Natural Sciences

The strength of the Natural Sciences course at Cambridge is the breadth and variety of subject choice across the physical and biological sciences, allowing students to tailor their programme of study according to their individual interests. Cambridge uniquely enables students to choose to cover an exceptional breadth of sciences, or to develop a much more focussed programme of study.

All Natural Sciences students take three experimental science subjects in their first year, plus an appropriate maths course. In the second year, students choose three subjects from nineteen possible options. In the third year, they either specialise in one subject from a choice of fifteen, or choose a more broad-based physical or biological sciences course with both "major" and "minor" subjects. Fourth-year courses are also available for eight subjects (Astrophysics, Biochemistry, Chemistry, Earth Sciences, History & Philosophy of Science, Materials Science, Physics and Systems Biology), leading to a Master of Natural Sciences (MSci) degree. Candidates can also apply to study Chemical Engineering via Natural Sciences. In this case, students take the first year of Natural Sciences and a further 3 years studying in the Department of Chemical Engineering and Biotechnology, leading to a MEng degree.

Natural Sciences at Peterhouse

Natural sciences can be studied at any college, but Peterhouse may be particularly attractive to you if:

(a) you might wish to make use of the wide variety of study grants that the college provides for vacation work placements and projects,
(b) you would enjoy working together with a small group of friends, as you make progress through your three or four years here,
(c) you would enjoy being part of a college with a proud scientific past and present.

Peterhouse was the first to be founded in the University of Cambridge, has produced five Nobel Laureates in the last 60 years, and is still at the cutting edge of scientific endeavour. Its current Fellows, those who might teach you, work in astrophysics (star formation), particle physics (CERN), molecular biology, ecology, evolution, cell biology, chemistry and genetics, and each year undergraduates leave to start careers in those (and other) areas. The College is known for the warm welcome its existing students give those who arrive, and looks forward to meeting you when you come.

Physics

Peterhouse has the strongest links to CERN of any college. Two of our teaching Fellows regularly work at CERN and one is the head of the physics department. They are:
**Prof. Andy Parker**: Head of Physics Department, currently head of the university's Particle Physics group, ex glider pilot, and lectures particle-astrophysics courses. He teaches physics to first year students at Peterhouse and works on the ATLAS experiment at CERN, looking for exotic states of matter, and has run a number of summer projects connected to ATLAS, for Peterhouse students.

**Dr. Chris Lester**: University Lecturer and Director of Studies (DoS) for "physical" natural scientists at Peterhouse. He usually teaches maths and particle physics to students at Peterhouse. He also works on the ATLAS experiment at CERN, looking for invisible particles that might make up dark matter and supersymmetry. He is occasionally known to lecture from one of his unicycles.

Many Peterhouse students have gone on to work in High Energy or Theoretical Physics, and/or have undertaken project work at CERN. Often people who came to Peterhouse to study Natural Sciences intending to specialise in physics end up finding that some other part of Natural Sciences is even more interesting. In the last six years, Peterhouse natural scientists who took physics have gone on work in a huge number of different areas including: management of a multi-billion pound oil refinery; teaching in schools; scientific research from Zoology to History of Science; the priesthood; banking; and management consultancy (to name just a few).

**Chemistry**

**Dr. Tim Dickens** is a Fellow of Peterhouse with a background in industrial chemistry at GlaxoSmithKline. He supervises first year students Peterhouse, and also keeps a close eye on those who study chemistry throughout their time in the college. He is frequently involved in admissions. His current research focuses on NMR Ring Current calculations on congregate aromatic systems. He is also a change ringer.

**Prof. Sophie Jackson** is a Fellow of Peterhouse, the Admissions Tutor for Sciences, a University Professor in Biophysical Chemistry, and has a long standing research interest in protein folding and assembly. In addition to her work advising and interviewing Peterhouse science applicants, she frequently supervises students in Part IB and Part II Chemistry courses.

**Biology**

**Dr. Justin Gerlach** is a Bye-Fellow and Director of Studies at Peterhouse. He specialises in teaching whole-organismal biology and scientific writing, and carries out evolutionary research as a sideline. His goal in teaching is to convey an enthusiasm for all biodiversity and to foster scientific writing of the very highest standard. Both his teaching and research are based on the view that understanding anything biology requires a knowledge of normal function and evolutionary ancestry. This applies to everything, whether it be a specific gene or the whole elephant.
Dr. Graham Christie is a Fellow and Director of Studies at Peterhouse. He is a microbiologist and heads the Molecular Microbiology research group within the Department of Chemical Engineering and Biotechnology. He supervises Part 1A Biology of Cells, drawing upon his research interests in bacterial molecular genetics, structural biology and advanced cellular imaging techniques.

