University of Birmingham

Theoretical Physics and Applied Mathematics MSci

Undergraduate degree course in Theoretical Physics and Applied Mathematics MSci F3DG:

Physics addresses some of the deepest questions of how the universe works and explores nature beyond the bounds of human experience. Our staff conducts research from the longest length and time scales - e.g. the role of dark matter in the structure of the Universe and mimicking the Big Bang in heavy nuclear collisions - to the smallest length and time scales, e.g. the hunt for the Higgs boson and other aspects of elementary particle physics.

In between these extremes, understanding how the Sun and stars work, the physics and biophysics of nanoscale structures, quantum states of matter such as superconductivity and ultracold atom gases, and metamaterials (the physics of invisible cloaks) are all key to our research themes.

You can benefit directly from this research activity by joining us and being taught by internationally acknowledged experts at the frontiers of physics; and by taking part in the research itself in the final years of your degree.

Study here and find out why the University of Birmingham was awarded The Times and The Sunday Times University of the Year 2013-14 (http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx)

Course fact file

UCAS code: F3DG

Duration: 4 years

Places Available: 160 (across all of our Physics courses)

Applications in 2014: 1032

Typical Offer: A*AA : (A* Maths, A Physics , A in a third A-level) (**More detailed entry requirements and the international qualifications accepted can be found in the course details (?OpenSection=EntryRequirements)**)

Start date: September

Related courses

Undergraduate degree courses - Physics and Astronomy (/schools/physics/undergraduate/index.aspx)

Contact

Admissions Team
Tel:+44 (0)121 414 4563
Email: **physics-adms@bham.ac.uk (mailto:physics-adms@bham.ac.uk)**

School of Physics and Astronomy (/schools/physics/index.aspx)

Follow us on Twitter (http://twitter.com/eps_unibham)

Details

This four-year accredited programme has a student satisfaction rating of 98%.

Theoretical Physics and Applied Mathematics (TPAM) provides versatility for those undecided between a physics or a maths degree.

A particular feature of the TPAM degree is that it includes little experimental laboratory work. The first two years provide roughly equally contributions from the School of Mathematics and the School of Physics and Astronomy. In later years (particularly for the MSci route), there is considerable freedom to emphasise either physics or mathematics.

When you graduate with a TPAM degree at Birmingham, you will have completed one of the most intellectually challenging programmes in Britain. You will be well-equipped to apply them in a wide range of careers or postgraduate study.

First year

In Year 1 your studies will be split equally between physics and applied maths. You will take take 50 credits of core physics modules covering relativity and classical mechanics, optics and waves, quantum mechanics, electromagnetism, and thermal physics. Transferable skills such as problem solving, oral and written presentation, and career development are covered in a 10 credit Communication Skills module. You will take 60 credits of core mathematics including linear algebra, analytical techniques and computational mathematics.

Second year (contributes 20% to overall degree mark)

In Year 2 you will take 40 credits of core physics modules developing the ideas from year 1 in greater depth, and introducing new topics such as nuclear and condensed matter physics. You will also take 20 credits of theoretical physics modules.Transferable skills are further enhanced in a 10 credit Communication Skills module. The 50 credits of applied mathematics modules further develop the mathematical skills needed by a theoretical physicist.

Third year (contributes 40% to overall degree marks)

In Year 3 there are a wide range of physics and mathematics options for you to choose from, enabling you to tailor the degree to your interests, with only 60 credits being core. This core material consists of quantum mechanics, statistical physics, covariant electrodynamics, complex variable theory and continuum mechanics.

Fourth year (contributes 40% to overall degree mark)

40 credits of the final MSci year is given over to a major research project, which you can taken in either the School of Physics or Mathematics. You will work with an academic supervisor to tackle a problem of current research interest. Recent topics include topological insulators and Bose-Einstein condensates. The remaining 80 credits are taken up by a wide range of advanced options which you can tailor to your interests.

