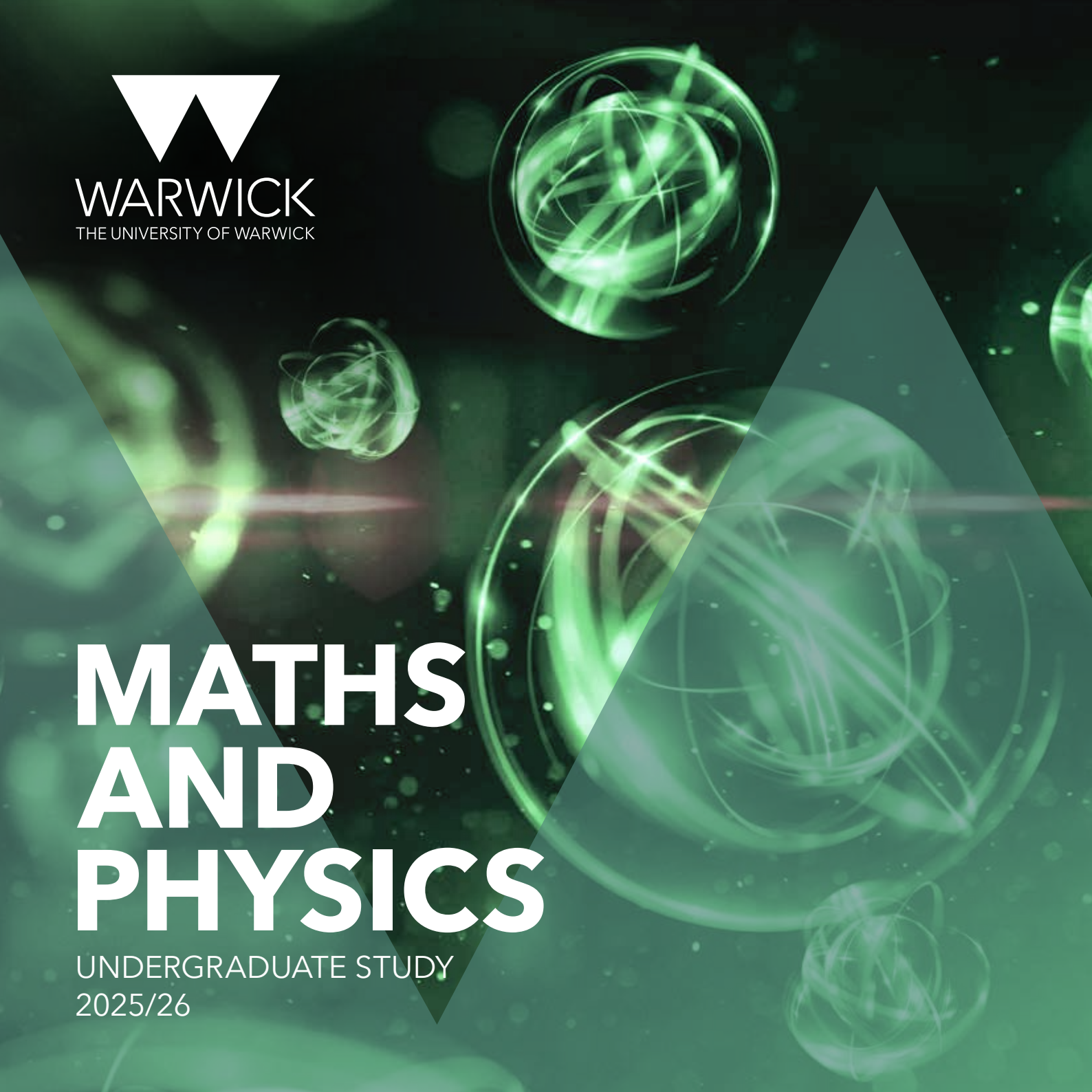


WARWICK
THE UNIVERSITY OF WARWICK

MATHS AND PHYSICS

UNDERGRADUATE STUDY
2025/26

MATHS AND PHYSICS
Joint Honours Courses

