Natural Sciences

Undergraduate Degree 2021
Welcome

Professor Crispin Halsall
Director of Natural Sciences

As the Director of Natural Sciences I see the tremendous career opportunities that are open to students with a Natural Sciences degree. As the Covid-19 crisis demonstrates, those with a strong interdisciplinary science skill set are highly sought after in areas like molecular biology, data science and statistics and even engineering have featured heavily in combating the pandemic. 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 three, 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.

So welcome to Lancaster and welcome to Natural Sciences.

Contents

02 Welcome
06 For the lover of science
07 Making the grade
08 Design your own degree
09 Pathways made easy
10 Kick start your career with a placement year
12 Broaden your horizons and study abroad
14 Hello Future
30 How to reach us

Subject/Department Pathways
16 Biology
18 Chemistry
20 Computing and Communications
20 Engineering
22 Environmental and Earth Science
23 Geography
24 Mathematics
25 Medical School
26 Physics
27 Psychology

Important information
The information in this brochure relates primarily to 2021/22 entry to the University and every effort has been taken to ensure the information is correct at the time of printing in June 2020. The University will use all reasonable effort to deliver the course as described but the University reserves the right to make changes after going to print. You are advised to consult our website at lancaster.ac.uk/study for up-to-date information before you submit your application.

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; 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.

Making the grade

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, Geology, Information Technology, Mathematics, Physics or Psychology.

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

We welcome applications from students with a range of alternative UK and international qualifications, including combinations of qualifications, provided a comparable level of science has been studied.

Further guidance on admission to the University, including other qualifications that we accept, frequently asked questions and information on applying, can be found on our general admissions webpage at lancaster.ac.uk/study/undergraduate/admissions/

All applications must be made through the UCAS scheme.

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

<table>
<thead>
<tr>
<th>Pathway</th>
<th>A level Requirements</th>
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<tbody>
<tr>
<td>Biochemistry, Cell Biology and Genetics</td>
<td>Chemistry, Chemistry and Mathematics</td>
</tr>
<tr>
<td>Chemistry Environmental</td>
<td>Chemistry, Chemistry and Mathematics</td>
</tr>
<tr>
<td>Chemistry Measurement and Synthesis</td>
<td>Mathematics and Physics</td>
</tr>
<tr>
<td>Chemistry Synthesis and Structure</td>
<td>Mathematics and Physics</td>
</tr>
<tr>
<td>Engineering Chemical</td>
<td>Mathematics and Physics</td>
</tr>
<tr>
<td>Engineering Electronic</td>
<td>Mathematics and Physics</td>
</tr>
<tr>
<td>Engineering Mechanical</td>
<td>Physics, Physics and Mathematics</td>
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<tr>
<td>Mathematics</td>
<td></td>
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<tr>
<td>Physics</td>
<td></td>
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<tr>
<td>Physics and Mathematics</td>
<td></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 and Earth Science
- Geography
- Mathematics
- Medical School
- 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.

Year 4
The MSci year comes with a mandatory research project selected from a department of your choice and often linked to an array of partner organisations. A wide selection of Masters level modules are open to you.

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>
</tr>
</thead>
<tbody>
<tr>
<td>9am</td>
<td>Environmental Science (lecture)</td>
<td>Biology (lecture)</td>
<td></td>
<td>Environmental Science (lecture)</td>
<td></td>
</tr>
<tr>
<td>10am</td>
<td></td>
<td>Chemistry (lecture)</td>
<td></td>
<td></td>
<td>Environmental Science (lecture)</td>
</tr>
<tr>
<td>11am</td>
<td>Chemistry (lecture)</td>
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<tr>
<td>12pm</td>
<td></td>
<td>Biology (lecture)</td>
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<td></td>
<td></td>
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<tr>
<td>1pm</td>
<td>Environmental Science (lecture)</td>
<td></td>
<td></td>
<td>Chemistry (lecture)</td>
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<tr>
<td>2pm</td>
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<td></td>
<td></td>
<td>Biology</td>
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<td>3pm</td>
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<td>5pm</td>
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Pathways made easy

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.

