Discover your world
Natural Sciences
lancaster.ac.uk/natural-sciences
As the Director of Natural Sciences I see the tremendous career opportunities that are open to students with a Natural Sciences degree. Pursuing a range of science subjects, often across discipline boundaries, provides you with a wide skill set and a level of independence that makes you very attractive to employers.

Why study Natural Sciences?
Coming to university does not necessarily mean specialising in one subject. A Natural Sciences degree will allow you to maintain an interest in two or three scientific disciplines where you will learn and integrate knowledge from a range of subjects.

Here at Lancaster there are no ‘Natural Sciences’ modules. You will take the same modules as the single honours students and be taught to the same depth of understanding.

What differentiates our Natural Sciences programme from other universities is the wide choice of subject pathways and flexibility. We have 22 pathways (a pathway is a selection of modules taken from single honours programmes) and in first year you will choose 3, giving you many possible combinations.

Such open-minded scientists are in great demand with employers and your job prospects are excellent. Your personal and professional development are of the utmost importance to us and by studying a Natural Sciences degree you are telling a prospective employer that you are the sort of person who is prepared to think and work across the conventional boundaries of science.

You are sure to make lasting friendships, create special memories and develop life skills that will stay with you long after you leave us.

So welcome to Lancaster and welcome to Natural Sciences.
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Disclaimer
The University makes all reasonable efforts to ensure that the information in this brochure is correct at the time of printing (June 2019).
Please see lancaster.ac.uk/compliance/legalnotice for further information.
I came here for an Open Day and I absolutely fell in love with the campus. The course was perfect for me, as I wasn’t entirely sure what I wanted to do, so everything just seemed to work out great. It was my first choice as soon as I came here.

I was doing Maths, Physics and Environmental Sciences for my A levels and as I really enjoyed doing all of them, I couldn’t decide which degree to do. Then I came to Lancaster and it was one of the only universities to do a Natural Sciences degree where you could do whatever you wanted, so that was just amazing because it allowed me to keep going with what I enjoyed doing and it was perfect! You can pick whatever you want and then you can specialise as you go through the years. It’s all about the flexibility.

There’s loads of support if you ever feel like you’re struggling with coursework or with exams. Meeting with academic advisors is really useful. They are lecturers and professors within your department, they look at your interactive transcript and you meet them every term. For me, I have three different tutors because I do three subjects. It’s a nice support network which is tailored to your degree; so for example, my physics tutor only deals with Natural Sciences students so she knows exactly what I’m going through and what’s happening, which is great.

I was amazed at how welcoming the College system was. I got involved in the rugby team and loads of different sports teams and everyone was just super welcoming. You can make loads of different friends, you have your flat, you have your college, you have your course, and I just felt really at home here.

I’ll be graduating this year and going to my graduate job at the National Air Traffic Service (NATS) as an Assistant Research Analyst where I’ve got a two year contract. After that I’ll either go into the next level position or do a Masters degree.
A Natural Sciences degree gives you a unique opportunity to mix scientific subjects to form your own hand-picked degree. If you are interested in more than one science subject or are interested in where traditional disciplines overlap, Natural Sciences is the choice for you.

We provide the following degrees:

- **BSc Hons Natural Sciences – 3 Years**
- **BSc Hons Natural Sciences (Study Abroad) – 3 Years**
- **BSc Hons Natural Sciences (Placement Year) – 4 Years**
- **MSci Hons Natural Sciences – 4 years**
- **MSci Hons Natural Sciences (Study Abroad) – 4 Years**

**Design your own degree**

Lancaster University offers one of the most flexible Natural Sciences degree schemes in the country. Unlike other institutions which package disciplines together, at Lancaster you choose your own combinations.

**Our degree programme was established in 1987**

It is one of the longest running Natural Sciences programmes in the country.
The standard entry requirements for all of our courses are A*AA – AAA at A level with at least two of these being in science subjects from the following:
Biology, Chemistry, Computing, Environmental Science, Geography, Biology, Information Technology, Mathematics, Physics or Psychology.

You must also have GCSE Mathematics grade B or 6 and English Language grade C or 4.

Enquiries are welcomed from candidates with other qualifications:
• Non-A level: GNVQ, BTEC, Open University, Open College, ONC, HNC, HND, Scottish Highers, Irish Leaving Certificate and International Baccalaureate
• Overseas qualifications
• Deferred entry

All applications must be made through the UCAS scheme.

In addition, entry to some first year subjects requires A level qualifications in particular subjects. Please see the list below:

<table>
<thead>
<tr>
<th>Subject</th>
<th>A level Requirements</th>
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<tbody>
<tr>
<td>Biochemistry</td>
<td>Chemistry</td>
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<tr>
<td>Chemistry</td>
<td>Chemistry</td>
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<tr>
<td>Engineering Chemical</td>
<td>Mathematics and Chemistry</td>
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<tr>
<td>Engineering Electrical</td>
<td>Mathematics and Physics</td>
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<tr>
<td>Engineering Mechanical</td>
<td>Mathematics and Physics</td>
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<tr>
<td>Mathematics</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Physics</td>
<td>Physics and Mathematics</td>
</tr>
</tbody>
</table>

In your personal statement, we recognise that you may be applying to universities to study one subject, as well as Natural Sciences. As long as we see your commitment to widening your knowledge in the sciences in general, (e.g. through reading, work experience and attending lectures etc.), then you would not be disadvantaged by us for making your personal statement concentrate on one subject.

If you achieve an A grade in your EPQ, then you are eligible for an offer that is one grade boundary lower than we would usually make, e.g. AAA going to AAB.
Design your own degree

MSci or BSc?
You can enrol on either the three year BSc honours degree or the four year MSci honours degree. Both programmes are identical in years one to three. You are able to transfer between the MSci and the BSc up until the end of third year, providing you achieve at least an upper second class honours mark at the end of the three year BSc.