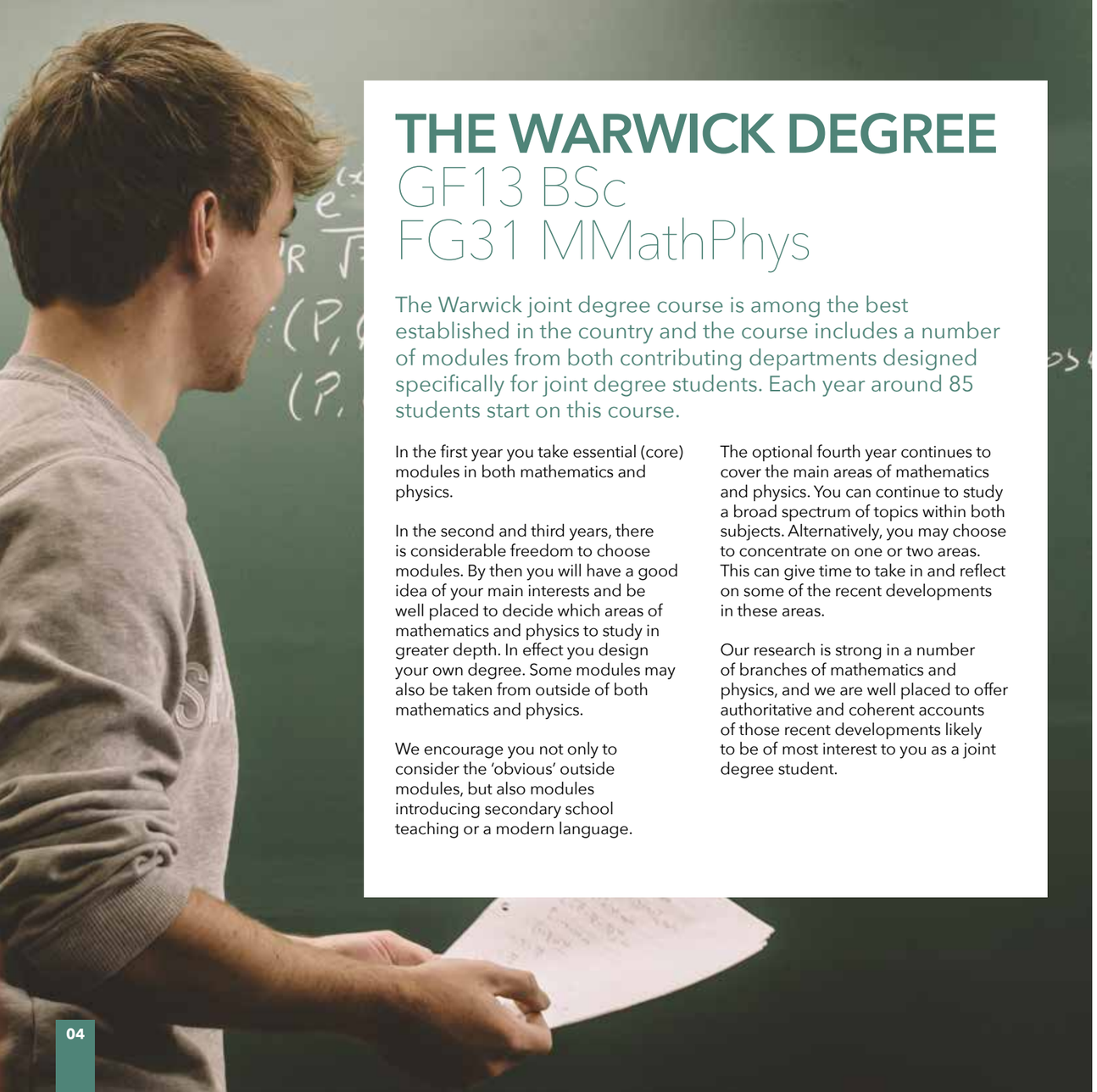
Mathematics and physics are a great combination to study at university, and provide the basis for a stimulating and enjoyable education.

