

# **GUIDE TO STUDYING NATURAL SCIENCES**



Queen Anne's  
— CAVERSHAM —



## Queen Anne's Guide to Studying Natural Sciences

Over the past few years many Queen Anne's students have won places at prestigious universities to study Natural Sciences. However, it is still a slightly unusual subject choice. The right students can flourish within its broad and flexible curriculum – making it an attractive alternative to studying a single science subject at university, especially for those who are uncertain of the area of study they ultimately want to pursue. This challenging course produces graduates who are literate, numerate and well qualified to go into a multitude of professions: from scientific research, medicine, and chemical engineering to publishing or law. Scientifically trained graduates are constantly in demand both in industry and in the public sector, rates of graduates employment for Natural Sciences are high.

### INTRODUCTION

#### Broad Study or specialism

Natural Sciences is different from single-subject science degrees in that students study a range of subjects in their first year and choose to either maintain this broad study over three years or become increasingly specialised as the course progresses. Students can choose between subjects from both the physical and biological branches of experimental 'hard' science. Some courses also allow students to take subsidiary papers from the social sciences or humanities.

Course options differ between universities, but are likely to include a selection from these below – of which first year students would probably choose three or four. Some universities require students to take two 'major' subjects plus one or two 'minor' subjects. Mathematics or statistics is usually taken as a compulsory subsidiary subject, in order to supply the essential numerical skills relevant to scientists. In each year of the course, students are able to choose new subjects to study or to continue with their current options in further depth.

#### PHYSICAL SCIENCES

- Chemistry
- Physics
- Astronomy
- Materials and Minerals Science
- Earth Science

#### BIOLOGICAL SCIENCES

- Biochemistry
- Zoology
- Plant Sciences
- Pharmacology
- Physiology
- Cell biology

#### MATHEMATICAL SUBJECTS

- Mathematics
- Statistics
- Computer science

#### SOCIAL SCIENCES

- Psychology
- Anthropology
- Management studies
- Humanities
- Modern languages
- History and Philosophy of Science

Natural Sciences degrees can lead to several qualifications – BA or BSc for three year courses, with most universities also offering four-year MSci courses. Both courses could be followed by further study towards a PhD. Some courses have the option of graduating with joint honours, if specialisation in a single subject is not desired.

For those wishing to enter scientific research, specialisation within the Natural Sciences course is probably advised. Conversely, continuing with broad study might be more appropriate for undergraduates wanting to enter publishing or business, or to apply to do postgraduate medicine (an accelerated course).

### Other options

Four-year BSc courses are offered at some universities in which the third year is spent studying abroad, or in industry. These 'sandwich courses' offer valuable industrial experience which would give graduates a head start in job applications; similarly language skills gained during a year abroad could boost employability. Scottish universities are also worth considering; while only Strathclyde actually offers Natural Sciences, the Scottish four-year BSc course includes study from several subsidiary subject areas giving a similar breadth of topics.

### Universities Offering Natural Sciences

Currently, Natural Sciences is offered at: Bath, Birmingham, Cambridge, Chester, Durham, University of East Anglia, Exeter, Falmouth, Lancaster, Leeds, Liverpool John Moores, Nottingham, Queen Mary's London, Southampton, Strathclyde, Sussex, University College London and The University of South Wales. Leeds and Southampton offer a BSc 'Interdisciplinary Science', which is similar to Natural Sciences.

## TEACHING METHODS

### Lectures

These form the backbone of the course; attendance is advisable!

### Practicals

The nature of these will vary between universities and course options, but practical work is key to the study of experimental sciences. The majority will be lab-based, but the courses include fieldwork trips. Practical work is the fun part of the course! In general they are very different from school experiments and place greater emphasis on interpreting results and carrying out independent investigation than just 'getting good results'. Some courses will include assessed practicals, where you will submit a lab report for marking with the result contributing towards the year's examination.

### Written work

This will probably include a mixture of mathematical problems, short answer questions, and – particularly in biological subjects- essays. Scientific writing skills are not necessarily acquired during A Level study, so courses often hold clinics to help with this.