Flexible options
In first year you will normally study three subjects, two of which must come from the following disciplines:

- Biology
- Chemistry
- Computing and Communications
- Engineering
- Environmental & Earth Science
- Geography
- Human Physiology
- Mathematics
- Physics
- Psychology

Non-science subjects
The third subject may be another science or non-science subject. It is possible to take up to 25% of your studies in a non-science subject. Almost any subject taught at Lancaster University is available to you as long as you meet the pre-requisites, it fits with your timetable and the module has the capacity.

Your first year (Part I)
During your first year you will complete 15 modules, five in each of your chosen subjects, though other variations are possible.

Each module covers a particular aspect of a subject and is typically 12 to 20 lectures in length and incorporates a large amount of laboratory-based practical work. Successful completion of the first year allows you to progress to second year.

After a broad-based first year, you will specialise in particular areas within each discipline, allowing you to study where your interest really lies. At the end of the first year, the possible options available to you are:

- Continue to study your original three subjects
- Drop one of the original subjects and continue with a two subject degree

Years 2 and 3 (Part II)
From your second year you will have the opportunity to specialise by choosing areas within a discipline. Your choices will be influenced by the subjects you selected in first year.

Sample timetable for first year students

<table>
<thead>
<tr>
<th>Time</th>
<th>Mon</th>
<th>Tues</th>
<th>Wed</th>
<th>Thurs</th>
<th>Fri</th>
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</thead>
<tbody>
<tr>
<td>9am</td>
<td>Environmental Science (lecture)</td>
<td>Biology (lecture)</td>
<td></td>
<td></td>
<td>Environmental Science (lecture)</td>
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<tr>
<td>10am</td>
<td></td>
<td>Chemistry (seminar)</td>
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<td>Chemistry (lecture)</td>
<td></td>
</tr>
<tr>
<td>11am</td>
<td>Chemistry (lecture)</td>
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<td></td>
<td>Environmental Science (lecture)</td>
<td></td>
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<tr>
<td>12pm</td>
<td></td>
<td></td>
<td>Biology (lecture)</td>
<td></td>
<td>Environmental Science (seminar)</td>
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<tr>
<td>1pm</td>
<td>Biology (lecture)</td>
<td>Environmental Science (lecture)</td>
<td></td>
<td></td>
<td>Chemistry (lecture)</td>
</tr>
<tr>
<td>2pm</td>
<td>Environmental Science (lecture)</td>
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<td></td>
<td>Chemistry (practical)</td>
<td>Biology (practical)</td>
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<td>3pm</td>
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<td>4pm</td>
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<td>5pm</td>
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Pathways made easy

It is not possible to study the entire content of two or three single-honours degree courses simultaneously. To help with your course selection, each science department has created one or more coherent collections of ‘modules’ called ‘Pathways’.

You choose which Pathways you would like to do – either two or three. By following a Pathway through a particular subject you are guaranteed to have the necessary pre-requisites for each subsequent year. You can follow any Pathway.

At the point of application you do not have to specify which three Pathways you intend to pursue in your Natural Sciences degree programme. After results day in August, you will be asked for your three Pathway choices and if you’re not sure, then these can be discussed at the start of October during Welcome Week.

<table>
<thead>
<tr>
<th>Subject/Department Area</th>
<th>Pathways</th>
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<tbody>
<tr>
<td>Biology</td>
<td>Biology</td>
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<tr>
<td></td>
<td>Biochemistry and Cell Biology</td>
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<tr>
<td></td>
<td>Ecology and Conservation</td>
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<td></td>
<td>Microbiology and Biomedicine</td>
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<tr>
<td>Chemistry</td>
<td>Chemical Measurement and Analysis</td>
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<td></td>
<td>Chemical Synthesis and Structure</td>
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<tr>
<td></td>
<td>Environmental Chemistry</td>
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<tr>
<td>Computing and Communications</td>
<td>Computing and Communications</td>
</tr>
<tr>
<td>Engineering</td>
<td>Chemical Engineering</td>
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<tr>
<td></td>
<td>Electrical Engineering</td>
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<tr>
<td></td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td>Environmental and Earth Science</td>
<td>Earth Science</td>
</tr>
<tr>
<td></td>
<td>Environmental Science</td>
</tr>
<tr>
<td>Geography</td>
<td>Human Geography</td>
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<td></td>
<td>Physical Geography</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Single Mathematics</td>
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<tr>
<td></td>
<td>Double Mathematics</td>
</tr>
<tr>
<td>Medical School</td>
<td>Human Physiology and Exercise Science</td>
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<tr>
<td>Physics</td>
<td>Physics</td>
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<tr>
<td>Psychology</td>
<td>Psychology</td>
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<tr>
<td></td>
<td>Psychology with BPS Accreditation*</td>
</tr>
</tbody>
</table>

*British Psychological Society

Discover our modules

Each Pathway contains a set of core and optional modules. These are subjects within your broader Pathway area.

Core modules represent the key areas required as part of your Natural Sciences degree and the optional modules provide you with extra skills and knowledge.

You will notice that in most cases, modules in the first year are fixed and more options open up in subsequent years. This is intentional as our Pathways have been expertly selected so that your first year covers as much ground as possible to keep your later options open.

Many Year 2 and Year 3 optional modules have pre-requisites from the previous year’s modules. Once you have decided on your Pathways and modules these will be discussed in detail at a one-to-one meeting at the start of your course where timetable flexibility and course capacity will also be taken into consideration.
Kick start your career with a placement year

BSc Hons (Placement Year) - 4 years

Our brand new Placement Year provides a wonderful opportunity for you to increase your attractiveness to employers and to add a distinctive element to your CV.