Mathematics and physics are complementary subjects. Often, a way of thinking developed in one discipline leads to new insights into the other. The advances in the mathematical theory of dynamical systems and chaos are an example. Ideas from the theory are now applied in the modelling of physical systems such as the atmosphere, lasers and other complex systems.

In both subjects the emphasis is on learning how to recognise the surprising and how to reason. So, although the joint degree is the natural route into theoretical physics, the skills it teaches are universal and can lead to many different careers. Our former students have gone on to work in industry and in professions such as business, journalism and the financial sector.

There are two variants of the degree course: the three-year BSc and the four-year MMathPhys. You need to decide by the end of your second year which degree to aim for. 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 mathematics and physics after you graduate.

James Lloyd-Hughes
Head of Undergraduate Admissions



THE WARWICK DEGREE
GF13 BSc
FG31 MMathPhys

The Warwick joint degree course is among the best established in the country and the course includes a number of modules from both contributing departments designed specifically for joint degree students. Each year around 85 students start on this course.

In the first year you take essential (core) modules in both mathematics and physics.

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 of mathematics and physics to study in greater depth. In effect you design your own degree. Some modules may also be taken from outside of both mathematics and physics.

We encourage you not only to consider the 'obvious' outside modules, but also modules introducing secondary school teaching or a modern language.

The optional fourth year continues to cover the main areas of mathematics and physics. You can continue to study a broad spectrum of topics within both subjects. Alternatively, you may choose to concentrate on one or two areas. This can give time to take in and reflect on some of the recent developments in these areas.

Our research is strong in a number of branches of mathematics and physics, and we are well placed to offer authoritative and coherent accounts of those recent developments likely to be of most interest to you as a joint degree student.

FIRST Year

The first year is currently:

Maths

Mathematical Analysis (60 Lectures), Sets and Numbers (30L), Linear Algebra (30L), Mathematical Methods and Modelling 1 and 2 (30L + 30L).

Physics

Physics Foundations (30L), Electricity and Magnetism (30L), Classical Mechanics and Relativity (30L), Quantum Phenomena (30L). There is also a Physics Programming Workshop.

Mathematics at university emphasises the importance of proof. All sciences test the validity of ideas and conjectures, usually by comparing with reality as seen in experiment. In mathematics, there are no experiments, so it is important to be able to construct watertight arguments or proofs.

Mathematics is also concerned with the generality of results. The process of figuring out the most general form of some result from an initial example is an important and rewarding part of the subject. It is often what suggests new results and can reveal connections with other areas within mathematics.

The modules Linear Algebra, and Sets and Numbers, treat concepts which you have met at school, but in a more abstract and general way. Analysis is another word for calculus but carries the implication that all results must have satisfactory proofs. Some of the material in the Analysis module should be familiar from A level, but it will be presented with the emphasis on proof. The Mathematical Methods and Modelling 1 (MMI) module deals with methods for solving the differential equations of motion, which describe the behaviour of various physical systems. The MM2 module looks at intuitive geometric and physical concepts such as curvature, mass and circulation. The focus is on practical application to physics.

Physics sets out to identify the (relatively few) fundamental laws and show how they may be invoked to explain many natural phenomena. A good example is provided by Electricity and Magnetism, which were shown by Maxwell and others to be manifestations of the same phenomenon – now called electromagnetism.

Most of the 1st year physics modules deal with familiar subjects, such as Newtonian mechanics and thermodynamics. The possible exceptions are the material on relativity and the module Quantum Phenomena. These deal with the breakdown of Newtonian physics at velocities close to the speed of light and at atomic length scales.

