



NATURAL SCIENCES

UNDERGRADUATE SUBJECT BROCHURE 2019
EXETER CAMPUS



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 I picked Exeter as it has the best Natural Sciences course. I didn't want to limit myself to studying one science when I went to university, because in research you need knowledge from lots of different areas. You still get to specialise later on and have a wide variety of modules to choose from.

Generally there is a mixture of group and independent learning, but we are all quite close on the course so even with independent work we can help each other out if there's something confusing. The lecturers are also really friendly and helpful if you ever have questions.

My advice would be to manage your time well. Even though this is quite a demanding course in terms of contact hours, if you just organise your time and get your work done, there's still plenty of time to join societies and do other fun things in your spare time!

Lucy, studying
Natural Sciences



NATURAL SCIENCES

True Natural Sciences programme covering all sciences with freedom to study your interests

Opportunity to be an active participant in research, with an emphasis on scientific methodology

Study within a community of internationally respected scientists

Contribute to our understanding of critical global issues, finding solutions to the challenges they present

Explore and study the world through multiple scientific lenses, identifying the intrinsic links between Biology, Chemistry, Physics, Mathematics and Computer Science

Finding solutions to key challenges facing society – from ageing populations to climate change – requires a new scientific approach inspired by a new generation of scientists.

Our Natural Sciences degrees give you the opportunity to study all of the sciences, even those you might have missed at A level. Our fully integrated programme enables you to explore multiple traditional subjects, while simultaneously engaging with inspirational new areas of modern scientific innovation and research. These areas span across mathematical and computational biology; biophysical, biochemical and biomedical science; materials science and materials chemistry; the science of oceans, atmospheres and climate; astrophysics and energy research.

Working across conventional scientific disciplines you will have access to a wide variety of facilities and buildings including the Living Systems Institute, which is dedicated to revolutionising the diagnosis and treatment of diseases, and the Collaborative Laboratory, where you will undertake the majority of your first- and second-year practicals.

Content covered is underpinned by our world-renowned research in climate change, extrasolar planets, sustainable futures, systems biology and functional materials. You will also have the opportunity to collaborate with staff on research projects.

Because of the breadth of the course, you will be able to succeed in an industry of your choosing – our Natural Science graduates are accomplished, multi-talented scientists who possess the ability to understand and question the natural world with several scientific methods.



I chose the University of Exeter because of the innovative outlook in Natural Sciences, the cohesive unit of the degree and also the option to study a semester abroad. It is great being able to study many different subjects, and also getting to meet loads of different people across the subjects in your second year. In addition to all of this, living in Exeter means you have access to multiple beaches and you can get to the quayside really quickly.

Elena, studying Natural Sciences

PROGRAMME STRUCTURE



Don't worry about having not previously studied one of Biology, Chemistry or Physics. Most people are missing at least one subject and their progress doesn't seem to be influenced by their knowledge on entry.

The lecturers for Natural Sciences seem to genuinely want to teach us and want to learn from us in the discussions that develop in lectures. It is not uncommon for your lecturers and other faculty to know you by name and be personally interested in your progress.

Oli, studying Natural Sciences

SINGLE HONOURS

MSci/BSc Natural Sciences (EXETER)

BSc CGF0 3 yrs

MSci FGC0 4 yrs

with International Study FGC1 4 yrs

A*AA-AAB | IB: 38-34

Required subjects: GCE AL Maths* grade B and one from Physics, Chemistry or Biology at grade B; IB Maths HL5 and Physics, Chemistry or Biology HL5.

- Investigate the natural world using a multitude of sciences
- Undertake a research project during your third year, and if you are an MSci student you will extend it into your fourth year
- MSci students have the opportunity to semester abroad at one of our partner universities
- Join our Natural Sciences society; a vibrant and active community of budding scientists
- Collaborative lectures with students in other disciplines

Year 1 The knowledge gained in Year 1 is the foundation for later years. You will develop core knowledge in biology, physics, mathematical modelling, computation and data analysis. Developing this, Frontiers of Science will teach you how each subject relates to the others, and you will learn how to combine them to further modern sciences.

Year 2 You will start to shape your own pathway of interest through a variety of optional modules. Our modules span across subjects such as biosciences, mathematics, engineering, physics, psychology, geography and sports and health science.