Working in a science or non-science related role at graduate level, you will deepen your understanding of the workplace and how to apply your skills and knowledge. This will greatly increase your confidence and broaden your horizons.

Throughout your first and second year we will support you to find a graduate level role for your placement in Year 3.

As this year does not contribute to the final degree classification, you only pay 20% of your year’s tuition fee.

Whilst on placement you will be expected to update a reflective work diary and you will be supported in your role by a Lancaster University academic and a company employee.
My motivation for doing a year abroad was I thought it would be a cool thing to do, and it certainly was. Studying abroad really increases your independence – you’re moving to a new country alone, adapting to a new culture and having to adjust to new teaching methods. It really pushes you out of your comfort zone.

Establishing myself in and falling in love with a new city was a fantastic part of my year abroad, but the best bit has definitely been the travelling and trying out new activities - white water rafting, a music festival in Montreal, a canoeing trip on a gorgeous lake, visiting Quebec City for Thanksgiving and a road trip around New England for reading week.

One of my biggest worries about going away was that if something went wrong there wouldn’t be anyone to help, but the support from both my exchange university and Lancaster was great.

My year abroad has been the craziest and scariest year of my life; I’ve done things I never thought I’d do! If you’re considering a year abroad, do it.”

Anna Cagnoni is in her third year of her MSci Hons Natural Sciences (Study Abroad)
Hello Future

A multidisciplinary degree, such as Natural Sciences, opens up a wide range of career opportunities. You will be highly sought after for your technical and practical skills that can be transferred across a range of industries.

Many of our students have progressed on to postgraduate studies at Lancaster and universities around the UK in the following areas:

- Advanced computing
- Astro biology
- Chemistry
- Clinical research
- Energy storage applications
- Particle physics
- Information technology
- Management and organisational change
- Mathematics
- Medical statistics
- Molecular medicine
- Medical physics
- Teacher training
- Theoretical modelling in science

Others have gained full-time work in a variety of sectors in roles such as:

- Application support specialists
- Audit associate
- Civil service
- Football analyst
- Graduate consultant enterprise
- Market survey officers
- Project co-ordinator
- Recruitment consultants
- Risk and hazard management
- Science explainers
- Science media production
- System operations analyst
- Tax consultant

Preparing for your future

We also believe that relevant work experience while you are at university is crucial to achieving a good graduate job. Not only that, our comprehensive careers service provides advice and guidance on writing CVs and job applications, and preparing for interviews.

Discover internships

We have an extensive network of businesses providing a range of full and part-time paid for internship opportunities. You get to apply your knowledge in the real-world and businesses get the skills they need. Honing the skills that are much sought after by employers, such as team working, commercial awareness and time management will give you an edge in the job market.
Since graduating my interdisciplinary background has helped my career

During my A levels, I wasn’t sure if I wanted to study biological sciences or geography, fortunately, Natural Sciences let me do both. I found that what I enjoyed most was the crossover area between the two subjects; disease geography. Since graduating, my interdisciplinary background has helped my career - I’ve worked in science communication at the Centre for Life in Newcastle and I’m currently working on my research project for an MRes in Epidemiology, looking at how early diagnosis of atrial fibrillation can prevent strokes.

The most important thing for me in choosing Lancaster was the flexibility of the course. I was able to take modules of any physical or social science in my first year whereas other universities I had offers from had more fixed pathways for Natural Sciences.

The best thing about the course was my experience with the teaching staff who were really great. They were experts in their field and the ones I contacted for advice or just to learn more about the course were helpful. It also enabled me to mingle with different groups of people and get benefits from different courses, such as field trips to power stations with geography and plenty of technical lab experience with my biology modules.

Rhiannon Green  
BSc Hons Natural Sciences with a 1st class and is now studying an MRes in Epidemiology full-time at Newcastle University.

From the directors of study to the careers service, everyone was amazingly helpful in finding my next steps

I was very undecided about which degree to study at university; I enjoyed so many of my A levels, it was hard to choose between them. A Natural Sciences degree was the perfect solution to this, but these degrees differ between universities. I really liked that at Lancaster I would be able to choose what I wanted to study, piecing together modules for my degree from my favourite subjects.

The Natural Sciences degree allowed me to explore the subjects that I enjoyed the most and change direction when I needed to. After my first year I decided labs were not for me and I was then able to tailor the rest of my degree to be a predominantly lecture/exam based scheme. No Natural Sciences degree is the same at Lancaster because of this freedom in choice of modules.

It was really good to have so many options for career paths. Many natural scientists go onto further study, however with such a wide range of subjects and skills behind you, many graduation schemes and jobs are open to you. This range of options really helped me, as an indecisive natural sciences student, to find the right career for me.

Lancaster worked so well for me because of the size of the campus and the city. I really liked how safe I felt and how much support I had during my time at university. From the directors of study to the careers service, everyone was amazingly helpful in finding my next steps, both during my degree and post graduation.

Beatrice Nixon  
MSci Hons Natural Sciences with a 1st class and is now working as an operational research fast streamer in the civil service.
Biology Pathways

Biology
Fundamental biological mechanisms are related to the environmental challenges of the 21st century, such as food security, environmental pollution, ecosystem functioning, sustainable resource management and biodiversity conservation. You will be trained in the scientific study of interactions between organisms and the environment, and how these are modified by human activities.

