<tr>
<td>PX2232</td>
<td>Optics</td>
<td>S</td>
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<tr>
<td>PX2233</td>
<td>Intermediate Practical Physics II</td>
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<tr>
<td>PX2234</td>
<td>Synoptic Physics</td>
<td>S</td>
<td>10</td>
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<tr>
<td>PX2235</td>
<td>Synoptic Astrophysics</td>
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<td>10</td>
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<tr>
<td>PX2236</td>
<td>Introduction to Condensed Matter Physics</td>
<td>S</td>
<td>10</td>
</tr>
<tr>
<td>PX2237</td>
<td>Radiation in Medical Diagnosis</td>
<td>S</td>
<td>10</td>
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<tr>
<td>PX2338</td>
<td>Observational Techniques in Astronomy (20-credit Autumn/Spring)</td>
<td>AS</td>
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### Year Four Programmes – 2016-2017

**Key:** A – Autumn   S – Spring   AS – Both semesters  
- Compulsory module   ● Optional module

<table>
<thead>
<tr>
<th>Module code</th>
<th>Module title</th>
<th>Semester</th>
<th>Credits</th>
<th>BSc Physics</th>
<th>MPhys Physics</th>
<th>BSc Theoretical and Computational Physics</th>
<th>BSc Physics with Medical Physics</th>
<th>BSc Physics with Astronomy</th>
<th>MPhys Physics with Astronomy</th>
<th>BSc Astrophysics</th>
<th>MPhys Astrophysics</th>
<th>BSc Joint Maths and Physics</th>
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<tr>
<td>PX4119</td>
<td>Mechanics and Matter (20-credit Autumn)</td>
<td>A</td>
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<td>PX4124</td>
<td>Introduction to General Relativity</td>
<td>A</td>
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<td>PX4125</td>
<td>Instrumentation for Astronomy</td>
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<tr>
<td>PX4127</td>
<td>Magnetsim, Superconductivity and their Applications</td>
<td>A</td>
<td>10</td>
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<td>PX4128</td>
<td>Data Analysis</td>
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<td>10</td>
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<td>PX4130</td>
<td>Quantum Theory of Solids</td>
<td>A</td>
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<tr>
<td>PX4221</td>
<td>Low Dimensional Semiconductor Devices</td>
<td>S</td>
<td>10</td>
<td>●</td>
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<tr>
<td>PX4222</td>
<td>Modern Quantum Optics</td>
<td>S</td>
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<td>PX4223</td>
<td>Physics of the Early Universe</td>
<td>S</td>
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<tr>
<td>PX4224</td>
<td>Advanced General Relativity and Gravitational Waves</td>
<td>S</td>
<td>10</td>
<td>●</td>
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<tr>
<td>PX4229</td>
<td>Interstellar Medium and Star Formation</td>
<td>S</td>
<td>10</td>
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<td>PX4230</td>
<td>Physics and Reality</td>
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</tbody>
</table>
Julie Gould  
MPhys graduate  

I asked some of my fellow students what they most enjoyed about their four years here at the School of Physics and Astronomy, and there was an unrivalled winner: project work. Being able to work on some real science and apply what we had learned in lectures. It was the sort of science that doesn’t go according to plan, hardly provides any significant results, and is very unpredictable. Yet, at the same time it is also exciting, thoroughly enjoyable and very rewarding. Throughout the entire final year we were able to apply our own insights and ideas to physics that was being studied.

We were able to build experiments tailored to our interests, test our theories, and gain a deeper understanding of the scientific method.

Many of our group are going on to quench their thirst for knowledge by studying for a PhD, some of us are going into more commercial routes of research, some of us are leaving science all together, and the rest haven’t decided yet. Maybe some of us will become Nobel Laureates, and some could be the next generation of influential politicians, but whatever routes we decide to take in life, we all know that we will succeed, no matter what. Studying physics has given us the confidence to tackle complex problems head-on, and find ways to overcome even the most challenging tasks that life throws our way.

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Studying physics has given us the confidence to tackle complex problems head-on and find ways to overcome even the most challenging tasks that life throws our way.
Eve North
MPhys graduate

As degrees go it’s intense; I’ve taken Mathematics further than I ever thought possible, solved the most fundamental equations known to man and learnt about the smallest and largest objects in existence. The staff and students are friendly, approachable and so dedicated to education and science it creates an inclusive atmosphere for learning and research. I must also add I have had great fun during this degree, making the best of friends and discovering some crazy, amazing physics along the way. I have enjoyed the experience so much I am about to continue into a PhD at Cardiff entitled ‘Monsters in the Dark’, an investigation into the effect of Black Holes on galaxy formation.

My favourite modules are the cosmology ones in third and fourth year, but I also enjoyed labs with the ever helpful PhD demonstrators. The synoptic module in second year involved solving physics/astrophysics problems in groups within the given 3 hours and really solidified my knowledge of how to apply what I already know to new areas of physics.