Dr Andrew Tanentzap is a Bye-Fellow of Peterhouse and leads the Ecosystems and Global Change research group within the Department of Plant Sciences. His research is interested in understanding how species arise and assemble into communities, and the ways in which disturbances affect biological communities and the benefits that they provide to humans in terms of water, food, and carbon storage. In his research, he uses theoretical models, experiments, and long-term observations across all scales of organisation from genes to landscapes.

First year biological courses are mostly taught by Peterhouse Fellows, providing structure and close support to the first year. Some continuity of supervisors carries on into the second year although at this point students are taught by a much wider range of high quality supervisors. Biology at Peterhouse aims to provide the best in teaching and to enable students to develop a wide ranging but also coherent understanding of biological systems. This applies to students with a primary interest in biology but also to other Natural Scientists, even if they are studying just one biological course.

**Materials Science**

Prof Paul Midgley is a Fellow of Peterhouse, a Professor of Materials Science, and is the Director of the Electron Microscopy Facility. That means he is always the man with the most powerful microscope in the University. Frequently involved in admissions, and recently a lecturer for the first year materials course, he is always on call to advise materials sciences students, and looks after materials scientists during their time at Peterhouse.

**Students’ views**

‘The breadth of the course allowed me to explore which areas of biology excite me the most. The best part is that you can engage with researchers who are at the cutting-edge of their field and have your questions answered. As a biological natural scientist at Peterhouse, you are part of a diverse group that makes you feel supported and confident that you can fulfil your aspirations in science.’

Charlotte, Natural Sciences (Biochemistry) graduate 2019, now Zoology MPhil student at Peterhouse
Famous scientists at Peterhouse

Peterhouse "science" can claim five Nobel Prize winners among its members, along with many other eminent scientists and inventors including:

- **Sir Aaron Klug** - Nobel Prize for developments in crystallographic electron microscopy
- **Max Perutz** - Nobel Prize for determining the structure of haemoproteins
- **Sir John Kendrew** - Nobel Prize for determining the structure of haemoproteins
- **Archer Martin** - Nobel Prize for developing partition chromatography.
- **Michael Levitt** - Nobel Prize for development of multiscale models for complex chemical systems
- **Lord Kelvin** - one of the founders of thermodynamics,
- **Air Commodore Sir Frank Whittle** - Inventor of the Jet Engine
- **Charles Babbage** - Originated the concept of a programmable computer
- **Henry Cavendish** - Discovered hydrogen and was first person to "weigh" the Earth
- **Sir Christopher Cockerell** - Inventor of the hovercraft
- **Sir James Dewar** - Inventor of the explosive cordite, and the thermos flask.

Course requirements

Candidates are asked to indicate whether this wish to apply as a Physical or Biological scientist, however this does not restrict options at all once at Cambridge and is done to determine how your application will be assessed and which interviews you will receive. Candidates should be honest about their interests as this is one of the things assessed at interview. The Admissions Team are happy to discuss this decision with you if you are unsure.

Physical scientists should be studying Mathematics and at least one of Chemistry or Physics to A level or equivalent, with Further Mathematics and the other of Chemistry or Physics to A level advantageous. Applicants in the Biological Sciences are expected to be studying two of Biology, Chemistry, Physics or Maths to A level or equivalent, and a third such subject is highly advantageous. Applicants to Chemical Engineering via Natural Sciences are expected to be studying Mathematics and Chemistry to A level or equivalent, and Physics and/or Further Mathematics to A level is highly desirable.

The application process

Candidates are asked to specify in their application whether they wish to focus on primarily Biological or Physical Sciences. Students interested in Chemistry should choose the option depending on their other preferred first year courses. This choice is non-binding and students can take whatever courses they are qualified for in the first year, but each of the two streams is interviewed by an appropriate team of
interviewers depending on their specialism. If an applicant wishes to specialise in primarily biological sciences but wants to have the option of taking a physics course in their first year, they should inform the Admissions Office of this so that a separate physics interview can be arranged. The final choice of first year courses is only confirmed once students arrive in October and some students switch ‘sides’ every year on arrival. This is the advantage of such a flexible course.

All applicants for Natural Sciences across the University will be asked to sit a pre-interview written assessment at their school, college or local testing centre on 4th November. These will form part of our holistic assessment of candidates’ achievements, abilities and potential and are no more, and no less important than any of the other pieces of information considered during the admissions process. Registration for this assessment closes on 15th October. Further information can be found on the University website.

Usually four Science Fellows conduct the two 30 minute interviews. In addition to general questions, they will ask some scientific questions; they do not expect candidates to know a “correct answer”, but are interested in their response to ideas or problems which may be unfamiliar.

**Typical conditional offers**

Our typical conditional offer for Natural Sciences is A*A*A at A level. IB offers are usually for a minimum of 40-42 points, to include 776 or 777 at Higher level in relevant subjects. We would expect the highest grades to be achieved in science or mathematics subjects. Offers are designed to be realistic, taking into account individual circumstances, and to reflect potential and likely levels of achievement. Most of those who receive offers will attain the grades required.