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 subject to pre-requisite entry requirements (see page 7).

Double weighted Pathways
Please note, due to the complexity of subject content, some of our Pathways are double weighted. This means you can only take one other Pathway with these Pathway choices. Double weighted Pathways are shown by an asterisk in the table below.

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.

### Subject/Department Area Pathways

<table>
<thead>
<tr>
<th>Subject/Department Area</th>
<th>Pathways</th>
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</thead>
<tbody>
<tr>
<td>Biology</td>
<td>Biology</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Chemical Engineering*</td>
</tr>
<tr>
<td>Chemical and Analysis</td>
<td>Conservation</td>
</tr>
<tr>
<td>Environmental Chemistry</td>
<td>Microbiology and Biomedicine</td>
</tr>
<tr>
<td>Computing and</td>
<td>Engineering*</td>
</tr>
<tr>
<td>Communications</td>
<td></td>
</tr>
<tr>
<td>Environmental and</td>
<td>Mechanical Engineering*</td>
</tr>
<tr>
<td>Earth Science</td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td>Human Geography</td>
</tr>
<tr>
<td>Geology</td>
<td>Physical Geography</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Single Mathematics</td>
</tr>
<tr>
<td>Medical School</td>
<td>Human Physiology</td>
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<tr>
<td></td>
<td>and Exercise Science</td>
</tr>
<tr>
<td>Physics</td>
<td>Physics*</td>
</tr>
<tr>
<td>Psychology</td>
<td>Psychology with British Psychological Society Accreditation*</td>
</tr>
</tbody>
</table>

* Double weighted Pathways
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.
Broaden your horizons and study abroad

Experience the world around you by spending a year studying in North America or Australasia. Your studies abroad count towards your final degree classification and so you take modules which fit into Lancaster’s scheme of study.

You will benefit greatly from your overseas experiences and our students often find it life changing. You will grow in confidence and become more mature and independent. It’s a great opportunity to broaden your horizons and develop an understanding of different cultures and values.

An overseas experience can add a distinctive element to your CV. Employers may be looking for graduates who demonstrate flexibility and have a richer outlook on life.

If you’re not sure whether this is the degree for you, our advice is to apply for the Study Abroad scheme - it’s easier to drop out of it, than to apply for it once you’re here.

“I went to study at the University of Calgary in Canada. I had a good time because around Calgary there is the Rocky’s so you can go and explore and it’s really pretty. I think studying abroad has made me a lot more independent than I was before. University is all about learning to live on your own and learning to manage yourself but going on a study abroad year is on another level because you’re in a completely different country all by yourself. You also learn how to make time for yourself and your studies as well as time to explore the country, because you’re not just there to learn.

It’s pretty easy to find something that you are doing in another country that also relates to your degree when you come back. The Natural Sciences department works in conjunction with the global experience office to find universities that do the course that you are doing, and then do similar modules as well.

I would highly recommend it.”

Esther Ansah Ans mooah
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
- Astrobiology
- 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 specialist
- Audit associate
- Civil service
- Football analyst
- Graduate consultant enterprise
- Market survey officer
- Project co-ordinator
- Recruitment consultant
- Risk and hazard management
- Science communicator
- 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.

Choosing Natural Sciences at Lancaster was one of the greatest decisions I made for my career.

The course is incredibly diverse and enabled me to combine my love for the biosciences with human geography. The facilities offered at Lancaster are second to none and the staff are always willing to assist you.

I believe Lancaster better equipped me to tackle the competitive job market through the available workshops and volunteering opportunities, which proved to be invaluable.