Year in Computer Science
Between your second and third year, you can choose to do a year's study in Computer Science, ideal if you expect your final career to involve a significant amount of computing.

Related links

- **Undergraduate degree courses - Physics and Astronomy (/schools/physics/undergraduate/index.aspx)**
- **Bursaries, Scholarships and Awards - School of Physics and Astronomy (/schools/physics/undergraduate/ug-physics-scholarships.aspx)**

Why study this course

Our School of Physics and Astronomy is one of the largest in the country, where internationally recognised research groups work on everything from the smallest fundamental particles through nanoscale physics to cosmology. Our excellence in research and teaching means that we can offer you a strong understanding of core physics, combined with many opportunities to pursue your own interests.

The latest Research Assessment Exercise places us joint fifth in the country. This strength in research enables us to offer specialised modules and projects, delivered by research-active staff working at the cutting edge of physics. We're proud of our small-group teaching environment which includes skills-development sessions, problem-based learning classes and weekly tutorials in groups of no more than four students. The School has well-equipped, state-of-the-art laboratories and computing facilities, and the University has its own observatory on the outskirts of Birmingham.

All our Physics degree programmes are accredited by the Institute of Physics (IoP). This independent, rigorous assessment of our programmes has several advantages for our students. For example, holders of accredited degrees are eligible to follow a route to corporate membership of the Institute and to the CPhys professional qualification. You can find more information at **www.iop.org (http://www.iop.org/)** .

Modules

Our **undergraduate course brochure (pdf) (http://www.birmingham.ac.uk/Documents/college-eps/physics/brochures/physics-undergraduate-programmes.pdf)** has some grids at the back which show all of the modules that comprise our degree courses. There you can see which modules are compulsory and which are optional for each of the degrees in the School of Physics portfolio. It is possible to compare each degree alongside each other in one place.

The majority of modules are assessed with continuous assessment (20%) and a final exam in the summer (80%).

Fees and funding

Standard fees (http://www.birmingham.ac.uk/students/ug/courses/fees/standard) apply.
Learn more about **fees and funding (http://www.birmingham.ac.uk/students/ug/feesandfinance/loans.aspx)** .

Scholarships

- The School of Physics and Astronomy offers a number of scholarships to students who perform particularly well in their A levels (or equivalent). For further details see our **School of Physics and Astronomy bursaries, scholarships and awards page (/schools/physics/undergraduate/ug-physics-scholarships.aspx)** .
- Learn more about the University of Birmingham's **scholarships and awards (http://www.birmingham.ac.uk/students/ug/feesandfinance/funding/index.aspx)** .

Entry requirements

Number of A levels required: 3

Typical offer: A*AA : (A* Maths, A Physics , A in a third A-level)

General Studies: not accepted

Additional information:

Other qualifications are considered – learn more about **entry requirements (http://www.birmingham.ac.uk/students/ug/requirements)** .

International students:

International Baccalaureate Diploma: 36 points including Mathematics and Physics at HL

Standard English language requirements apply
Learn more about **international entry requirements (http://www.birmingham.ac.uk/students/ug/requirements/international)** .

International students applying for this programme will need an **Academic Technology Approval Scheme (ATAS)** certificate from the Foreign & Commonwealth Office before the University can issue you with a Certificate of Acceptance of Studies (CAS). We recommend that you apply for your ATAS certificate as soon as you receive an offer from us. More information can be found here: **www.fco.gov.uk/en/about-us/what-we-do/services-we-deliver/atas/ (http://www.fco.gov.uk/en/about-us/what-we-do/services-we-deliver/atas/)** .

Depending on your chosen course of study, you may also be interested in the Birmingham Foundation Academy, a specially structured programme for international students whose qualifications are not accepted for direct entry to UK universities. Further details can be found on the **foundation academy web pages (http://www.birmingham.ac.uk/students/foundation-academy/Pathways/index.aspx)** .

How to apply

Apply through UCAS at **www.ucas.com (http://www.ucas.com/)** .
Learn more about **applying (http://www.birmingham.ac.uk/students/ug/courses/apply)** .