Year 3 This year is all about putting what you have learnt in Years 1 and 2 into practice. As well as optional modules, you will have the opportunity to undertake an independent research project. Your project will work within the framework of one of the University's interdisciplinary research

areas: climate change and sustainable futures, functional materials, systems biology and extrasolar planets. Additionally, you will complete a group research project, applying your expertise and interests to a collaborative investigation.

Year 4 (MSci only) Progress your Year 3 independent research project whilst working alongside the University's leading scientists, who will mentor your project, helping you to refine your technical and analytical expertise. You can extend your project further with the aim of publishing your results in scientific literature. In addition to this, optional modules that explore new areas of interdisciplinary science shape you into a true pioneer of scientific thinking. You may also choose more specific and traditional modules, allowing you to tailor and specialise according to your interests.

INTERNATIONAL STUDY

Our MSci Natural Sciences degree offers you the opportunity to undertake a semester abroad during Year 3, at one of our world-class partner universities.

While abroad you'll get the chance to study specialist material particular to your host university. Destinations include University of New South Wales, City University Hong Kong, Nanyang Technological University, Uppsala Universitet, ETH Zurich and Colorado State University.

Your semester abroad counts towards 60 credits of your third year, with your mark being calculated at Exeter.

ENTRY REQUIREMENTS: MORE INFO

*Candidates may offer GCE AL Maths, Pure Maths or Further Maths.

Applicants achieving IB Maths SL7 plus IB HL5 in two from Physics, Chemistry or Biology will also be considered.

LEARNING AND TEACHING

To ensure you get the most from your degree, we teach you a wide variety of techniques and approaches used when it comes to understanding science. Typically you will have 21 hours of contact time per week during your first year. This is divided into formal lectures, tutorials, laboratory sessions and workshops.

As this is an intensive programme, you are expected to undertake 30 hours of independent study per week, outside of your timetabled sessions. However, there is a lot of support and you will have one-on-one tutorials throughout your studies with a dedicated tutor, plus you are welcome to request extra support should you need it.

Whilst this programme may be challenging at times, the benefits are worth it. Upon graduation, you will be a confident and able individual who possesses a unique set of skills and knowledge, allowing you to challenge, create and inspire the world that surrounds you.

FACILITIES

Due to the varied nature of Natural Sciences, you will have access to multiple facilities and buildings on campus. Throughout your studies you will have access to Geoffrey Pope 'Collaborative' laboratory, physics laboratories, engineering facilities, plus various computing suites. In your later years you will begin to undertake your own research at the university, utilising our flagship research institute, the Living System Institute, specialist research laboratories in Geoffrey Pope, the Harrison Building and Physics, and also various facilities in the Medical School.

ASSESSMENT

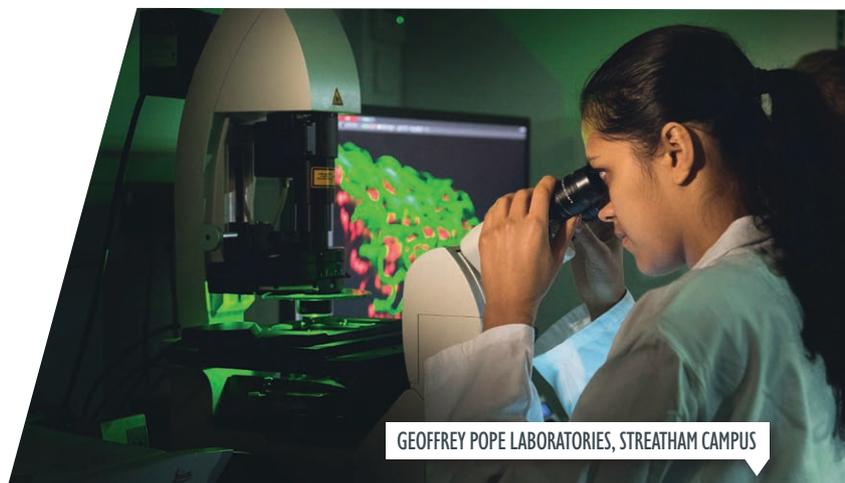
You will be assessed in all years through a variety of means. These will include coursework, exams, written reports and presentations, amongst others. You must pass your first-year assessment in order to progress to the second year, but the results do not count towards your degree classification and the assessment will not disadvantage students who did not study all subjects at A level.