Since leaving Lancaster in 2018, I have gone on to study whale sharks in the Maldives with the Maldives Whale Shark Research Programme and great white sharks in South Africa with White Shark Projects, as part of the MSc Marine Environmental Management course with the University of York. I was also selected as a 2019 Women in Shark Science Scholar with the South African Shark Conservancy and have been researching the role of ecotourism in shaping public perceptions of sharks. Today I am the campaigns officer for the Angling Trust and a freelance science communicator and marine conservationist working with New Nature Magazine and the UK Youth for Nature coalition, as well as the founder of the Leading Women in Marine Science platform and an ambassador for the Ocean Conservation Trust.

I would recommend the Natural Sciences course, and Lancaster University, to anyone who is interested in pursuing a multi-disciplinary degree at a university that is at the cutting edge of scientific research.

It was the flexibility to choose almost any module that interested me.

I chose Lancaster because it provided a flexible approach to Natural Sciences and it was also in the Top 10.

I started first year doing Environmental Science, Biology and Spanish. I finished my third year having done primarily Environmental Science, with a couple of Environmental Biology and Geography modules, with a plan to get an MSc (after a gap year) to give me the best chance of getting a job as an environmental consultant.

I really enjoyed the range of topics I learnt about at Lancaster as well as all the societies that were on offer. I also took part in the Career Mentoring Scheme, which lead me to apply for a 6 month internship at Stopford in my second year and ultimately helped me decide that I wanted to give environmental consultancy a try.

I’m an Environmental Consultant within the Permitting & Compliance team at RPS, a multi-disciplinary consultancy. All developments that could potentially cause pollution during their operational life (to the air, land or water) need to have an environmental permit in order to operate. The main part of my job involves preparing the necessary documents and assessments that are needed to apply for an environmental permit or to change or surrender an existing one.

Lancaster is a great university with a campus that contains all you need.

Hannah Rudd
BSc Hons Natural Sciences and is now working in MSc Marine Environmental Management

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Alice Gibbs
BSc Hons Natural Sciences and is now working as an Environmental Consultant
## 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.

### 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.

### 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.

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### Core Modules

#### YEAR 1
- Aquatic Ecology
- Evolutionary Biology
- Global Change Biology
- Marine and Estuarine Biology

#### YEAR 2
- Animal Behaviour
- Global Change Biology: Challenges and Solutions

#### YEAR 3
- Data Collection and Analysis
- Field Biology
- Dissertation
- Field Course in the Eden Project, Cornwall

### Optional Modules

- Field Course in the Spanish-Doñana
- Field Course in the Eden Project, Cornwall
- Field Course in the Scottish Highlands
- Field Course in Kenya – Tropical Biology and Conservation

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*Please note: some field courses will incur additional costs and are subject to availability*
Chemistry Pathways

Chemical Measurement and Analysis

**A Level Requirements:** Chemistry

Chemical measurement 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**
  - Advanced Kinetics, Reaction Dynamics, and Surfaces
  - Advanced Spectroscopy: Theory and Applications
  - Advanced Techniques for Analytical Separations
  - Biological Chemistry and Chemical Biology
  - Computational Chemistry
  - Electronic Structure Theory
  - Research Project (BSc only)

**YEAR 2**

- **CORE MODULES**
  - Molecular Structure Determination
  - Solids, Soft Matter and Surfaces

- **OPTIONAL MODULES**
  - Molecular Structure Determination
  - Principles of Spectroscopy for Biological Sciences
  - Solids, Soft Matter and Surfaces

**YEAR 3**

- **CORE MODULES**
  - Advanced Kinetics, Reaction Dynamics, and Surfaces
  - Advanced Spectroscopy: Theory and Applications
  - Advanced Techniques for Analytical Separations
  - Biological Chemistry and Chemical Biology
  - Computational Chemistry
  - Electronic Structure Theory
  - Research Project (BSc only)

**Environmental Chemistry**

**A Level Requirements:** Chemistry and Mathematics

Environmental chemistry specifically relates to the chemistry of the aquatic, 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.