Key Information Set (KIS)

Key Information Sets (KIS) are comparable sets of information about full- or part-time undergraduate courses and are designed to meet the information needs of prospective students.

All KIS information has been published on the Unistats website and can also be accessed via the small advert, or 'widget', below. On the **Unistats website (http://unistats.direct.gov.uk)** you are able to compare all the KIS data for each course with data for other courses.

The development of Key Information Sets (KIS) formed part of HEFCE's work to enhance the information that is available about higher education. They give you access to reliable and comparable information in order to help you make informed decisions about what and where to study.

The KIS contains information which prospective students have identified as useful, such as student satisfaction, graduate outcomes, learning and teaching activities, assessment methods, tuition fees and student finance, accommodation and professional accreditation.

Related links

Undergraduate degree courses - Physics and Astronomy (/schools/physics/undergraduate/index.aspx)

Bursaries, Scholarships and Awards - School of Physics and Astronomy (/schools/physics/undergraduate/ug-physics-scholarships.aspx)

Physics undergraduate programmes brochure (pdf 2.4 MB) (/Documents/college-eps/physics/brochures/physics-undergraduate-programmes.pdf)

Related news and events

Physics at Birmingham continues to rank highly in league tables (/schools/physics/news/league-tables.aspx)

Learning and teaching

How will I be taught?
As a Birmingham student, you are joining the academic elite and have the privilege of learning from world-leading experts in the field of physics and astronomy. Throughout your studies, you'll be encouraged to become an independent and self-motivated learner, thriving on challenge and opportunities to think for yourself.

Personal tutor: The School has a comprehensive welfare system based around academic and personal tutors, and led by the Senior Tutor, who will see students at any time. Our tutors support you throughout your studies to help you in three important areas: supporting your academic progress, developing transferable skills and dealing with any welfare issues. You can also raise any issues related to your studies at the Staff Student Committee or, for the fastest response, the weekly meeting of Student Representatives.

Contact hours: In your first year, the course is delivered as lectures, small group workshops, laboratories, computer-based activities, enquiry-based learning and tutorials. Much of your learning will be carried out in small groups, including laboratory work, examples classes, and tutorials. There's a strong emphasis on project work throughout your degree, especially in your final year.

Laboratory-based work is an integral part of our Physics degree programme, vital to develop your experimental practical skills, and to reinforce concepts introduced in lectures or to explore a particular phenomenon. You will benefit from our recent £1 million investment into additional first-class physics-teaching laboratory facilities.

Lectures form the major source of information for most modules and are delivered in a variety of styles by enthusiastic staff, in our state-of-the-art lecture theatres.

Small group tutorials support your lectures in years one and two, consisting of groups of no more than four meeting once a week with an academic or researcher. By year three you'll be choosing from a wide range of options and specialisms, beyond the scope of a single tutor. Instead you can sign up for 'supervisions' - specialist tutorials given by a senior academic carrying out research into each specific area.

Project work allows you to take part in our leadingresearch activity across the full breadth of the subject - from astrophysics to quantum matter and particle physics - in every year of your degree. It's an unprecedented chance to gain easy access to world experts and cutting-edge equipment in all the major branches of the subject.

Examples classes focus on working through problems issued by the lecturer and are usually run by a lecturer with the help of one or more graduate students. They're a chance to check your learning and reflect on particular examples.

Web-based learning is an essential part of the programme, with all our modules linked to iVLE - a virtual learning environment that gives you access to lecture notes, additional learning units, self-tests and supplementary interactive information to support your learning.

Assessment methods

Each module is assessed independently with most containing some components of continuous assessment. Typically, year one and two lecture modules contain 20% continuous assessment in the form of weekly problem sheets. Some modules are completely assessed by coursework. Assessment methods include end-of-year examinations in May and June, written assignments, oral and poster presentations, computer-based tests, and laboratory and project reports.