PROJECTS

Both the BSc and MSci offer a research project module that will be started in your third year, then carried forward into your fourth and final year if you study the MSci version of the programme. Projects are an excellent way to develop your skills independently, in an area of your interest. Some recent examples of projects are modelling the chemistry of (exo)planetary atmospheres, the role and basis of the 'alarm buzz' in bumble bees, the strange world of bohmian mechanics and evolutionary ecology on a chip.

NATSOC

Natural Sciences is a combination of several sciences; not knowing one area as well as you know the rest may seem daunting. To ensure students receive the best support outside the laboratory, Natural Sciences students set up NatSoc. NatSoc is a very close-knit and welcoming group of individuals who not only support one another in their studies, but also organise regular social events such as nights out and formal dinners.



GEOFFREY POPE LABORATORIES, STREATHAM CAMPUS

YOUR SUCCESSFUL CAREER

RECENT GRADUATES ARE NOW WORKING FOR[▲]:

- Radox
- Deloitte
- BAE Systems Applied Intelligence
- RBS
- Binder Dijker Otte

CAREERS SERVICES

We have a dedicated, award-winning Careers Service, with offices at our Exeter and Penryn campuses, ensuring you have access to careers advisors, mentors and the tools you need to succeed in finding employment in your chosen field on graduation. We offer the Exeter Award and the Exeter Leaders Award, which include employability-related workshops, skills events, volunteering and employment that will contribute to your career decision-making skills and success in the employment market. Our graduates compete very successfully in the employment market, with many employers targeting the University when recruiting new graduates. For further information about our Careers Service please visit: www.exeter.ac.uk/careers

RECENT GRADUATES ARE NOW WORKING AS[▲]:

- Consultant
- Financial Services Trainee
- Research and Development Scientist
- PhD Researcher
- Auditor

[▲] This information has been taken from the Destinations of Leavers from Higher Education (DLHE) Surveys 2014/15 and 2015/16. Please note that, due to data protection, the job titles and organisations are listed independently and do not necessarily correspond.

OPPORTUNITIES

Our Natural Sciences degree will not only provide you with a unique understanding of scientific global challenges facing our society, but will also help you to develop a wide range of key skills for employment and further study – such as analytical problem solving, teamwork and organising and communicating information. Whether you choose to pursue a career in scientific research in academia or government, research and development in industry, or a career in law (particularly intellectual property), business, management or teaching, a University of Exeter Natural Sciences degree will make you highly attractive and will open a wide range of career opportunities.

Natural Sciences graduates are ideally placed to work within academia, organisations or government agencies that draw upon expertise across different fields. You could enrol on a graduate programme with one of these employers, or pursue integrative positions such as project management, technical leadership or analysis.

For further information about what the careers service offers at Exeter, visit: www.exeter.ac.uk/ug/careers

INTERNSHIP EXAMPLES

During your time at Exeter, we encourage you to undertake a summer placement. This is an excellent way to apply your knowledge from the programme to a professional environment.

While it is ultimately your responsibility to secure a placement, our dedicated and connected CareerZone will help you throughout the entire process. In the past, students have worked at the Royal Melbourne Institute of Technology, the Public Health England laboratory in Porton Down, and on collaborative projects with the UK Met Office.



Since starting university, the biggest change that I have seen in myself is confidence. Exeter has allowed me to push myself to my limits, and my confidence in my own abilities has grown hugely since the start of my degree! I have found some of my closest friends through my course, as lectures provide an environment of like-minded people who have a genuine interest in their subject. I would encourage anyone who has the opportunity to go to university to do it; I have loved my time here so far, the learning curve has been massive, and I have had opportunities here that I doubt I could have found anywhere else!

Ayesha, studying Natural Sciences

MODULES

KEY C = Core
● = Optional

Please note that availability of all modules is subject to timetabling constraints and that not all modules may be available every year. The modules below are just some of those open to Natural Sciences students; you may take any University science-based module providing you satisfy any necessary prerequisites and have not already taken the module or an equivalent.