## DECIDING WHERE TO GO - THINGS TO CONSIDER

### The course

All Natural Science courses offer flexibility, but they also differ a lot. Do you want to study a language as part of your course? Might History and Philosophy of Science interest you? Do you think you want to specialise or continue with a broad curriculum for three years? Years abroad, sandwich placements or the ability to continue on to an MSci degree aren't offered on all courses. Also lots of students apply for Natural Sciences at a few universities and for single science degrees at other universities – this is fine, but the personal statement must be able to serve both equally. *Look at prospectuses or university websites for course details.*

### The University

League tables are useful, but they don't tell you the whole story. Go for universities that a strong research background, but also take into account sports facilities, IT library provision, size, co-curricular opportunities. Is the university collegiate, campus or spread across the city – all offer quite different experiences. *Find University vital stats in books like The Times Good University Guide.*

### The Town

Remember you are going to be living there for three years! Would living in a big city be stimulating, or distracting? Where are the faculties and halls of residence – will transport be an issue? Of course, your primary consideration should be for the course, but these factors should be considered when making your decision. **Visit!**

### Open Days

These can be variable – they could include tours of the campus, presentations on the course, opportunities to see inside labs and accommodation buildings, the opportunity to ask current students or staff your questions. Some are useful, but be aware that the university is advertising itself and current students could give you a more realistic opinion of the courses strengths and weaknesses. If you can't make an open day but want to visit, try emailing the department to arrange a time. Just walking around the city can help you get an idea of weather you'd want to live and study there.

### Natural Sciences at Cambridge

Cambridge has a long and distinguished history as a world class centre for the study of science. The Cambridge natural Sciences 'tripos' is challenging – the first year of the course involves Saturday morning lectures and up to 40 hours of work a week, including practicals, lectures, supervisions, and set work but it is also highly stimulating.

The course involves lots of practical work as well as academic study, and students really benefit from the supervisions system. Supervisions are weekly, hour-long discussion sessions between two or three students and a supervisor, who could be a PhD student or a fellow of the college. Supervisions provide a framework for exploring beyond material covered in lectures, or getting help with difficult topics.

Applications to Cambridge can either be made through a particular college, or without stating a preference of college (an open application). Most apply to a college, although an 'open' application is unlikely to be severely disadvantaged. Although some colleges are known for being particularly strong in Natural Sciences, it is best to just apply for the colleges that you like and can imagine living at for three years. Some colleges are also more competitive than others, but again your choice is unlikely to affect your chance of getting an offer.

Competition for places is high. Between a third and a quarter of Natural Sciences applicants are made offers; standard offer is A\*AA. GCSE results are also expected to be mainly As and A\*s. However, don't be put off applying if you feel your GCSE results were below this standard – they are just one element of your application. As with any personal statement, keep it simple and direct. When applying to Cambridge, however, a bit extra is expected. Enter the biology, chemistry or physics Olympiads; ask to take AEA in the summer; enter the Telegraph Young Science Writer competition; mention books, scientific magazines or journals that you've read; do some unusual work experience – try university research departments or industry. The important thing is to demonstrate interest and enthusiasm for the subject above and beyond what you study in school.

After sending off your UCAS form, you will have to complete an additional questionnaire online form called the SAQ (supplementary access questionnaire). Interviews will then be held towards the end of the autumn term – depending on the college, you may have two or three interviews, or a written test. The best way to prepare for interviews is practise, which school will help to arrange. Interviewers aren't expecting perfect answers, but the ability to think through a problem which is unfamiliar to you by applying scientific knowledge.

## THE ADMISSION PROCESS

### Exams, Personal Statements, Interviews

#### EXAMS – SUBJECTS AND RESULTS

##### GCSEs

At GCSE, most applicants will have taken the triple science option (although having taken double science should not be a distinct disadvantage.) Most Queen Anne's pupils shouldn't have trouble meeting the standard university entrance requirement of five A\*-C GCSEs, including Maths and English (sometimes a science and a modern language and also required).