During your first year you will undergo a formal 'transition' review to see how you are getting on and whether there are particular areas where you need support. This is in addition to your tutor who is based in Physics and can help with any academic issues you encounter.

Feedback is an essential part of learning and we use a wide range of methods, such as written feedback on your assessments, oral feedback during examples classes, workshop sessions, laboratories, and one-on-one discussions with your tutors. You'll receive prompt feedback on each assessment, highlighting the positives of your work as well as any areas that need more attention. You will also be given feedback on any exams that you take; if you need to resit an exam, we will ensure that you receive detailed feedback and support to enable you to learn for the future.

Employability

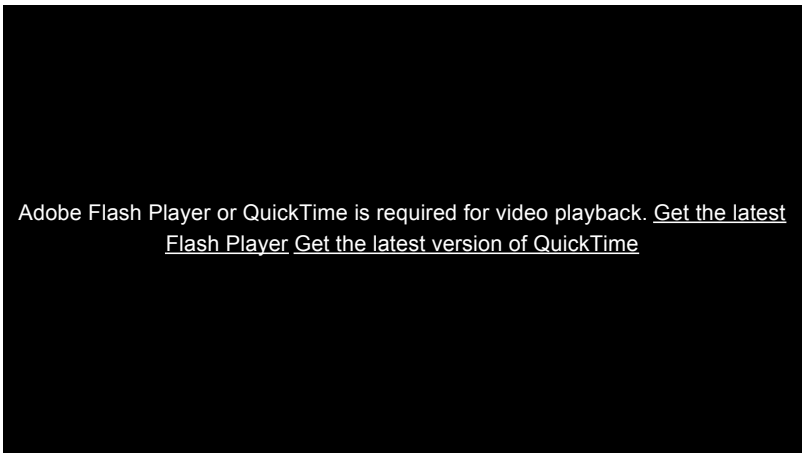
Feedback shows that 90%-95% of our students go on to work or study on graduation. Of those in employment, typically, around 90% gain graduate-level jobs and are

earning salaries in the region of £18,000-£26,000 pa six months after graduation.

Preparing for your career is one of the first things you need to think about when you start university. As a Physics graduate, you have great potential to gain an intellectually stimulating, well-paid and high-powered job. You could pursue a career in research in an academic or industrial environment, or you could work in product development for a high-tech company. You could also apply your analytical and computational skills through scientific consultancy. This is just the beginning, with many other careers open to you, including teaching, patent law, and mathematical finance.

Studying physics at Birmingham is much more than attending lectures. As you progress through your degree, we place a great emphasis on teaching you transferable skills: mathematical, computational, problem solving, group working, management and presentational. They will all contribute to making you more attractive to potential employers.

Alumni Brigid Jones (MSci Physics) talks about her time at Birmingham



Video transcript (http://www.birmingham.ac.uk/accessibility/transcripts/eps/physics/alumni-brigid-jones-physics.aspx)

Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers Network and the School's own career tutor can help you to secure research or industry placements and, eventually, your graduate job.

Our **unique careers guidance service (https://intranet.birmingham.ac.uk/as/employability/careers/college/eps.aspx)** is tailored to your academic subject area, offering a specialised team (in each of the five academic colleges) who can give you expert advice. Once you have a career in your sights, one-to-one support with CVs and job applications will help give you the edge. In addition, our employer-endorsed, award-winning **Personal Skills Award (PSA) (https://intranet.birmingham.ac.uk/as/employability/psa/index.aspx)** recognises your extra-curricular activities, and provides an accredited employability programme designed to improve your career prospects.

Your Birmingham degree is evidence of your ability to succeed in a demanding academic environment. Employers target Birmingham students for their drive, diversity, communication and problem-solving skills, their team-working abilities and cultural awareness, and our graduate employment statistics have continued to climb at a rate well above national trends. If you make the most of the wide range of services you will be able to develop your career from the moment you arrive.