The staff and students are friendly, approachable and so dedicated to education and science...

Peri Jones
BSc graduate

I have always had an interest in Medical Physics as I had a few modules in my undergraduate degree. After some work in the first few months of my final year I realised that I enjoyed the research project better than some of the lecturing modules and decided then that I was going to pursue a PhD. As an undergraduate at Cardiff University, I had the knowledge of the city as well as the Student’s union and the physics department and had made many contacts within the University. The Physics department is very student orientated and tries its best to make the teaching experience the best it can be for each student.

The Physics department is very student orientated and tries its best to make the teaching experience the best it can be for each student.

Paul Hegarty
Project Manager, Telecom New Zealand

I am working as a Project Manager in the Information Technology and Communications (ICT) field. I manage the design, build and implementation of IT systems for internal business infrastructure and customer facing IT Solutions. This is a role I would not have been suitably qualified for, as most companies require Prince II qualified Project Managers, had I not completed my degree at Cardiff University.

This is a challenging role and my degree prepared me to carry out such complex work. ICT Project management requires being able to look at a solution from a high level view and often at a very detailed level. The computer programming and electronics modules during my degree allowed me to gain an understanding of systems and their interactions. Alongside this the problem solving skills learnt during the degree were priceless: it is crucial to be able to approach an issue logically, when it arises, and resolve it successfully.

This is a challenging role and my degree prepared me to carry out such complex work.
A good degree in Physics ensures that your skills in these key categories are developed to exceptional levels. The Physics project in the third and fourth year also develops your ability to work by yourself, directing your own research and planning your workload to produce an original piece of work. The final report and presentation of your project also demonstrate that other key skill set – communication.

We also encourage our students to use their time at Cardiff to broaden their horizons and gain further useful employability skills, outside the Physics curriculum.

First and second year students may undertake Free Standing Modules, studying for example Science and Communication, history or a foreign language, for one module per year;

We strongly encourage students to undertake work experience placements, either over the summer break, or by taking a year out to do a Professional Placement;

Many other opportunities exist, and we really encourage you to get involved with the vibrant student life in Cardiff, not only to enhance your enjoyment of your time here, but also to help you build team-working, communication and project management skills.

Examples of Destinations


Professions: Barclays, Clifford Talbot Partnership, FDM Academy, HBOS, Towers Watson.

Public Service: AWE, Intellectual Property Office, GCHQ, HMRC.

Graduates also go on to further study including PhD degrees, MSc programmes and Postgraduate Certificates in Education.

Matt Hutchinson
2016 graduate

I graduated in 2016 and I am now working in Disruptive Technologies as part of the Maritime, Land and Weapons Graduate Scheme. Between my second and third year of academic study, I had the opportunity to undergo a year-long work placement at National Instruments UK, a company specialising in data acquisition and instrument control. During my time there I worked as a member of the applications engineering team, provided with all the training and opportunities that were available to graduate members of the department.

The placement was excellent in helping me develop a broad spectrum of skills, from problem solving to interpersonal. On a day-to-day basis I would be required to work on several problems from professional engineering customers and to balance this workload effectively. Using this knowledge I was even able to take part in complex electronics projects, including developing my own ultrasonic musical instrument, and working as part of a team to build a draughts playing robotic arm!

Overall I cannot recommend the placement year experience enough. It is a fantastic learning experience, allowing insight into a working environment, development of communication skills, and the opportunity for applied problem solving. A placement will make you stand out from the crowd to employers, and stand you in good stead for later graduate life.

Graduation Day is a highlight of your undergraduate experience
Admissions and Entry Requirements

Applications
To be considered for entry onto our courses you should apply online via the UCAS website using the UCAS Apply facility.

To use this facility you need to log on to: www.ucas.com/apply. The website will provide you with information on how to apply and explain the procedure. Applications should be made by mid January. Please check the UCAS website for specific application deadlines.

All eligible applicants are invited to visit the School on one of our UCAS visit days. We do not routinely interview; however, informal interviews may be held on request.

Open Days
You will meet students and staff, providing us with the opportunity of getting to know more about you and enabling you to find out what life is like as a physics student at Cardiff. These visits include tours of the University and School, allowing you to see such facilities as the library, Students’ Union, PC laboratory, experimental laboratories and research facilities. There are illustrated talks describing the courses and demonstrations of the research work carried out in the School. You will have an opportunity to talk to current students as well as have a one-to-one chat with the teaching staff, eat lunch in the refectory, browse the library, etc., so that you can see for yourself what it’s like to be a student at Cardiff.

Entry Requirements
If you are taking or currently studying A-levels, we normally require good grades in three subjects that should include Maths and Physics (but exclude General Studies and Critical Thinking). Students will need to demonstrate proficiency in science practicals where applicable. Applicants must have full A-levels as AS-levels are not sufficient for entry onto BSc or MPhys programmes. A typical offer is in the range of AAA-ABB at A-level.