Computers are increasingly important in all of mathematics and theoretical physics. The Programming Workshop teaches Python programming and how to solve numerically the mathematical models of physical systems.

Overleaf is a typical first year timetable. We plan to deliver a timetable similar to this in 2025/26.

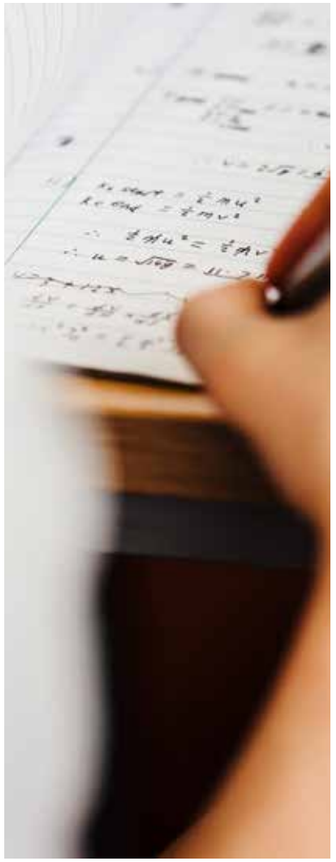
TIMETABLE

The timetable for the first five weeks of the first year should give an idea of the typical weekly workload of lectures and tutorials.

The tutorials involve smaller groups and a lecturer or postgraduate student. The idea is to work through example sheets handed out in the lectures and to discuss any problems with the material. Wednesday afternoons are kept free of classes, as Wednesday is the main day for university activities such as sport, drama and music.

First Year timetable (weeks 1-5) - mornings			
	10:05 - 10:55	11:05 - 11:55	12:05 - 12:55
Monday		Mathematical Analysis I	Sets and Numbers
Tuesday	Sets and Numbers	Mathematical Analysis I	Tutorial
Wednesday	Physics Foundations	Classical Mechanics and Relativity	
Thursday	Sets and Numbers	Mathematical Analysis I	
Friday	Programming Workshop		Physics Examples Class

First Year timetable (weeks 1-5) - afternoons				
	13:05 - 13:55	14:05 - 14:55	15:05 - 15:55	16:05 - 16:55
Monday	Mathematical Methods and Modelling I		Physics Foundations	Classical Mechanics and Relativity
Tuesday		Physics Foundations	Classical Mechanics and Relativity	
Wednesday				
Thursday	Mathematical Methods and Modelling I			
Friday		Physics Examples Class		



SECOND Year

In the second year there are core modules taken by everybody.

These core modules complete the treatment of basic material assumed by subsequent modules. There is then a broad range of modules covering all the main areas of mathematics and physics from which you choose a selection.

Currently the core modules are:

Maths

Mathematical Analysis III, Methods of Mathematical Physics, Partial Differential Equations.

Physics

Hamiltonian and Fluid Mechanics, Quantum Mechanics and its Applications, Statistical Mechanics, Electromagnetic Theory and Optics.

Mathematical Analysis III extends ideas learnt in the first year and introduces the analysis of functions of more than one variable and of complex variables.

The field of fluids is one of the richest in applied mathematics and physics. Although motions of fluids – water and air are two we meet every day – are complicated, many flow patterns have simple and intuitively appealing explanations. You will learn, for example, why power lines whistle in the wind and why aeroplanes use their engines just before landing.

You choose at least four further modules with at least one from Maths. The lists may change over time. Currently they are:

Maths

Metric Spaces, Multilinear Algebra, Multivariable Analysis.

The module Metric Spaces generalises concepts like continuity and convergence to more general spaces and provides a basis for many of the tools used in mathematical physics.

Physics

Computational Physics, Environmental Physics.

Outside Options

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

THIRD Year BSc

In the third year of the BSc you take a module on Communicating Science. You select at least seven modules from the lists of options, which currently are:

Maths

Functional Analysis; Complex Analysis; Fluid Dynamics; Measure Theory; Theory of PDEs; Topics in Mathematical Biology; Variational Principles, Symmetry and Conservation Laws.