Past Physics and Astronomy graduates have gone into a very wide range of challenging and rewarding careers in destinations which include:

- NASA
- NHS - Medical Physics
- Rolls-Royce
- EDF Energy
- BAE Systems
- Barclays Capital
- PriceWaterhouse Coopers
- Accenture - Technology Services

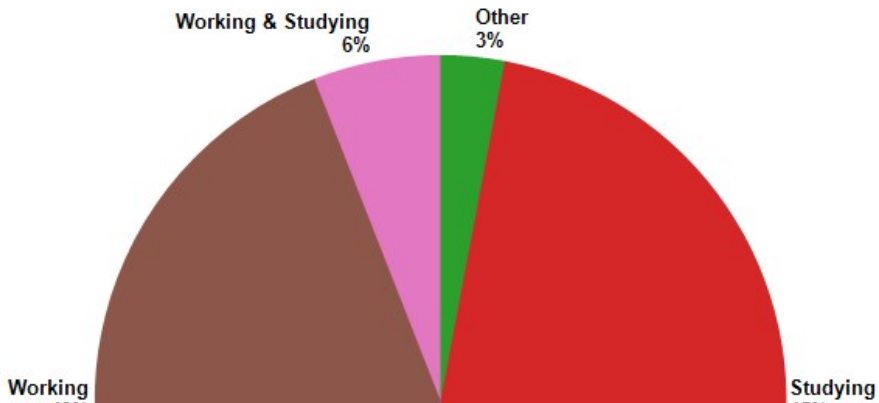
University Careers Network

Preparation for your career should be one of the first things you think about as you start university. Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers Network can help you achieve your goal.

If you make the most of the **wide range of services (https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx)** you will be able to develop your career from the moment you arrive.

Destinations of Leavers from Higher Education (DLHE) 2011/12

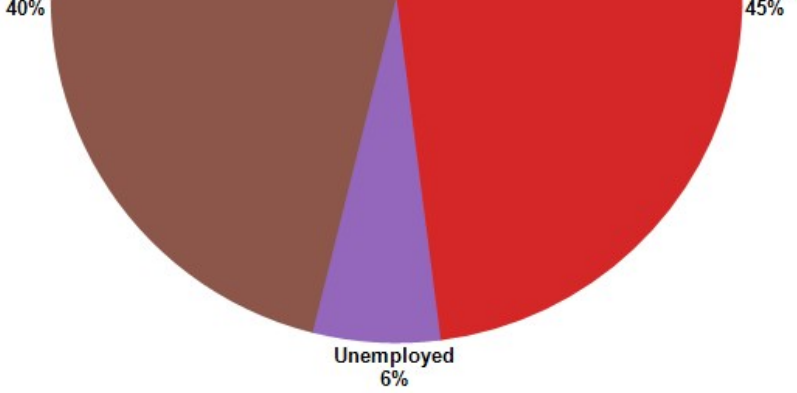
The DLHE survey is conducted 6 months after graduation.



Examples of occupations

- Software Engineer
- Trainee Clinical Scientist
- Technology Graduate
- Secondary School Teacher - Physics
- Research Analyst
- Nuclear Manufacturing Engineer Intern
- Musician
- Recruitment Consultant
- Internet Application Engineer
- Data Analyst

Further study - examples of courses



- MSc Astrophysics
- MSc Computer Science
- MSc Forensic Ballistics
- MSc Medical Imagery
- MSc Nuclear Physics
- MSc Physics and Technology
- MRes Chemical Engineering
- PhD Electronic Engineering
- PhD Physical Sciences

Visit the **Careers section of the University website** **(https://intranet.birmingham.ac.uk/as/employability/careers/college/eps.aspx)** for further information.

Professional accreditation

Accredited by the Institute of Physics.

IOP Institute of Physics

Additional accreditation **Yes**

MSci (Hons) Theoretical Physics and Applied Mathemati...
Full time

To see more details and compare with other courses

Visit UNISTATS

Official data collected by HEFCE

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2014 Website of the Year