We normally require a pass at GCSE English language at grade C or above, or IELTS 6.5 (with 5.5 in each skill area). For those students sitting the International Baccalaureate, we require 34 points with 6 in Physics and Maths at higher level.

Other Qualifications
We welcome applications from those with other qualifications including Open University, International Baccalaureate and Welsh Baccalaureate; each application is assessed individually. If you would like to discuss your application before applying, please contact the admissions tutor and you may also visit the School website for further information.

Overseas Applicants
We welcome overseas applicants. Overseas applicants’ qualifications must be comparable to UK qualifications. Please contact the admissions tutor for details.

More information is also available on our website at: www.cardiff.ac.uk/international

Notes for Welsh Language Applicants
We recognise that if you are a Welsh speaker you may feel more comfortable speaking to a Welsh speaking personal tutor. Provided there are Welsh speaking members of staff in your subject area, every effort will be made to allocate a Welsh speaker to you. If you wish, you can also submit your assessed work and take your examinations through the medium of Welsh, regardless of the language of tuition of the course you are following.

Some of the accommodation at Senghennydd Court and Talybont student residences has been allocated for Welsh speakers and learners who would like to be grouped together. If you would like to take advantage of this, please make a note of this on your accommodation form.
Employment
The School and University are able to offer term-time and vacation employment to some undergraduate students. This is operated by the University’s own student employment agency. The School’s Careers and Industry Liaison Officer is also available to offer employment guidance to students.

Equal Opportunities
Cardiff University is committed to promoting equality and diversity in all of its practices and activities, including those relating to student recruitment, selection and admission. The University aims to establish an inclusive culture which welcomes and ensures equality of opportunity for applicants of all ages, ethnicities, disabilities, family structures, genders, nationalities, sexual orientations, races, religious or other beliefs, and socio-economic backgrounds. This commitment forms part of the Equality and Diversity Policy which is available at: www.cardiff.ac.uk/public-information/equality-and-diversity

Applicants with Disabilities/ Special Needs
All offers to study at Cardiff University are made solely on the basis of academic merit. Where applicants have specific requirements that relate to a disability or medical condition, they are encouraged to discuss these with relevant staff in order that appropriate arrangements can be made to ensure the University provides an accessible environment. Specifically, applicants are invited to contact the Disability Adviser who can provide information about the applications procedure, course delivery and access to the physical environment.

Where appropriate, informal visits can be arranged in which applicants can view accommodation and meet academic staff.

The Disability Adviser can be contacted at:

Student Support Centre
50 Park Place
Cardiff
CF10 3AT
Tel: 029 20874844
Email: studentsupport@cardiff.ac.uk

The School of Physics and Astronomy also has a dedicated Disabilities contact in the School Office who can also provide additional guidance and advice.

Tuition Fees and Financial Assistance
The University charges an annual fee which covers all tuition fees, registration and examinations other than the re-taking of examinations by applicants not currently registered. Please note charges for accommodation in University Residences are additional.

Tuition Fees
Please see the following website for more information: cardiff.ac.uk/fees

Scholarships and Bursaries
For more information please visit the following website: www.cardiff.ac.uk/scholarships

Useful websites for information about tuition fees and financial assistance:
Cardiff University website: www.cardiff.ac.uk/fees
Student Support Centre website: www.cardiff.ac.uk/financialsupport
DfES Student Support: www.dfes.gov.uk/studentsupport
Welsh Assembly Student Finance: www.studentfinancewales.co.uk
Student Finance England: www.studentfinanceengland.co.uk
Student Loans Company: www.slc.co.uk

For further information contact:
Dr Chris North
Undergraduate Admissions Tutor
School of Physics and Astronomy
Queen’s Buildings
The Parade
Cardiff CF24 3AA
Tel: 029 2087 6457
Email: admissions@astro.cf.ac.uk

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Tel: 029 2087 4455
Email: RobertsL9@cardiff.ac.uk

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How to find the School
We are located in the multi-million pound Queen’s Buildings complex which also houses the Cardiff School of Engineering and the Cardiff School of Computer Science & Informatics.

The site is very close to the city centre and Cardiff Queen Street station and is easily accessible from University halls of residence.
Got questions about student life? Get them answered at: www.cardiff.ac.uk/insiders

Some of our current students are sharing their experiences online through their Facebook pages, so if you want to know what life as a student at Cardiff is really like, then you can find out now. There is also lots of information about what is happening in Cardiff, including articles written by our students, videos, and much more.

To find out more about the Cardiff School of Physics and Astronomy, please visit our website: www.cardiff.ac.uk/physics

Enquiries
Tel: 029 2087 6457
Email: admissions@astro.cf.ac.uk

School of Physics and Astronomy
Cardiff University
Queens Buildings
The Parade
Cardiff CF24 3AA

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