**Double Weighted Pathway:** 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**
  - Atoms and Molecules
  - Chemical Reaction Kinetics
  - Physical Foundations of Chemistry
  - Spectroscopy and Analytical Chemistry
  - Thermodynamics of Chemical Processes

- **OPTIONAL MODULES**
  - Advanced Kinetics, Reaction Dynamics, and Surfaces
  - Advanced Spectroscopy: Theory and Applications
  - Advanced Techniques for Analytical Separations
  - Biological Chemistry and Chemical Biology
  - Computational Chemistry
  - Electronic Structure Theory
  - Research Project (BSc only)

**YEAR 2**

- **CORE MODULES**
  - Molecular Structure Determination
  - Solids, Soft Matter and Surfaces

- **OPTIONAL MODULES**
  - Molecular Structure Determination
  - Principles of Spectroscopy for Biological Sciences
  - Solids, Soft Matter and Surfaces
  - The Physical Principles of Spectroscopy

**YEAR 3**

- **CORE MODULES**
  - Advanced Kinetics, Reaction Dynamics, and Surfaces
  - Advanced Spectroscopy: Theory and Applications
  - Advanced Techniques for Analytical Separations
  - Biological Chemistry and Chemical Biology
  - Computational Chemistry
  - Electronic Structure Theory
  - Research Project (BSc only)

**OPTIONAL MODULES**

- Advanced Chemistry Practical Research
- Advanced Spectroscopy
- Advanced Techniques for Analytical Separations

*Please note: some field courses will incur additional costs and are subject to availability.*
## Computing Pathways
### Computing and Communications
This Pathway explores the theory and practice of innovative and experimental computing, allowing you to develop well-rounded professional and technical skills. Areas covered include programming and software development, the theory of computation, human-computer interaction, digital media, and its applications.

### Engineering Pathways

## Chemical Engineering
### A Level Requirements: Chemistry and Mathematics
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. Double Weighted Pathway: 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.

<table>
<thead>
<tr>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
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<tbody>
<tr>
<td><strong>CORE MODULES</strong></td>
<td><strong>CORE MODULES</strong></td>
<td><strong>CORE MODULES</strong></td>
</tr>
<tr>
<td>Software Development</td>
<td>Chemical Engineering Laboratory Projects I</td>
<td>Engineering Mechanics</td>
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<tr>
<td><strong>OPTIONAL MODULES</strong></td>
<td><strong>OPTIONAL MODULES</strong></td>
<td><strong>OPTIONAL MODULES</strong></td>
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<tr>
<td>Advanced Programming</td>
<td>Catalytic and Bio-reaction Engineering</td>
<td>Fluid Mechanics and Chemical Engineering</td>
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<tr>
<td>Computer Networks</td>
<td>Chemical Engineering Design and Process Safety</td>
<td>Particle Technology and Separation</td>
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<tr>
<td>Computer Science Group Project Human Computer Interaction</td>
<td>Computer Applications in Process Engineering</td>
<td>Energy Conversion</td>
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<tr>
<td>Operating Systems Software Design</td>
<td>Reactors and Equipment</td>
<td>Materials and Design</td>
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<td><strong>CORE MODULES</strong></td>
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<tr>
<td>Business Development Project Engineering Analysis</td>
<td>Advanced Process Transfers</td>
<td>Engineering Mechanics</td>
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<tr>
<td>Engineering Analysis</td>
<td>Fluid Mechanics and Chemical Engineering</td>
<td>Fluid and Thermal Systems</td>
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<tr>
<td>Mass Transfer</td>
<td>Process Safety</td>
<td>Mechanical Materials</td>
</tr>
<tr>
<td>Reactors and Equipment</td>
<td>Computer Applications in Process Engineering</td>
<td>Processing Materials</td>
</tr>
</tbody>
</table>

## Mechanical Engineering
### A Level Requirements: Mathematics and Physics
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. Double Weighted Pathway: 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.