For up-to-date details of all our programmes and modules, please check the undergraduate section of our website at: www.exeter.ac.uk/natural-sciences

Year 1 Modules

Module Name	BSc Natural Sciences	MSci Natural Sciences	MSci Natural AI:E5 with International Study
Mathematics and Computing: Integrative Tools for Natural Sciences	C	C	C
Foundations in Natural Science	C	C	C
Experimental Science	C	C	C
Frontiers in Science I	C	C	C

Year 2 Modules

Module Name	BSc Natural Sciences	MSci Natural Sciences	MSci Natural AI:E5 with International Study
Frontiers in Science 2	C	C	C
Physical Chemistry	●	●	●
Introduction to Numerics and Simulation for Scientists	●	●	●
Electromagnetism I	●	●	●
Thermal Physics	●	●	●
Differential Equations	●	●	●
Vector Calculus and Applications	●	●	●
Structure and Reactivity of Organic Compounds II	●	●	●
Quantum Mechanics I	●	●	●
Condensed Matter I	●	●	●
The Physics of Living Systems	●	●	●
Ecology and Environment	●	●	●
Observing the Universe	●	●	●
Advanced Cell Biology	●	●	●
Analytical Techniques in Biochemistry	●	●	●
Bioinorganic Chemistry	●	●	●
Genomics and Introductory Bioinformatics	●	●	●

Year 3 Modules

Module Name	BSc Natural Sciences	MSci Natural Sciences	MSci Natural AI:E5 with International Study
Research Project	C	C	C
Group Project	C	C	
Semester of Science Studies Abroad			C
Ecology of Environmental Change	●	●	●
Specialist Topics in Chemical Sciences	●	●	●
Frontiers in Molecular Cell Biology	●	●	●
Horizons of Biochemical Research	●	●	●
Organic Synthesis and Drug Design	●	●	●
Mathematical Biology and Ecology	●	●	●
Mathematics History and Culture	●	●	●
Mathematics of Climate Change	●	●	●
Atmospheric Chemistry	●	●	●
Macromolecular and Supramolecular Chemistry	●	●	●
Nuclear and High Energy Particle Physics	●	●	●
The Biophysics of Cells and Tissues	●	●	●
Energy and the Environment	●	●	●

Year 4 Modules

Module Name	MSci Natural Sciences	MSci Natural AI:E5 with International Study
Research Project 2	C	C
Secondary Metabolites	●	●
Cellular Basis of Immunity	●	●
Bioinformatics	●	●
Energy Metabolism	●	●
Research Project 2 Extension	●	●
Mathematical Modelling in Biology and Medicine	●	●
Advanced Topics in Natural Sciences Chemistry I	●	●
Advanced Topics in Natural Sciences Chemistry II	●	●
Dynamical Systems and Chaos	●	●
Fluid Dynamics of Atmospheres and Oceans	●	●
The Climate System	●	●
Waves, Instability and Turbulence	●	●
Magnetic Fields and Fluid Flows	●	●
Quantum Mechanics II	●	●
Physical Methods in Biology and Medicine	●	●
Condensed Matter II	●	●
Solar and Extra-Solar Planets and Their Atmospheres	●	●

YEAR 1

Mathematics and Computing: Integrative Tools for Natural Sciences

Mathematical and computational methods play an increasingly important role in understanding the complex observational data used to understand problems across the natural sciences, for example: developmental biology, biochemistry, physics and medicine. These systems are often best explored using the power of mathematical and computational tools and the purpose of this module is to introduce some of the fundamental techniques and tools that are used to study these problems.

Foundations in Natural Science

Biology, chemistry and physics are the core disciplines upon which our scientific understanding and teaching are based. Physics underpins our understanding of the real world with a mathematical framework based on fundamental laws. Chemistry derives knowledge of the composition, properties and behaviour of matter and materials. Biology investigates the living world, deriving general principles and obtaining detailed insight into the way in which units of life relate to one another. In this module, you will be introduced to the key concepts of each discipline, while recognising the inter-reliance of each in understanding the natural world.

Experimental Science

On completion of this module you will have a broad foundation in experimental science, gained through laboratory sessions, which you will later build upon in Year 2 and your research project in subsequent years. The laboratory sessions are compulsory and consist of core experiments designed to complement and support the biology, chemistry and physics taught in the first year. It will also help you to develop transferable skills, such as report writing, which are essential to all scientists.

