PHYSICS Courses
UNDERGRADUATE PROGRAMMES 2019/20

WARWICK
THE UNIVERSITY OF WARWICK
The physics course is designed as a broad and flexible education.

Studying for a physics degree gives benefits which last a lifetime, as well as knowledge and skills which are valued by employers generally. Some of these benefits are less tangible than others, such as the pleasure that can come from being able to read about and understand the latest discoveries in science, while others are more specific.

Where these skills are useful in many contexts, they are called generic skills. They include, for example, a practical approach to problem solving, and the ability to reason clearly and to communicate well.

There are two variants of the degree course: the three-year BSc and the four-year MPhys. BSc courses should be seen as part of a general rounded education, which should leave you numerate, articulate and employable.

The four-year course should appeal most to you, if you intend to make direct use of your knowledge of physics after you graduate.

Danny Steeghs
Head, Undergraduate Admissions
THE PHYSICS DEGREE
F303 MPhys
F300 BSc

In the first year, you take essential (core) modules and choose at least one more module from a list of options.

In the second and third years there is considerable freedom to choose modules. By then you will have a good idea of your main interests and be well placed to decide which areas to study in greater depth. In effect you design your own degree.

The option scheme also allows a proportion of modules to be taken from outside of physics. We encourage you not only to consider obvious outside modules, for example in mathematics, but also modules introducing secondary school teaching, business studies, or a modern language.

We have research strengths in a number of branches of physics, and can offer authoritative and coherent accounts of those recent developments likely to be of most interest to you. In the third and fourth years, you will benefit from interacting with our research groups when you undertake research-style projects.

The fourth year includes modules on all the main areas of physics. It will encourage you to reflect more on some of the unsolved problems in physics than is possible in the first three years.
The first year is currently:

**Core**
Mathematics for Physicists (60 Lectures (L)), Classical Mechanics and Relativity (30L), Physics Foundations (30L), Electricity and Magnetism (30L), Programming Workshop (15L), Quantum Phenomena (15L).

There is a key skills module, which everybody takes. This involves conducting experiments in the laboratory, as well as computing and presentation work.

**Options**
You also choose at least one of: Astronomy (15L), Particle Physics (15L).

Physics involves observing nature and identifying the universal laws, which govern its behaviour.

The module on classical mechanics illustrates this well. The laws of mechanics were deduced by Newton after studying observations of planetary motion. They apply to nearly all systems familiar from everyday life as well as many of the phenomena observed in stars and the other planets, some of which are also discussed in the module on Astronomy.

The modules Classical Mechanics and Relativity, and Quantum Phenomena, deal with the breakdown of Newtonian mechanics at speeds close to the speed of light and at short (atomic) distances. Other first year physics modules treat material, which should in part be familiar from A level (electricity, magnetism and heat), but are able to illustrate it with more interesting examples and to bring out better the unifying concepts.

Measurement is central to physics and nearly all discoveries involve experiment. Time spent in the teaching laboratory helps you to develop the skills needed for measurement and the reliable interpretation of data.

You may also take other modules taught within the university under our ‘unusual option’ scheme. We encourage you to explore outside the field of physics. As well as exposing you to alternative ways of thinking, outside modules can help set physics into the context of science as a whole.

To give an impression of the weekly workload of lectures and tutorials, please see overleaf a typical timetable for the first five weeks of the first year.
TIMETABLE

The tutorials involve smaller groups working with a lecturer or postgraduate student.

The idea is to work through examples sheets handed out in the lectures and to discuss any problems with the material. Wednesday afternoons are kept free of teaching as this is the main day for university activities such as sport, drama and music.

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<th>First Year timetable (weeks 1-5) - mornings</th>
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SECOND Year

In the second year everyone currently takes the following modules:

**Core**

Electromagnetic Theory and Optics, Mathematical Methods for Physics, Quantum Mechanics and its Applications, Thermal Physics II. You continue to work in the laboratory as part of the Physics Skills Programme. You also complete library research, data analysis and writing exercises. You choose about a further six modules (not all modules are the same length) from option lists. Currently these are:

**Physics**


**Outside Options**

Interdisciplinary modules like The Challenge of Climate Change, and modules from WBS (Warwick Business School), the Language Centre (Arabic, Chinese, French, German, Japanese, Portuguese, Russian and Spanish), and the Centre for Education Studies (Introduction to Secondary School Teaching).

“Since childhood I had always maintained an interest in energy and electricity, and this was piqued both by the excellent Second Year Module on the Physics of Electrical Power Generation at Warwick and through reading *Sustainable Energy without Hot Air*.

I now work as a staff scientist at Japan Atomic Energy Agency on various radiation and environmental analyses related to the recovery from the 2011 Fukushima Daiichi meltdowns.”