Currently GCSE results and your AS grades are the only hard evidence of academic performance supplied to universities during the application process. Therefore it pays to have a really strong set of GCSE results to back up the predicted grades supplied by the school. This is especially important for those applying to competitive, high ranking institutions.

##### A Levels

Most universities specify at least two scientific subjects at A Level out of Biology, Chemistry, Physics and Mathematics; many natural scientists will have studied three of these. Some Natural Sciences course options will require specific A Levels to have been taken, particularly those within the Physical sciences. Equally some course options such as Geology or Materials science, will require no previous knowledge of the subject.



#### COURSE OPTION

Physics  
Chemistry  
Biochemistry  
Cell Biology  
Ecology, zoology, physiology & other biological subjects

#### POSSIBLE A LEVEL PREREQUISITES

Mathematics, Physics (sometimes Further, maths, Mechanics)  
Chemistry  
Chemistry  
Chemistry, Biology (sometimes not essential)  
Usually no strict requirements, but biology preferred

It is a good idea to pick A Levels wisely in order to maximise the choice of course options open to you. Chemistry is a prerequisite for many subjects, and will be useful for most biological options as well as chemistry. Mathematics is also a versatile choice. However, having the arts subject or a language in addition to three sciences can be valuable too, showing breadth of study.

Offers vary between institutions: they tend to be A\*AA – AAB.

## The Personal Statement

The most important thing to remember when writing a personal statement is not to waffle – every sentence must help to convince the admissions tutor that you would enjoy, and succeed in, studying Natural Sciences.

There is no formula for writing a personal statement! However, it is good to bear in mind a few guidelines. A common mistake is writing too much about extra-curricular activities; 2/3 on why you want to do the course, academic interests etc and 1/3 on relevant extra-curricular activities is fine. Equally, don't just list things – relate everything back to the course you're applying for. Time management, interpersonal skills and lateral thinking are attributes relevant to studying science at school which you could have developed through e.g. being a prefect, captaining a sports team or doing Duke of Edinburgh. If you are struggling, talk to Dr Vincent.

However the majority of the personal statement should be focussed on academic matters – what especially interests you about the course; work experience you have undertaken; and career aspirations. Bearing in mind the nature of the course, it is a good idea to show in your personal statement a breadth of interests from different areas of science; however, admissions tutors do accept that many natural science applicants will have applied for single subject science degrees elsewhere. Essentially, it is best to pick a couple of topics from outside the A Level curriculum which interest you and write briefly about them - this can be especially useful in providing talking points at interview.

Finally, check and re-check for spelling and grammar. There is no need to write in a really fancy style – simpler is better!

## Interviews

Only a few universities interview for Natural Sciences, and they can vary a lot in formality and content between universities. Be comfortable talking about topics in your personal statement (and refresh your memory of any books you have said you have read.); be relaxed and don't be afraid to say if you don't understand a question.

Below are some questions from recent interviews for Natural Science degree courses. Obviously, style of interviewing and questions asked will vary between institutions and interviewers, but these will give an indication of the kinds of thinking skills required. In almost all cases, interviewers are not looking for a perfect answer, but an indication that you understand the scientific basis of the question and are willing to attempt to come up with some ideas. Some questions may seem deceptively simple – remember that interviewers are looking for evidence some evidence that you have investigated topics outside the A Level science syllabi through reading or work experience, so don't just give a basic answer.

- How would you persuade a fellow train passenger on a journey home that Darwin's theory of evolution is correct?
- How would you present the evidence to someone with no scientific background? (Cambridge)
- What are the possible changes to the brain responsible for Alzheimer's disease? (UCL)
- What would happen to an enzyme if you dried it out?
- Describe a cell membrane.
- When removing the water from a biological sample, how dry is dry?
- What course options do you think you would like to take if you receive and offer?
- Why have you chosen this subject? (university/college)?

## Finally

Reading lists, useful websites, journals and prospectuses, can be provided by the school science departments and the careers library. Your application shouldn't seem like hard work – getting involved in the scientific community, reading widely and studying what interests you is good preparation for university as well as your application (and should be enjoyable!).

**GOOD LUCK!**

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