Physics

Physics Project, Condensed Matter Physics, The Earth and its Atmosphere, Electrodynamics, Galaxies and Cosmology, Kinetic Theory, Physics of Life and Medicine, Plasma Physics and Fusion, Quantum Physics of Atoms, Scientific Computing, The Standard Model, Statistical Physics.

Outside Options

Modules from WBS, the Language Centre and other departments.

You can choose to carry out a research-style project worth roughly 30% of the year's credit. A project brings you into contact with a research group, where you work with and alongside postgraduate students and research fellows. It can give fresh insight into the way research scientists work and think.

THIRD Year MMathPhys

Opting for the MMathPhys allows you more time to explore the implications of what you have already learnt.

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

Physics

Quantum Physics of Atoms, Kinetic Theory, Electrodynamics

Mathematics

Fluid Dynamics

There is a Laboratory and Skills module. As a member of a group of three students, you complete an experiment and a computer-based simulation of a physical system.

You present your results both orally and in an extended written report.

Typically, you take a further six modules from the options listed for the third year of the BSc.

"The overlap – using cool maths to explain the phenomena we see around us – is what I am particularly interested in. I don't just want to be told the answers though; being able to learn more deeply, and fully understand these problems is much more important to me. It has enabled me to develop so many useful skills, alongside learning more about my subjects."

Beth Kynman
Civil Servant
2019 MMathPhys graduate

FOURTH Year
MMathPhys

During the fourth year you join one of the research groups and work with a partner on a research-style project.

The project work gives you experience of working more independently. This experience should be valuable to you in your subsequent career, whether you choose to work as a scientist or not, and can help you when you are making decisions about possible careers.

You choose at least five of the following modules choosing at least two from the list of maths modules and two from the list of physics modules. The lists are currently:

Mathematics

Advanced Partial Differential Equations, Dynamical Systems, Fourier Analysis, Linear Analysis, Quantum Mechanics: Basic Principles and Probabilistic Methods, Statistical Mechanics, Topics in Mathematical Biology.

Modules from the third year lists can also be chosen.

Physics

Advanced Quantum Theory, Condensed Matter Physics II, The Distant Universe, Frontiers of Particle Physics, General Relativity, High Performance Computing, Planets Exoplanets and Life, Quantum Computation and Simulation, Solar and Space Physics, Structure and Dynamics of Solids, Theoretical Particle Physics.

You may also take modules from the third year which you have not already taken.

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.

You would spend this 'intercalated' year studying at a foreign university or working in a research laboratory.

HOW TO APPLY

Everything you need to know about applying to Warwick is on our web pages. There is up-to-date information about:

- How to apply
- Writing your personal statement
- Key dates and deadlines
- How we process your application
- After you've applied

If you are made and accept an offer, and meet any outstanding conditions, we will confirm your place and look forward to warmly welcoming you at the start of your life here at Warwick.

OVERSEAS APPLICANTS

At Warwick, we welcome applications from across the globe, and have dedicated teams available to advise and support, as well as a global network of Agents and Representatives.

CONTEXTUAL OFFERS

We're committed to supporting students from diverse and under-represented backgrounds. We do this in a variety of ways, including through our contextual admissions policy which is designed to ensure fairness in our admissions processes.

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.

ACCOMMODATION

We manage approximately 7,500 self-catered rooms on campus for different budgets and requirements. Living on campus in your first year gives you the opportunity to meet people and form friendships whilst never being more than a short distance from your lectures or our amazing campus facilities. At Warwick, you'll enjoy the freedom of independent living with the security of knowing you're surrounded by people who can support you.

CHAT TO OUR STUDENTS ON UNIBUDDY

If you have questions about living and studying at Warwick, speak to our current students to get answers on:

- Campus life
- Accommodation
- Study support, wellbeing and more

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