Frontiers in Science 1

Explore interdisciplinary scientific research being undertaken across the University and beyond, through a series of seminars and workshops. You will develop and reflect on a portfolio of transferable skills essential to all scientists including scientific writing, group working, and presentation skills. These will be developed through activities such as a student conference.

YEAR 2

Frontiers in Science 2

At the heart of the module is the project, which spans the second term: you will design, build, run and analyse experiments that will require elements of computer programming, physics, biology, chemistry and mathematical modelling. The written report of the project will take the form of a scientific paper. You will also present your results as an oral presentation at a conference held at the end of the module. Modern apparatus and techniques used across the sciences will be introduced and explained in a series of lectures, which you will then use to help shape your project. In addition, you will undertake a series of shorter experiments that are designed to develop core, transferrable scientific skills.

Electromagnetism I

Survey the phenomena associated with electrostatics (charges at rest) and magnetostatics (the magnetic effects associated with steady currents). It introduces and develops the use of the electric and magnetic field vectors and relates them by considering electromagnetic induction at a classical level. The connection between these fields and conventional lumped-circuit parameters R, C and L is also developed.

The Physics of Living Systems

You will examine the basic physical concepts and principles required to understand and study living systems. A synthetic approach is adopted: molecules-cells-tissue, emphasising the contributions of physics and the outstanding challenges. It starts at the molecular level and works up the scale of size and complexity to cover several major systems found in complex organisms.

Ecology and Environment

Study the biodiversity and sustainability of ecological systems, including case studies on bats, bees, seaweeds and fish. It will suit you if you have interests in conservation and the environment, but it will also give you scientifically rigorous insights into the discipline. This module provides a good foundation for related third-year modules.

Bioinorganic Chemistry

Metals are required in many different biological systems and processes, and also find application in a whole host of drugs and medical diagnostic agents. You will build on your existing biochemical and chemical knowledge to understand the important interactions between metals and macromolecules (such as DNA and proteins). You will learn how organisms use metals in key life processes, such as respiration and electron transfer, how they transport and store metals and understand how we can use our knowledge of bonding and reactivity to design therapeutic and diagnostic agents at the cutting edge of medicine.

MODULES CONTINUED

YEAR 3

Research Project	In this module you will work on a real research project linked to a research group from across the University. You will work in pairs and for the duration of the project will become a member of the research group. You will gain a valuable insight into scientific research, but will also have an opportunity to make a real contribution to this research.
Group Project	Many work environments, often including scientific research, require highly developed team skills. Your ability to act as an effective and cooperative member of a group will make you a valued employee. This module aims to provide experience of working as part of a project team in a situation close to that which might be found in a research, industrial or commercial setting.
Semester of Science Studies Abroad	While abroad you'll get the chance to study specialist material particular to your host university. Destinations include University of New South Wales, City University Hong Kong, Nanyang Technological University, Uppsala Universitet, ETH Zurich and Colorado State University.
Mathematics of Climate Change	Gain a solid understanding of the mathematics underlying human-induced climate change. You will possess a general understanding of the climate system, against which to assess the likely role of anthropogenic forcing factors. You will learn to apply a range of mathematical methods, including differential equations, calculus and the use of small parameters to approximate and simplify climate system problems. Topics of study will include observations of climate change, the greenhouse effect, regimes of atmospheric absorption, climate feedbacks, climate tipping points and geoengineering.
Energy and the Environment	You will work individually and in groups in order to engage with the technical, economic and social issues arising from energy-use and environmental change. You will study these in sufficient depth to allow yourself to make informed and quantitative judgements about proposals to ameliorate environmental damage by policy and other changes. You also have the opportunity to exercise these skills by examining a real-world issue as the topic of a group research project and report.