YEAR 1

CORE MODULES
Aquatic Ecology
Developmental Biology or Marine and Estuarine Biology
Evolutionary Biology
Global Change Biology
Zoology

OPTIONAL MODULES
*Field Course in the Spanish-Doñana
(This module may be taken in place of any of the core modules above except Evolutionary Biology and Zoology)

YEAR 2

CORE MODULES
Environmental Physiology
Evolution

OPTIONAL MODULES
Data Collection and Analysis
Field Biology
Introduction to Eco-Innovation
Populations to Ecosystems
Research Design and Delivery
Vertebrate Biology

YEAR 3

CORE MODULES
Animal Behaviour
Global Change Biology: Challenges and Solutions

OPTIONAL MODULES
Coral Reef Ecology
Dissertation
Dissertation with Work Placement
Environmental Plant Biology
*Field Course in Kenya – Tropical Biology and Conservation
*Field Course in the Scottish Highlands
Host-Parasite Interactions
Issues in Conservation Biology
Sustainable Agriculture

Biochemistry and Cell Biology
Cellular biochemistry examines the macromolecular structure and the relationship of cellular organisation to the central pathways of intermediary metabolism and the physical processes underlying cellular functions. Cell biology covers the interactions within and between cells which allow them to perform their function in the whole organism. Genetics examines the mechanisms of heredity, moving through Mendelian genetics and its extensions to molecular genetics.

YEAR 1

CORE MODULES
Biotechnology
Cell Structure and Function
Genetics
Molecules of Life
Protein Biochemistry

YEAR 2

OPTIONAL MODULES
Biochemical Techniques
Biochemistry
Bioinformatics
Cell Biology
Cell Biology Techniques
DNA Technology
Genetics

YEAR 3

OPTIONAL MODULES
Biology of Ageing
Cancer
Cell Cycle and Stem Cells
Cell Signalling I
Cell Signalling, Transport and Disease
Genetics
Medical Genetics
Proteins: Structure, Function and Evolution

*Please note: some field courses will incur additional costs
## Ecology and Conservation

Interactions between organisms, the environment and humanity are often complex. You will receive a thorough grounding in ecological theory and how these biological principles relate to the conservation of wildlife and ecological habitats. The pathway also concerns the practice of ecology and has a strong fieldwork component designed to encourage you to develop your practical skills.

### YEAR 1

**CORE MODULES**
- Aquatic Ecology
- Biodiversity and Conservation or Marine and Estuarine Biology
- Evolutionary Biology
- Global Change Biology
- Zoology

**OPTIONAL MODULES**
- *Field Course in the Spanish-Doñana* (This module may be taken in place of any of the core modules above except Evolutionary Biology and Zoology)

### YEAR 2

**CORE MODULES**
- Populations to Ecosystems
- Principles of Biodiversity Conservation

**OPTIONAL MODULES**
- Data Collection and Analysis
- Environmental Physiology
- Evolution
- Field Biology
- Introduction to Eco-Innovation
- Research Design and Delivery

### YEAR 3

**CORE MODULES**
- Coral Reef Ecology
- Issues in Conservation Biology

**OPTIONAL MODULES**
- Animal Behaviour
- Dissertation
- Dissertation with Work Placement
- Environmental Plant Biology
- *Field Course in Kenya – Tropical Biology and Conservation*
- *Field Course in the Scottish Highlands*
- Global Change Biology: Challenges and Solutions
- Host-Parasite Interactions
- Sustainable Agriculture

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## Microbiology and Biomedicine

This pathway contains a balanced mixture of biochemistry, microbiology and physiology. It attempts to demonstrate the relevance of microbiology to human affairs, whether the connection is direct, e.g. diseases of humans, or indirect, e.g. the control of diseases of food crops. Although some lectures deal specifically with one group of microbes, i.e. bacteria, fungi or protozoa, entire modules emphasise ecological and functional relationships between different groups of microbes.

### YEAR 1

**CORE MODULES**
- Anatomy and Tissue Structure
- Hormones and Development
- Human Physiology
- Impact of Microbes
- Infection and Immunity

### YEAR 2

**OPTIONAL MODULES**
- Cell Biology
- Cell Biology Techniques
- Genetics
- Medical Microbiology
- Microbiological Techniques

### YEAR 3

**OPTIONAL MODULES**
- Biology of Ageing
- Cancer
- Cell Cycle and Stem Cells
- Cell Signalling I
- Cell Signalling, Transport and Disease
- Clinical Immunology
- Environmental Pathogens
- Molecular and Biochemical Parasitology
- Tropical Diseases

*Please note: some field courses will incur additional costs*
Chemistry Pathways

**Chemical Measurement and Analysis**
Chemical theory and analysis relates to the measurement, rationalisation, and prediction of the chemical and physical properties of individual molecules and bulk materials. This pathway covers the theory and practical application of techniques in physical, analytical, and computational chemistry. It also prepares you for potential research projects in physical and computational chemistry in your final year.

**YEAR 1**
- **CORE MODULES**
  - Atoms and Molecules
  - Chemical Reaction Kinetics
  - Physical Foundations of Chemistry
  - Spectroscopy and Analytical Chemistry
  - Thermodynamics of Chemical Processes
- **OPTIONAL MODULES**
  - Molecular Structure Determination
  - Solids, Soft Matter and Surfaces

**YEAR 2**
- **CORE MODULES**
  - Electrochemistry
  - Quantum Chemistry, Symmetry and Group Theory
  - The Physical Principles of Spectroscopy
  - Thermodynamics and Statistical Mechanics
- **OPTIONAL MODULES**
  - Advanced Spectroscopy: Theory and Applications
  - Advanced Techniques for Analytical Separations
  - Biological Chemistry and Chemical Biology
  - Chemistry Practical Research Skills
  - Computational Chemistry
  - Computational Electronic Structure
  - Research Project (BSc only)
  - Solids, Surfaces and Soft Materials II

