



## Science Department

### Departmental Overview

Science is a compulsory subject for Key Stage 3 (Years 7 - 9) and Key Stage 4 (Years 10 - 11). For GCSE, pupils will take either Combined Science: Trilogy (previously known as double-science; worth two GCSEs); or Triple Science GCSE (separate GCSEs in Biology, Chemistry and Physics). In Sixth Form, our department offers Cambridge Technicals Extended Certificate in Applied Science, and A Levels in Biology, Chemistry, Physics and Psychology.

### Introduction

Science is the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence. Science is able to inform problem solving and decision making in many areas of life. The major challenges and opportunities that confront society need to be approached from a scientific perspective, considering the social and ethical considerations. By studying science throughout their school career, our pupils and students will develop themselves as learners, as problem-solvers, as question-askers. We want to prepare them to engage fully in society by being able to make informed decisions about the applications and implications of science as they relate to their own lives, to a sustainable future and to wider developing society.

### Key Stage 3

Pupils are taught a range of Biology, Chemistry and Physics topics in Years 7, 8 and 9, in line with the National Curriculum for Science. The Key Stage 3 key concepts of scientific thinking, applications and implications of Science. Cultural understanding and collaboration are built into all topics, and pupils are given many opportunities to enhance their practical and enquiry skills, their critical understanding of evidence and their communication skills through investigations, role plays, modelling, presentations and research-based projects.

Pupils are encouraged to self and peer-assess their achievement throughout the year to inform their learning and give them ownership of their progress. Below are the topics covered in each year group.

#### Year 7:

Along with a 'Working Scientifically' topic, pupils study topics which include ecology, Earth structure, Universe, Gravity, movement and breathing, particle model, speed, cells, variation, mixtures, energy transfers and sound. Pupils are taught in mixed-ability classes and have three lessons of science a week.

We are in the middle of modifying our Key Stage 3 curriculum. The current Year 7 pupils will have a different route through Key Stage 3 in Years 8 and 9.

#### Year 8:

Topics in Year 8 for 2022-23 include healthy lifestyle, ecosystems, adaptation and inheritance, the Periodic Table, separation techniques, metals and acids, the Earth, electricity and magnetism, energy and motion and pressure. Pupils are taught in mixed-ability classes and have three lessons of Science a week.

**Year 9:**

By the beginning of Year 9 for 2022-23, pupils have covered all of the required content for Key Stage 3. The Autumn term of Year 9 is designed to extend and engage, with preparation for GCSE. Topics covered are new technologies in Biology, Chemistry and Physics. Pupils are taught in mixed-ability classes and have three lessons of science a week.

Pupils are assessed within each topic, using both summative and formative assessment tasks and in an end of year exam each year.

**Key Stage 4**

Pupils will complete one of two routes through Key Stage 4: Combined Science: Trilogy (previously known as double-science; worth two GCSEs); or Triple Science GCSE (separate GCSEs in Biology, Chemistry and Physics). The decision as to which course pupils will complete will be based on their prior attainment, including the end of Year 9 assessments. All pupils will have five hours of science lessons a week.

**Combined Science: Trilogy (previously known as double-science)**

In this course – worth two GCSEs - pupils will cover a range of topics in Biology, Chemistry and Physics. In all subject areas, there are key ideas underpinning the learning. Pupils will be expected to work scientifically, use mathematical skills, and develop their analysis and evaluation. The specification is available at the AQA website, course code 8464. The course is linear, and assessed through 100% written examination. There will be six papers at the end of Year 11, two in each subject area.

**Triple Science**

In this course, pupils will cover a wider range of topics in Biology, Chemistry and Physics than in the combined science course in order to complete three GCSEs. In all subject areas, there are key ideas underpinning the learning. Pupils will be expected to work scientifically, use mathematical skills, and develop their analysis and evaluation. The specifications are available at the AQA website, course codes 8461 (Biology), 8462 (Chemistry) and 8463 (Physics). The courses are linear, and assessed through 100% written examination. There will be six papers at the end of Year 11, two in each subject area.

**Key Stage 5**

At Key Stage 5, our department offers Cambridge Technicals L3 Extended Certificate in Applied Science, and A Levels in Biology, Chemistry, Physics and Psychology.

**Cambridge Technicals Extended Certificate in Applied Science**

The course enables students to gain practical laboratory skills and theoretical scientific understanding in an applied setting. They develop professional and practical skills by carrying out experiments and research. They gain an understanding of the different types of scientific industries and settings along with laboratory design and safe working practices. The variety of opportunities available to them are emphasized, to show how they may choose to progress their careers in this exciting and important industry.