<table>
<thead>
<tr>
<th>YEAR 1</th>
<th>YEAR 2</th>
<th>YEAR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CORE MODULES</strong></td>
<td><strong>CORE MODULES</strong></td>
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<tr>
<td>Heat Transfer</td>
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<td>Materials and Design</td>
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<tr>
<td>Introduction to Engineering Thermodynamics</td>
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<td>Mechanical Materials</td>
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<tr>
<td>Manufacturing Fundamentals</td>
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<td>Process Engineering Fundamentals</td>
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<td>Processing Fundamentals</td>
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<td>Programming Fundamentals</td>
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<td><strong>OPTIONAL MODULES</strong></td>
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<td>Chemical Engineering Laboratory Projects I</td>
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<td>Fluid Mechanics and Chemical Engineering</td>
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<td>Process Safety</td>
<td>Particle Technology and Separation</td>
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<td>Computer Applications in Process Engineering</td>
<td>Energy Conversion</td>
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<tr>
<td>Business Development Project Engineering Analysis</td>
<td>Advanced Process Transfers</td>
<td>Fluid Mechanics and Chemical Engineering</td>
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<td>Fluid Mechanics and Chemical Engineering</td>
<td>Mechanical Materials</td>
</tr>
<tr>
<td>Reactors and Equipment</td>
<td>Computer Applications in Process Engineering</td>
<td>Processing Materials</td>
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<td>Instrumentation and Control</td>
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Environmental and Earth Science Pathways

Earth 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 the dynamics of the Earth’s surface, rivers, lakes, oceans and the atmosphere, as well as Earth’s internal processes, against the backdrop of environmental change. 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
  - Geology
  - Hydrology
  - Water in the Environment
  - Natural Hazards
  - The Earth’s Interior

- **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**
  - Introduction to Geophysical Techniques
  - The Dynamic Earth

**YEAR 3**
- **CORE MODULES**
  - Geological Mapping
  - Environmental Data Visualization and Analysis

- **OPTIONAL MODULES**
  - Dissertation
  - Dissertation with Work Placement
  - Extended Essay
  - Field Course in Devon - Hydrological Processes
  - Field Course - Volcanic Processes
  - Geological hazards
  - Hydrogeology

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**
  - Biogeochemical Cycles
  - Atmosphere, Weather and Climate
  - Earth’s Interior
  - Geochemistry
  - 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**
  - Climate and Society
  - Dissertation
  - Dissertation with Work Placement
  - Extended Essay
  - Field Course in Devon - Hydrological Processes
  - Field Course in the Lake District - Environmental
  - Soil Science

**YEAR 3**
- **CORE MODULES**
  - Environmental Process and Systems
  - Geographical Skills and Application in a Changing World

- **OPTIONAL MODULES**
  - Geographical Skills and Application in a Changing World
  - Human Geographical Pioneers and Concepts
  - Independent Research
  - Social Analysis and GIS

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. 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**
  - Geographical Skills and Application in a Changing World
  - Society and Space - Human Geography

- **OPTIONAL MODULES**
  - International Development
  - Geography and the Majority World
  - Human Geographical Pioneers
  - Independent Research
  - Political Geography
  - People and the Sea
  - Economic Geography
  - Cultural Geography
  - Conservation and Sustainable Development

**YEAR 2**
- **CORE MODULES**
  - Development, Geography and the Majority World
  - Human Geographical Pioneers and Concepts

- **OPTIONAL MODULES**
  - Africa Geographies of Transformation
  - Cities and Globalisation
  - Climate and Society
  - Dissertation
  - Dissertation with Work Placement
  - Extended Essay
  - Field Courses in Croatia - Water, Society and the Istran Landscape
  - Field Courses in New York - Cultural, Economic, Political and Social Geographies
  - Food and Agriculture in the 21st Century
  - Geographies of Health: Understanding and Tackling Inequality
  - GIS Principles and Practice
  - Global Consumption
  - Independent Research
  - Perspectives on Technology and Environment