**YEAR 3**
- **OPTIONAL MODULES**
  - Advanced Chemistry Practical Research Skills
  - Advanced Synthetic Chemistry
  - Biological Chemistry and Chemical Biology
  - Further Inorganic Chemistry: f-block and Metals in Biology
  - Investigating Mechanism in Sustainable Polymer Chemistry
  - Investigation of Chemical Mechanisms and Experimental Design
  - Research Project (BSc only)
  - Solids, Surfaces and Soft Materials II
  - The Chemistry of Biomedical Imaging

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**Chemical Synthesis and Structure**
Chemical synthesis concerns the creation of new molecules. Key to this is understanding molecular reactivity and mechanism techniques to design and synthesise molecules, and how we can characterise and measure their properties. This pathway develops knowledge and practical skills across all of synthetic chemistry, and prepares you for potential research projects in chemical synthesis in your final year.

**YEAR 1**
- **CORE MODULES**
  - Atoms and Molecules
  - Chemistry of the Elements
  - Coordination Chemistry
  - Organic Reactivity and Mechanism
  - Organic Structure

**YEAR 2**
- **CORE MODULES**
  - Alkene and Aromatic Chemistry
  - Inorganic Chemistry
  - Organometallics Catalysis and Mechanism
  - Strategies for Chemical Synthesis
- **OPTIONAL MODULES**
  - Molecular Structure Determination
  - Principles of Spectroscopy for Biological Sciences
  - Solids, Soft Matter and Surfaces

**YEAR 3**
- **OPTIONAL MODULES**
  - Advanced Chemistry Practical Research Skills
  - Advanced Synthetic Chemistry
  - Biological Chemistry and Chemical Biology
  - Further Inorganic Chemistry: f-block and Metals in Biology
  - Investigating Mechanism in Sustainable Polymer Chemistry
  - Investigation of Chemical Mechanisms and Experimental Design
  - Research Project (BSc only)
  - Solids, Surfaces and Soft Materials II
  - The Chemistry of Biomedical Imaging
Environmental Chemistry

Environmental chemistry specifically relates to the chemistry of the aqueous, atmospheric and terrestrial environments. This Pathway is designed to give a thorough grounding in chemistry whilst covering the techniques and methodology of environmental chemical analysis, together with an introduction to environmental planning and assessment.

Due to the complexity of this subject and the background knowledge it requires in later years, this Pathway is double weighted. As such you can only take one other Pathway with this option.

YEAR 1

**CORE MODULES**
- Atmosphere, Weather and Climate
- Atoms and Molecules
- Biogeochemical Cycles
- Chemical Reaction Kinetics
- Earth’s Interior
- Geology
- Hydrology: Water in the Environment
- Physical Foundations of Chemistry
- Spectroscopy and Analytical Chemistry
- Thermodynamics of Chemical Processes

**OPTIONAL MODULES**
- Subject to A level portfolio, you may be required to replace one of the above modules with one of the following:
  - Numerical Skills I
  - Numerical Skills II

YEAR 2

**CORE MODULES**
- Aquatic Biogeochemistry
- Atmospheric Science
- Electrochemistry
- Thermodynamics and Statistical Mechanics

**OPTIONAL MODULES**
- Data Collection and Analysis
- *Field Course in the Lake District - Environmental
- Hydrology
- Molecular Structure Determination
- Quantum Chemistry, Symmetry and Group Theory
- Soil Science
- Solids, Soft Matter and Surfaces
- The Physical Principles of Spectroscopy

YEAR 3

**OPTIONAL MODULES**
- Advanced Chemistry Practical Research
- Advanced Spectroscopy
- Advanced Techniques for Analytical Separations
- Biological Chemistry and Chemical Biology
- Causes and Consequences of Environmental Radioactivity
- Chemistry Research Project (BSc only)
- Climate and Society
- Computational Chemistry
- Dissertation
- Global Change and the Earth System
- Solids, Surfaces and Soft Materials II
- The Causes and Consequences of Environmental Radioactivity
- Water Resources Management

*Please note: some field courses will incur additional costs*
Computing Pathways

Computing and Communications

The School of Computing and Communications is one of the UKs leading departments (positioned 7th in the UK for world-leading and internationally excellent research REF2014) offering an extensive portfolio of high quality programmes for undergraduate and postgraduate study, taught by a team of acknowledged world experts in their field. This Pathway covers practical storage and usage of data and digital media and its applications.

**CORE MODULES**
Software Development

**OPTIONAL MODULES**
- Advanced Programming
- Computer Networks
- Computer Science Group Project
- Human Computer Interaction
- Operating Systems
- Software Design

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**YEAR 3**

**OPTIONAL MODULES**
- Artificial Intelligence
- Computer Science Seminars
- Distributed Systems
- Game Design
- Internet Application Engineering
- Languages and Compilation
- Media Coding and Processing
- Security and Risk

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Engineering Pathways

Chemical Engineering

Chemical Engineering influences numerous areas of technology. These Pathways will help you to develop the skills needed to conceive and design processes for the production, transformation and transportation of materials. Due to the complexity of this subject and the background knowledge it requires in later years, this Pathway is double weighted. As such you can only take one other Pathway with this option.