YEAR 4

Research Project 2	You will work on a research project linked to a research group from across the University. You will work in pairs and for the duration of the project will become a member of the research group. You will gain a valuable insight into scientific research, but will also have an opportunity to make a real contribution to your area of study and interest.
Bioinformatics	Research in the biological sciences is increasingly dependent on large datasets such as those generated by DNA sequencing and microarrays. This is also true for diagnostics and medicine. Analysis of these datasets requires a range of skills and knowledge drawn from computer science, physical sciences and mathematics and statistics as well as biological sciences. Bioinformatics is the discipline that integrates algorithms and methods from these disciplines to model biological systems and infer patterns hidden in complex data.
Advanced Topics in Natural Sciences Chemistry I	This module provides you with small-group teaching across a selection of advanced topics in Natural Sciences Chemistry, reflecting the research interests of the staff involved. The syllabus consists of six short courses, each taught as a self-contained set of eight lectures (or the workshop/tutorial equivalent). You should choose three of these courses, enabling you to tailor the module to your specific interests and your intended future career.
Fluid Dynamics of Atmospheres and Oceans	This module lays the foundations for an understanding of large scale weather patterns and ocean circulation. It will introduce you to the kinds of dynamics that can occur in stratified and rotating fluids, and introduce key concepts, such as conservation and balance, that are used to understand and analyse such flows.
Physical Methods in Biology and Medicine	Discuss and explore the principles and current techniques used for the understanding of biology at cellular and molecular level and the particular challenges arising in their application to living systems. In addition it will highlight some of the contributions these approaches can make to medicine and the life sciences.
Condensed Matter II	Develop your understanding of effects that play a key role in the development of contemporary solid state physics. The different topics covered will be linked by the idea that electrons in solids can be treated as quasi-particles interacting with other quasi-particles: electrons, phonons, photons. In addition to electrons, other excitations in solids are considered, eg, Cooper pairs, plasmons and polaritons.

KEY INFORMATION AT A GLANCE

	UCAS CODE	TYPICAL OFFER
BSc Single Honours Natural Sciences	CGF0	A*AA-AAB; IB: 38-34
MSci Single Honours Natural Sciences	FGC0	A*AA-AAB; IB: 38-34
Natural Sciences with International Study	FGC1	A*AA-AAB; IB: 38-34

The full and most up-to-date information about Natural Sciences is on the undergraduate website at www.exeter.ac.uk/ug/natural-sciences and we strongly advise that you check this before attending an Open Day or making your application.

We make every effort to ensure that the entry requirements are as up-to-date as possible in our printed literature. However, since this is printed well in advance of the start of the admissions cycle, in some cases our entry requirements and offers will change.

International students

If you are an international student you should consult our general and subject-specific entry requirements information for A levels and the International Baccalaureate, but the University also recognises a wide range of international qualifications. You can find further information about academic and English language entry requirements at www.exeter.ac.uk/ug/international

For further details on our entry requirements, please see our Natural Sciences pages at www.exeter.ac.uk/ug/natural-sciences

For full and up-to-date information on applying and entry requirements, including requirements for other types of qualification, please see www.exeter.ac.uk/ug/applications

STREATHAM CAMPUS, EXETER

Website: www.exeter.ac.uk/ug/natural-sciences
www.exeter.ac.uk/enquiry

Phone: +44 (0)1392 724061



LIVING SYSTEMS INSITUTE, STREATHAM CAMPUS

THE UNIVERSITY OF EXETER



Teaching Excellence
Framework assessment 2017



5 star rated from QS



22,000 students from
178 countries



98% of our research rated of
international quality¹

RUSSELL
GROUP

A member of the Russell Group
of universities



The UK's fastest growing and
fastest rising research university²

FIND OUT MORE

Come to one of our open days. Visit us at our campuses
in Exeter and Cornwall: www.exeter.ac.uk/ug/visiting

For further information please visit
www.exeter.ac.uk/ug/natural-sciences

Accuracy of subject brochure information

The information in this subject brochure forms part of the undergraduate prospectus 2019 and is aimed at prospective undergraduate students wishing to apply for a place at the University of Exeter (the University) and start a course with us in autumn 2019. The prospectus and subject brochures describe in outline the courses and services offered by the University and we make every effort to ensure that the information provided is accurate and up-to-date at the time of going to print (undergraduate prospectus is printed January 2018 and subject brochures are printed in May 2018).

However, it may be necessary for the University to make some changes to the information presented in the prospectus following publication – for example, where it is necessary to reflect changes in practice or theory in an academic subject as a result of emerging research; or if an accrediting body requires certain course content to be added or removed. More information about our terms and conditions can be found at: www.exeter.ac.uk/undergraduate/applications/terms

¹ 98% of our research was rated as 2*,3* or 4* in the Research Assessment Exercise 2014.

² Between 2006/07 – 2015/16, the University of Exeter saw the greatest rise in research income, compared to all other Russell Group universities.