**Alex Malins**
Staff Scientist, Japan Atomic Energy Agency
BSc Physics graduate 2007
The project brings you into contact with a research group where you work alongside research students, technicians and research fellows. The project can give you insights into how research scientists work and think.

You take the modules Quantum Physics of Atoms and Communicating Science. You select further modules from the representative lists below, where we have grouped the physics modules together according to subject matter. Although there is no formal requirement to select a set number of modules from any one list, it is usually better to concentrate on two or three areas.

**Astrophysics**
Astrophysics, Cosmology, Galaxies.

**Classical Physics**

**Quantum Phenomena**
Condensed Matter Physics, Nuclear Physics, The Standard Model.

**Interdisciplinary**

**Outside Options**
Modules from WBS, the Language Centre, the Mathematics, and other departments.

If you are on the three-year BSc course, you will work in a pair on a project chosen from a list of titles suggested by your supervising members of staff.
The Group Project and the laboratory are designed to give experience of those working methods which cannot easily be taught in lecture halls. For the Group Project, you work in groups of five or six to study an area of physics and write a review of the current status of the area.

In the laboratory, you complete some longer and more involved experiments than are possible in the first and second year teaching laboratories.

The rest of the third year consists of a core of compulsory modules covering material which will be assumed by many of the fourth year modules, and modules chosen from lists of options.

**Core**
Quantum Physics of Atoms, Electrodynamics, Mathematical Methods III.

You take further modules from the options listed for the third year of the BSc but must choose at least two of Galaxies, Condensed Matter Physics, The Standard Model and Plasma Electrodynamics.

**THIRD Year - MPhys**

Opting for the MPhys allows you more time to explore the implications of what you have already learnt. This is the idea behind the Group Project and the MPhys laboratory.
FOURTH Year

During the fourth year, you join one of the research groups in the department (experimental or theoretical) and work in pairs on a research project.

The project work gives experience of working more independently. This experience should be valuable in your future career, whether you work as a scientist or not, and can help you make more informed career choices.

You will also take around twelve (not all modules are the same length) of the following modules with at least eight chosen from the list of physics modules. Current lists are:

**Astrophysics**

**Classical Physics**

**Computing**
High Performance Computing in Physics.

**Condensed Matter**
Condensed Matter Physics, Structure and Dynamics of Solids.

**Quantum Theory**
Gauge Theories for Particle Physics, Relativistic Quantum Mechanics, Quantum Theory of Interacting Particles.

**Elementary Particle Physics**
Advanced Particle Physics, Gauge Theories for Particle Physics, Neutrino Physics.

**Outside Options**
There is no formal list of outside options. However, you can follow modules from outside the department provided that the timetable permits this.

INTERCALATED Year

You may also extend the BSc degree by inserting an extra year (usually) between your second and what would otherwise be your third year.

During this ‘intercalated’ year, you would study at a foreign university or laboratory.
PHYSICS WITH BUSINESS STUDIES
FN31 BSc

The departments at Warwick have a tradition of offering as many of their modules as possible to students from other disciplines. However, for those with a particular interest in Business Studies there is the Physics with Business Studies degree.

The course is designed for students who enjoy physics but wish also to develop an interest in management and business. The Warwick Business School (WBS), which is a leading Business School in the country, has pioneered the teaching of management science to undergraduates at British universities.

During the first two years of the degree, you are based in the Department of Physics. You take the core physics modules and an introductory module on business. You would normally take more outside modules including perhaps a foreign language module.

In the third year you transfer to WBS, where you choose four modules from the lists of those available. Each module lasts the whole year and carries 25% of the final year credit.
FIND OUT MORE

HOW TO APPLY
Applications are made through UCAS ucas.com

We do not typically interview applicants. Offers are made based on your predicted and actual grades, along with your personal statement. Occasionally, some applicants may be interviewed, for example candidates returning to study or those with non-standard qualifications. After completing your application through UCAS and being made an offer you will be invited to an offer holder day. warwick.ac.uk/study/undergraduate/apply

OFFER HOLDER DAYS
A perfect opportunity to visit our campus and experience what it is like to be a student at Warwick. warwick.ac.uk/opendays

STUDENT FEES AND FUNDING
We want to ensure that, wherever possible, financial circumstances do not become a barrier to studying at Warwick. We provide extra financial support for qualifying students from lower income families. warwick.ac.uk/study/undergraduate/studentfunding

ACCOMMODATION
Warwick Accommodation has over 6,000 rooms across a range of well-managed self-catering residences. There is an excellent network of support staff in the Residential Life Team. warwick.ac.uk/accommodation

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This course information was accurate at the time of printing. Our course and module content and schedule is continually reviewed and updated to reflect the latest research expertise at Warwick, so it is therefore very important that you check the website for the latest information before you apply and when you accept an offer.