**CORE MODULES**
- Calculus
- Design, Innovation and 3-D Thinking
- Differential Equations
- Fundamentals of Chemistry for Engineers
- Further Engineering Mathematics
- Heat Transfer
- Introductory Engineering Mathematics
- Introduction to Engineering Thermodynamics
- Process Engineering Fundamentals
- Strength and Materials
- The World of Manufacture

**YEAR 2**

**OPTIONAL MODULES**
- Chemical Engineering Lab Project I
- Engineering Analysis
- Fluid Mechanics and Chemical Engineering Thermodynamics
- Particle Technology and Separation Processes
- Process Transfers of Mass and Heat Reactors and Equipment

**YEAR 3**

**OPTIONAL MODULES**
- Advanced Process Technology
- Chemical Engineering Design and Process Safety
- Computer Applications in Process Engineering
- Energy Conversion
- Life Cycle Analysis
- Nuclear Instrumentation
**Electrical Engineering**

This Pathway will help you develop a sound foundation in all aspects of Electronic and Electrical Engineering that is crucial to the design and manufacture of future systems in the medical, environmental, energy, transport and ICT markets. You will also have the opportunity to specialise in areas including wireless communications, silicon chip design, nanotechnology, green technologies and power generation. Due to the complexity of this subject and the background knowledge it requires in later years, this Pathway is double weighted. As such you can only take one other Pathway with this option.

**YEAR 1**

- **CORE MODULES**
  - Calculus
  - Computers and Control
  - Differential Equations
  - Electrical and Electronics Fundamentals
  - Fundamentals of Chemistry for Engineers
  - Fundamentals of Digital Electronics
  - Fundamentals of Electronic Instrumentation
  - Further Engineering Mathematics
  - Introductory Engineering Mathematics
  - Process Engineering Fundamentals

**YEAR 2**

- **CORE MODULES**
  - Digital Electronics
  - Electrical Circuits and Power Systems
  - Electromagnetics and RF Engineering
- **OPTIONAL MODULES**
  - Engineering Analysis
  - Instrumentation and Control

**YEAR 3**

- **OPTIONAL MODULES**
  - Analogue Electronics
  - Digital Signal Processing
  - Integrated Circuit Engineering
  - Optoelectronics and Wireless Communications

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**Mechanical Engineering**

Mechanical Engineering is a field covering any industry that uses moving parts, from construction to transport; medicine to manufacturing; renewable energy to consumer technology. Our programme gives you the skills necessary for the subject, with an applied focus on mechanical system designs.

Due to the complexity of this subject and the background knowledge it requires in later years, this Pathway is double weighted. As such you can only take one other Pathway with this option.

**YEAR 1**

- **CORE MODULES**
  - Calculus
  - Computers and Control
  - Design, Innovation and 3-D Thinking
  - Differential Equations
  - Further Engineering Mathematics
  - Heat Transfer
  - Introduction to Engineering Thermodynamics
  - Introductory Engineering Mathematics
  - Strength and Materials
  - The World of Manufacture

**YEAR 2**

- **CORE MODULES**
  - Engineering Mechanics
  - Fluid Mechanics and Thermodynamics
  - Materials and Design
- **OPTIONAL MODULES**
  - Engineering Analysis
  - Instrumentation and Control

**YEAR 3**

- **OPTIONAL MODULES**
  - Design and Manufacturing
  - Engineering Materials
  - Machine Elements
  - Vibration Analysis and Application
Environmental & Earth Science Pathways

Earth Science
The solid rocks that comprise Earth's upper crust contain a record of change driven by processes originating from the core to the atmosphere over a period exceeding 2 billion years. This Pathway provides the basic skills needed to read this record and understand how Earth has evolved over both long and short periods of time. You will have the opportunity to take a number of field-based modules in both the UK and abroad.

YEAR 1
- **CORE MODULES**
  - Biogeochemical Cycles
  - Earth's Interior
  - Geology
  - Hydrology: Water in the Environment
  - Natural Hazards
- **OPTIONAL MODULES**
  - Subject to A level portfolio, you may be required to replace one of the above modules with one of the following:
    - Introduction to Environmental Chemistry
    - Numerical Skills I
    - Numerical Skills II

YEAR 2
- **CORE MODULES**
  - Data Collection and Analysis
  - Geoscience in Practice
- **OPTIONAL MODULES**
  - Aquatic Biogeochemistry
  - Catchment Hydrology
    - *Field Course in the Lake District - Environmental
    - Geological Mapping
    - Soil Science
- **OPTIONAL MODULES**
  - Dissertation
  - Dissertation with Work Placement
  - Extended Essay
    - *Field Course in Devon - Hydrological Processes
    - *Field Course - Volcanic Processes
    - Geological Hazards
    - Hydrogeology
    - Water Courses Management

YEAR 3
- **CORE MODULES**
  - Introduction to Geophysical Techniques
  - The Dynamic Earth

Environmental Science
This Pathway aims to train you in those areas of natural science (including chemistry, physics, biology, mathematics, geology, physical geography) that are used to understand natural and anthropogenic processes on the surface of the Earth, rivers, lakes, oceans and the atmosphere, as well as Earth's internal processes; against the backdrop of environmental change.

YEAR 1
- **CORE MODULES**
  - Atmosphere, Weather and Climate
  - Biogeochemical Cycles
  - Earth's Interior
  - Geology
  - Hydrology: Water in the Environment
- **OPTIONAL MODULES**
  - Subject to A level portfolio, you may be required to replace one of the above modules with one of the following:
    - Introduction to Environmental Chemistry
    - Numerical Skills I
    - Numerical Skills II

YEAR 2
- **CORE MODULES**
  - Data Collection and Analysis
- **OPTIONAL MODULES**
  - Aquatic Biogeochemistry
  - Atmospheric Science
  - Catchment Hydrology
  - Energy, Economy and the Environment
  - Environmental Data Visualisation and Analysis
    - *Field Course in the Lake District - Environmental
    - Soil Science

YEAR 3
- **OPTIONAL MODULES**
  - Climate and Society
  - Dissertation
  - Dissertation with Work Placement
  - Extended Essay
    - *Field Course in Devon - Hydrological Processes
    - Global Change and the Earth System
    - Hydrogeology
    - The Causes and Consequences of Environmental Radioactivity
    - Water Resources Management

*Please note: some field courses will incur additional costs*
**Geography Pathways**

**Human Geography**
This Pathway provides you with an understanding of society, culture, development and issues of globalisation within a framework of environmental issues in the 21st century.