**YEAR 3**
- **CORE MODULES**
  - Environment, Politics and Society
  - Economic, Political and Social Geographies
  - Global Consumption

- **OPTIONAL MODULES**
  - Independent Research
  - GIS: Principles and Practice
  - Glacial Systems
  - Independent Research
  - Lakes, Rivers and Estuaries

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

- **OPTIONAL MODULES**
  - Aquatic Biogeochemistry
  - Atmospheric Science
  - Catchment Hydrology
  - Environmental Data Visualization and Analysis
  - Field Course in the Mediterranean - Glacial Systems
  - GIS: Principles and Practice
  - Independent Research
  - Lakes, Rivers and Estuaries
  - Marine Systems
  - People and the Sea
  - Political Geography
  - Physical Geographical Pioneers and Concepts
  - Research Project Skills
  - Spatial Analysis and GIS

**YEAR 2**
- **CORE MODULES**
  - Glacial and Fluvial Landscape Processes
  - Soil Science

- **OPTIONAL MODULES**
  - Field Course in Croatia - Water, Society and the Istran Landscape
  - GIS Principles and Practice
  - Glacial Systems
  - Independent Research
  - Lakes, Rivers and Estuaries

**YEAR 3**
- **CORE MODULES**
  - Marine Systems
  - People and the Sea
  - Political Geography
  - Physical Geographical Pioneers and Concepts
  - Research Project Skills
  - Spatial Analysis and GIS

*Please note: some field courses will incur additional costs and are subject to availability.
**Mathematics Pathways**

**Single Mathematics**

**A Level Requirements:** 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 III
- Probability II
- Statistics II

**YEAR 3**

**OPTIONAL MODULES**
- Algebraic Curves
- Bayesian Inference
- Combinatorics
- Commutative Algebra
- Geometry of Curves and Surfaces
- Generalised Linear Models
- Graph Theory
- Groups and Symmetry
- Likelihood Inference
- Machine Learning
- Mathematics for Stochastic Finance
- Mathematical Education
- Medical Statistics
- Number Theory
- Representation Theory of Finite Groups
- Stochastic Processes

**Double Mathematics**

**A Level Requirements:** Mathematics

Double Weighted Pathway: 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**
- Calculus
- Further Calculus
- Linear Algebra
- Probability
- Statistics

**YEAR 2**

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

**YEAR 3**

**OPTIONAL MODULES**
- Abstract Algebra
- Computational Mathematics
- Linear Algebra III
- Probability II
- Statistics II

**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
- Fundamental Anatomy

**YEAR 2**

**OPTIONAL MODULES**
- Essentials of Sports and Exercise Physiology
- Introduction to Nutrition
- Hormones and Metabolism
- Public Health Challenges
- Principles of Biomechanics
- Concepts in Sports and Exercise Psychology

**YEAR 3**

**OPTIONAL MODULES**
- Biomechanics II
- Current Debates in Sports and Exercise Science
- Physiology and Metabolism
- Sports and Exercise Psychology
- Sports Medicine or Exercise Medicine
- Maximising Elite Performance
- Optimising Health Outcomes
- Research Project
Physics Pathways

Physics

A Level Requirements: Mathematics and 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.

Double Weighted Pathway: 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.

YEAR 1

CORE MODULES

Classical Mechanics
Electric and Magnetic Fields
Quantum Physics
The Physical Universe
Thermal Properties of Matter

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

YEAR 2

CORE MODULES

Introduction to Experimental Lab

OPTIONAL MODULES

Astrophysics II
Astrophysics Group Project
Atomic Physics
Computer Modelling
Cosmology Group Project
Cosmology II
Energy
Flavour Physics
Groups and Symmetries
Low Temperature Physics Laboratory
Particle Physics
Particle Physics Group Project
Physics Literature Search
Physics of Fluids
Physics of Living Systems
Semiconductor Physics Laboratory
Solid State Physics
Space and Auroral Physics
Statistical Physics
Theoretical Physics Group Project
Theoretical Physics Independent Study

