SCIENCE AT THE BOURNE ACADEMY

Key Stage 3 (Years 7 and 8)

In Years 7 and 8, students cover a range of Biology, Chemistry and Physics topics following the national requirements.

The learning commences in Year 7 with a Chemistry and practical skills induction unit, after which students branch out into the key themes of Cells ad Reproduction (Biology), Particles, Acids and Alkalis (Chemistry), and Forces, Circuits and Waves (Physics).

The Year 8 syllabus builds on the foundations laid in Year 7, with a continuing focus on practical work and a growing emphasis on scientific literacy. More challenging topics include Magnetism and Space, The Periodic Table, and Evolution and Inheritance, amongst others.

The Key Stage 3 syllabus is designed to equip our students with the skills and confidence that they require in order to tackle the new more challenging GCSE courses that they progress onto in the later years of the school.

Key Stage 4 (Years 9, 10 & 11)

The majority of students in each year group study the "Trilogy" course which covers a wide range of topics and themes from all three scientific disciplines. Students work towards their exams at the end of year 11, success in which will result in students receiving a double-GCSE in the subject.

Main aspects of each science covered are as follows:

Biology – Cells, organ systems, infection and response, photosynthesis and respiration, homeostasis, inheritance and variation, ecology

Chemistry – Periodic Table, structures and bonding, quantitative chemistry, chemical reactions, energy changes, rates of reaction, organic chemistry, environmental chemistry, sustainability

Physics – Energy, electricity, the Particle Model, radiation, forces, waves, and magnetism.

One group in each year group shall have the opportunity to study the **Triple Science** course in which each separate Science subject is taught by a dedicated teacher. All of the **Trilogy Science** content is taught, with an even deeper dive into more complex and challenging Science topics. This course is most suitable for students who are thinking of doing Science subjects at A-Level.

Biology Triple Content – monoclonal antibodies, complex hormone interactions within the human body, the evolution of new species, ecological niches, energy in food chains

Chemistry Triple Content – transition metals, nanoparticles, additional quantitative and calculations, complex organic chemistry, complex sustainability

Physics Triple Content – motor effect, static electricity, background radiation, hydraulics and mechanical forces, electromagnetism, Space and the Universe

Key Stage 5 (Years 12 & 13 – 6th Form)

In Key Stage 5, our students follow studies which will provide them with A-Levels at the end of 2 years of study. In the 6th Form, students can opt to study particular areas of Science in-depth. Each of the three sciences on offer (Biology, Chemistry and Physics) involve a more committed attitude from the student, including independent research and study, and a demonstration of practical skills at regular intervals.

Biology gives students the opportunity to study the subject at a much more advanced level. Building on the skills learned during Key Stages 3 and 4, during Year 12 students look at some of the finer aspects of molecular biology, cells and organisms and the connections between organisms and their environments. In Year 13, the focus of study is more drawn towards energy transfers; responses to environments; genetics; evolution and ecosystems.

Chemistry looks at three main areas: physical chemistry, inorganic chemistry and organic chemistry. In physical chemistry students investigate atomic structure; bonding; kinetic & energetic chemistry and reactive equations (with Year 13 extensions into thermodynamics; equilibrium; electrochemical potentials and acids & bases). The area of inorganic chemistry covers periodicity, with emphasis on Group 2 and Group 7 chemicals (Year 13 extends to cover transition metals and ionic reactions). Organic chemistry is comprised of alkanes, alkenes & alcohols and organic analysis during the first year, which is further broken down in Year 13 with the study of isomers; aromatic chemistry; polymers; amino acids & DNA and using investigative methods of spectroscopy and chromatography.

Physics has a core component of measurement; particles & radiation; waves; mechanics; electricity; thermal physics; magnetic fields and nuclear physics, with Year 13 options of studying astrophysics; mechanical physics; engineering and electronics.

Where Can Science Lead You?

Science qualifications, particularly at A-Level, can equip Bourne Academy students with important qualifications that are highly respected in the STEM employment areas (Science, technology, engineering and Maths). Biology and Chemistry are best studied in tandem, and together they can unlock access to a large range of degrees in medical, research and environmental fields. Physics is more commonly paired with Maths and leads to an enormous range of opportunities in engineering, research and electronics. It is a fact that students who come away from school with STEM qualifications are more likely to be earning higher salaries in their careers.

Job areas, and degree options, which involve scientific knowledge include working with aircraft, sea craft and vehicles; animals; computing; Earth & the environment; engineering; healthcare and medicine; law & criminology; media; music; space and studying the past (archaeology).

Some degrees can be studied closer to home (Bournemouth or Southampton Universities) or further afield (elsewhere in England, Wales, Scotland or Ireland), or even abroad (USA, Europe, Asia or Australia).

Please email the Director of Science jonathan.fry@thebourneacademy.com if you have any questions about the curriculum or about your child's progress during the year.