**YEAR 1**
- **CORE MODULES**
  - Geographical Skills and Application in a Changing World
  - Society and Space - Human Geography

**YEAR 2**
- **CORE MODULES**
  - Development, Geography and the Majority World
  - Human Geographical Pioneers and Concepts
- **OPTIONAL MODULES**
  - Cultural Geography
  - Economic Geography
  - *Field Course in Paris - Globalizing Food: Food, Politics and Culture*
  - Geosocial Spaces
  - Introduction to Eco-Innovation
  - People and the Sea
  - Political Geography
  - Research Project Skills
  - Spatial Analysis and GIS

**YEAR 3**
- **OPTIONAL MODULES**
  - Africa: Geographies of Transformation
  - Cities and Globalisation
  - Climate and Society
  - Dissertation
  - Dissertation with Work Placement
  - Environment, Politics and Society in Amazonia
  - Environmental Governance and the Biodiversity Crisis
  - *Field Course in the Brazilian Amazon - Conservation and Sustainable Development*
  - *Field Course in Croatia - Water, Society and the Istrian Landscape*
  - *Field Course in New York - Inequality and the City*
  - Geographies of Health: Understanding and Tackling Inequality
  - GIS: Principles and Practice
  - Global Consumption
  - Independent Research
  - Urban Infrastructure in a Changing World

**Physical Geography**
You will learn about the main components of our ‘Earth-system’, how environments have changed in the past, what controls the dynamics of environments in the present, and how we can predict changes in the future. All this is studied in the context of an interconnected planet.

**YEAR 1**
- **CORE MODULES**
  - Environmental Process and Systems
  - Geographical Skills and Application in a Changing World

**YEAR 2**
- **CORE MODULES**
  - Interacting Landscapes: Biogeography and Geomorphology
  - Soil Science
- **OPTIONAL MODULES**
  - Aquatic Biogeochemistry
  - Atmospheric Science
  - Catchment Hydrology
  - Environmental Data Visualization and Analysis
  - *Field Course in the Mediterranean - Investigating Mediterranean Environments*
  - Introduction to Eco-Innovation
  - Physical Geographical Pioneers and Concepts
  - Research Project Skills
  - Spatial Analysis and GIS

**YEAR 3**
- **OPTIONAL MODULES**
  - Dissertation
  - Dissertation with Work Placement
  - Environmental Remote Sensing and Image Processing
  - *Field Course in Croatia - Water, Society and the Istrian Landscape*
  - GIS: Principles and Practice
  - Glacial Systems
  - Independent Research
  - Lakes, Rivers and Estuaries

*Please note: some field courses will incure additional costs*
Mathematics Pathways

Single Mathematics
This Pathway allows you to continue your study of maths at degree level in a top ranking department. You’ll focus on both pure mathematics and statistics with an emphasis on solving practical mathematical problems.

YEAR 1
CORE MODULES
- Calculus
- Further Calculus
- Linear Algebra
- Probability
- Statistics

YEAR 2
OPTIONAL MODULES
- Abstract Algebra
- Computational Mathematics
- Linear Algebra II
- Probability II
- Statistics II

YEAR 3

Double Mathematics
If you prefer to focus your studies on maths, we also offer a double-weighted Pathway that allows you to study the subject in greater detail. This incorporates the maths modules listed above and gives you the opportunity to concentrate on theoretical problems. As a double-weighted Pathway you can only take one other Pathway with this option.

YEAR 1
CORE MODULES
As above, plus:
- Convergence and Continuity
- Discrete Mathematics
- Geometry and Calculus
- Integration and Differentiation
- Numbers and Relations

YEAR 2
OPTIONAL MODULES
As above, plus:
- Complex Analysis
- Project Skills
- Real Analysis

YEAR 3
OPTIONAL MODULES
As above, plus:
- Differential Equations
- Hilbert Spaces
- Lebesgue Integration
- Linear Systems
- Metric Spaces
- Probability Theory
Medical School Pathways

Human Physiology and Exercise Science

If you are interested in science and physical education, this Pathway provides a solid foundation in application and performance modules. These will help to increase your understanding of the functions and regulations of the human body and physiological integration of the systems.

**YEAR 1**

**CORE MODULES**
- Digital Technologies in Sports and Exercise Science
- Essentials of Sports and Exercise Physiology
- Fundamental Anatomy
- Introduction to Nutrition
- Principles of Biomechanics

**YEAR 2**

**CORE MODULES**
- Biomechanics
- Physiology and Metabolism

**OPTIONAL MODULES**
- Current Debates in Sport and Exercise Science
- Sports Medicine or Exercise Medicine

**YEAR 3**

**CORE MODULES**
- Anatomy and Biomechanics of Human Performance
- Performance Physiology

**OPTIONAL MODULES**
- Advanced Training for Performance
- Applied Digital Health Technology
- Entrepreneurship II
- Injury Prevention and Rehabilitation
- Nutritional Application and Challenges
Physics Pathways

Physics

You will gain a working knowledge and understanding of the physics of fluids and solids, especially their thermal and electrical properties, with an emphasis also on computing, classical mechanics and quantum physics.