This OCR course is equivalent to one A Level and comprises 5 mandatory units:

- Unit 1: Science Fundamentals
- Unit 2: Laboratory Techniques
- Unit 6: Control of Hazards in the Laboratory
- Unit 18: Microbiology
- Unit 21: Product testing techniques

Units 1 and 2 are examined units, while Units 6, 18 and 21 are assignment based.

## **A Level Biology**

A Level Biology provides a solid grounding in analytical thinking, writing reports and clear communication – all of which are useful life skills. Students will undertake lab and field experiments which underpin the theoretical study; they also hone your teamwork skills and practical abilities. It's an exciting time to be a biologist, as we are working to solve the biggest challenges currently facing humans: fighting disease, protecting the environment and feeding our growing population in a sustainable manner.

We teach the OCR syllabus which covers: cells, biological molecules, exchange and transport systems, disease and the immune system, biodiversity, evolution, organ systems for excretion, homeostasis, bioenergetics, genetics, ecosystems and sustainability. Assessment is by exams, with an additional practical component:

- Biological Processes exam: 2 hours 15 min 37% 100 marks
- Biological Diversity exam: 2 hours 15 min 37% 100 marks
- Unified Biology exam: 1 hour 30 min 26% 70 marks
- Practical endorsement, based on practical work completed across the two years: Pass or Fail

## **A Level Chemistry**

Students following A Level Chemistry will understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society. This course will develop the essential knowledge and understanding of chemistry and how the units that are studied relate to each other. Students will develop competence and confidence in a variety of practical experiments. Through these experiments, they will develop mathematical and problem-solving skills. They will study specific reactions in detail by carrying them out yourself, working out the calculations associated with that reaction and the chemistry behind the results. Students will also get to discover the real breadth that chemistry offers - there are many subjects within the area of chemistry, and we cover many of them throughout the two-year course.

We teach the OCR syllabus which covers: development of practical skills and analysis, foundations in chemistry, periodic table and energy, core organic chemistry, physical chemistry and the transition elements. We also carry out a minimum of 12 required practicals throughout the course to support the learning of the content. Assessment is by exams, with an additional practical component:

- Periodic Table, elements and physical chemistry exam: 2 hours 15 min 37% 100 marks
- Synthesis and analytical techniques exam: 2 hours 15 min 37% 100 marks
- Unified chemistry exam: 1 hour 30 min 26% 70 marks
- Practical endorsement, based on practical work completed across the two years: Pass or Fail

## **A Level Physics**

This OCR course enables students to build on their knowledge of the laws of physics, applying their understanding to solve problems on topics ranging from subatomic particles to the entire universe. They also have the opportunity to develop all the relevant practical skills.

We teach the OCR syllabus. In Year 12 students will study: practical skills, units, prefixes, physical quantities, analysing data, forces and motion (Newton's Laws, momentum, energy), materials (stress, strain), electricity (circuits, components), waves (propagating waves, stationary waves, polarisation) and photons/light (quantum mechanics). In Year 13 they will study: thermal physics, circular motion and simple harmonic motion, capacitors, gravitational, electric and magnetic fields, electromagnetism, nuclear and particle physics, astrophysics and cosmology and medical physics. Students do a series of 'endorsed practicals' during the course, which are written up in a lab book. Assessment is by exams, with an additional practical component:

- Paper 1 Modelling Physics: 2 hours 15 min 37% 100 marks
- Paper 2 Exploring Physics: 2 hours 15 min 37% 100 marks
- Paper 3 Unified Physics: 1 hour 30 min 26% 70 marks
- Practical endorsement, based on practical work completed across the two years: Pass or Fail

### **A Level Psychology**

Psychology is a popular subject because it develops a range of valuable skills, including critical analysis, independent thinking and research. These skills are particularly relevant to young people and are transferable to further study and the workplace. The qualification offers students an engaging and stimulating introduction to the study of Psychology, combined with the academic integrity and skills that higher education and employers value.

We teach the AQA syllabus. In Year 12, the topics taught are: social influence, memory, attachment, psychopathology, approaches in psychology, biopsychology, research methods. In Year 13 the topics taught are: issues and debates in psychology and one of the topics from each of the three sections:

- Option 1: relationships, gender, cognition and development
- Option 2: schizophrenia, eating behaviour, stress
- Option 3: aggression, forensic psychology, addiction

Assessment is by exams only:

- Paper 1 Introductory topics: 1 hour 30 min 33.3% 96 marks
- Paper 2 Psychology in context: 2 hours 33.3% 96 marks
- Paper 3 Issues and options in Psychology: 2 hours 33.3% 96 marks