YEAR 3

OPTIONAL MODULES

Astronomy
Astrophysics I
Classical Fields
Cosmology I
Electromagnetism, Waves and Optics
Experimental Lab I
Experimental Lab II
Experimental Principles of Particle Detection
Maths I
Maths II
Mechanics and Variations
Quantum Mechanics
Relativity, Nuclei and Particles
Scientific Programming and Modelling Project
Thermal Properties of Matter

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

Introduction to Cognitive Psychology
Introduction to Developmental Psychology
Introduction to Neuroscience
Personality and Individual Differences
Social Psychology in the New Digital Age

OPTIONAL MODULES

Cognitive Psychology
Developmental Psychology
Foundations of Cognitive Neuroscience
Social Psychology

YEAR 2

CORE MODULES

Cognitive Psychology
Developmental Psychology
Foundations of Cognitive Neuroscience
Social Psychology

OPTIONAL MODULES

Cognitive, Affective and Clinical Neuroscience
Bewildering, Bizarre or Just Banal?
Cognition in and out of the laboratory
Culture in Cognition and Development
Current Directions in Social Psychology
Forensic and Investigative Psychology
Psilocybin: 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 Cooperation
Topics in Clinical Psychology

YEAR 3

CORE MODULES

Developmental Psychology
Personality and Individual Differences
Project
Social Psychology

OPTIONAL MODULES

Cognitive Psychology
Foundation of Cognitive Neuroscience
Research Methods I
Experimental Methods in Psychology
Research Methods II
Aiding Questions and Analysing Responses
Statistics

Psychology with BPS accreditation

Double Weighted Pathway: 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

Introduction to Cognitive Psychology
Introduction to Developmental Psychology
Introduction to Neuroscience
Personality and Individual Differences
Social Psychology in the New Digital Age

OPTIONAL MODULES

Essential Skills for Psychologists
Research Integrity and Open Science 1
Research Integrity and Open Science 2
Statistics for Psychologists 1

YEAR 2

CORE MODULES

Cognitive Psychology
Research Methods I
Research Methods II

OPTIONAL MODULES

Cognition in and out of the laboratory
Culture in Cognition and Development
Psychology of Art
Psychology of Meditation

YEAR 3

CORE MODULES

Developmental Psychology
Personality and Individual Differences
Project
Social Psychology

OPTIONAL MODULES

Cognitive, Affective and Clinical Neuroscience
Bewildering, Bizarre or Just Banal?
Cognition in and out of the laboratory
Culture in Cognition and Development
Current Directions in Social Psychology
Forensic and Investigative Psychology
Psilocybin: 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 Cooperation
Topics in Clinical Psychology

Statistics
I chose to study my Natural Sciences degree because it is so flexible. I have the freedom to pick and choose the modules I want to study, which means I enjoy all my modules. I find that the practical workshops and learning how to write reports really puts me in good stead for the future and provides me with a range of great future prospects after my studies. If I want to further research and study for a PhD, I’m readily equipped with independent study skills and I know how to undertake research, or if I decide to work in industry I’m equipped with hands-on skills and experience.

I first came to Lancaster University on an Applicant Visit Day and I remember walking up the main drive of campus being completely blown away at how stunning it was! I was greeted by both the staff and students in a welcoming manner which sparked my sense of belonging to the University straight away and I immediately felt comfortable, meaning that I didn’t end up looking at other universities.

I’m from London, so coming from a big city to a campus university has been a big change. Lancaster University has a real community feel and everything you need access to is right on your doorstep, however, you can still escape from your studies by making use of the woodland walks in the grounds, as the campus is surrounded by countryside.

The favourite aspect of my course so far is the group project we did on my chemistry module, where we designed safe rechargeable zinc batteries, as this allowed us to put a lot of our foundations of skills and knowledge learnt from previous years in to practice, whilst learning new techniques too.
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