This Pathway requires a set of first year maths-based modules, either through the Physics Department or the Mathematics and Statistics Department (under the Pathway Single Mathematics, on the previous page). As such, students taking Physics can only take one other Pathway in addition to either of the supporting Maths Pathways.

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<td>Introduction to Experimental Lab</td>
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<td>Quantum Physics</td>
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<td>The Physical Universe</td>
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<td>Atomic Physics</td>
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<td>Thermal Properties of Matter</td>
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<td>Computer Modelling</td>
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</tbody>
</table>

**OPTIONAL MODULES**

Students need to take either the Physics Mathematics modules listed below or the Single Mathematics Pathway.

- Complex Methods
- Functions and Differentiation
- Integration
- Series and Differential Equations
- Vector Calculus

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<td>Cosmology I</td>
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<td>Atomic Physics</td>
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<tr>
<td>Experimental Lab I</td>
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<td>Experimental Lab II</td>
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<td>Experimental Principles of Particle Detection</td>
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<td>Cosmology II</td>
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<td>Maths I</td>
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<td>Energy</td>
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<td>Maths II</td>
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<td>Mechanics and Variations</td>
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<td>Groups and Symmetries</td>
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<td>Quantum Mechanics</td>
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<td>Low Temperature Physics Laboratory</td>
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<td>Relativity, Nuclei and Particles</td>
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<td>Particle Physics</td>
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<td>Scientific Programming and Modelling Project</td>
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<td>Particle Physics Group Project</td>
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<tr>
<td>Thermal Properties of Matter</td>
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<td>Physics Literature Search</td>
</tr>
</tbody>
</table>

**THEOLOGICAL MODULES**

- Physics of Living Systems
- Semiconductor Physics Laboratory
- Solid State Physics
- Space and Auroral Physics
- Statistical Physics
- Theoretical Physics Group Project
- Theoretical Physics Independent Study
Psychology Pathways

Psychology
This Pathway develops your range of knowledge and skills in order to continue your study of psychology at degree level.

YEAR 1
CORE MODULES
Understanding Psychology

YEAR 2
OPTIONAL MODULES
Cognitive Psychology
Developmental Psychology
Foundations of Cognitive Neuroscience
Social Psychology

YEAR 3
OPTIONAL MODULES
Cognitive, Affective and Clinical Neuroscience
Culture in Cognition and Development
Current Directions in Social Psychology
Forensic and Investigative Psychology
Prozac Nation: Human Psychopharmacology
Psychology of Art
Psychology of Meditation
The Developing Mind
The Lying Brain: An Examination of Hallucinations and Delusions in Normal, Clinical and Pathological Populations
The Neuroscience of Typical and Atypical Social Development
The Psychology of Attention: from Laboratory to Everyday Behaviour
Topics in Clinical Psychology

Psychology with BPS accreditation
This double-weighted Pathway allows you to study psychology and receive accreditation from the British Psychological Society. It can only be taken alongside one other Pathway and cannot be taken by BSc students intending to study abroad due to the accreditation regulations.

YEAR 1
CORE MODULES
Investigating Psychology
Understanding Psychology

YEAR 2
CORE MODULES
Cognitive Psychology
Foundation of Cognitive Neuroscience
Research Methods I: Experimental Methods in Psychology
Research Methods II: Asking Questions and Analysing Responses
Statistics

YEAR 3
CORE MODULES
Developmental Psychology
Personality and Individual Differences Project
Social Psychology
I was in my final year in high school and I was initially looking for a degree that wouldn’t constrain me to only one science, because I couldn’t decide between them and wanted to do all of them. When I came across Lancaster – I saw its ranking position and then the first thing that caught my eye was the campus – I did a virtual campus tour because I’m from Romania and couldn’t come to an Open Day. It was amazing – I was like ‘this looks like the place for me!’

I come from Bucharest, and Lancaster is different in the sense that in Romania we don’t put such an emphasis on sciences for uni, so that was the game changer for me.

The flexibility of the degree is what I loved, because not every university offers that level of control over all of your choices. In the first year, they tell you everything that you can do in your second part of your degree, so that makes it easier for you to choose exactly what modules you want in your second and third year. In the second and third year I chose only the modules I wanted to do, and that was fantastic because it really made me feel enthused - wanting to go to the lectures and wanting to go to the seminars because it’s topics that you’re interested in.

I definitely feel I’ve made Lancaster my own little home. I have never been homesick, and I think that was because in my first year there were lots of activities to get involved in, including societies that really filled up your timetable. Making friends at university wasn’t scary at all. During Welcome Week everybody was so nice and helpful, so that really helped.

I found people were really open and wanted to meet you and speak about different interests that you had in common. In my spare time I enjoy walking across the city. I’m now living in the city and I find it amazing. I also enjoy hanging out with my friends at societies and socials.

Sandra Georgescu is in her final year of her BSc Hons Natural Sciences
How to reach us

We’re easy to find!

By road
From the north or south, leave the M6 motorway at Junction 33 and take the A6 north towards Lancaster for about 2 miles. The University is on the right. For SatNav use LA1 4YW.

By rail
There are direct rail links between Lancaster and many of the UK’s major cities and airports. The single journey between London and Lancaster takes between 2.5 and 3 hours.
Buses and taxis are available from just outside the station.

By coach and bus
Lancaster city is on the national coach network; National Express coaches call at the University. A number of local buses run from Lancaster bus station to the University every 5 minutes on weekdays.

Further details can be found at lancaster.ac.uk/travel
Lancaster University is set in beautiful parkland and lies approximately three miles south of the City of Lancaster. The campus is easily accessible via road, rail and bicycle and is within 70 miles of Manchester’s International Airport.
Natural Sciences

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