

## SCIENCE AT THE BOURNE ACADEMY

### Key Stage 3 (Years 7, 8 & 9)

Students at Key Stage 3 are taught 4 main areas of scientific study, those of 'Organisms, Behaviour & Health' (Biology), 'Chemical & Material Behaviour' (Chemistry), 'Energy, Electricity & Forces' (Physics), and 'The Environment, Earth and Universe' (a combination of Biology, Chemistry and Physics, with aspects of the scientific knowledge involved in Geography).

From Year 7, our students are taught basic scientific skills and knowledge in each subject, which are expanded and developed throughout Year 8 in preparation for the commencement of the GCSEs in Key Stage 4.

### Key Stage 4 (Years 9, 10 & 11)

The main purpose of Key stage 4 is to prepare students for their GCSE exams, and as the progress of our GCSE students is a top priority, we now commence the GCSE courses at the beginning of Year 9. Students are taught either the Combined Science (sometimes called the "Trilogy") course, with one or two sets covering the Triple Science course, depending on student demand in each year group. Combined Science is taught by two teachers and Triple Science classes have one for each Science subject.

Main aspects of each science covered are as follows:

Combined (Trilogy)	Biology	Human Health; Nerves & Hormones; How Drugs Affect the Body; Adaptation; Food Chains; Plant & Animal Waste; Genetic Variation and Evolution
	Chemistry	Fundamental Chemistry; Building Materials; Metals; Oil & Fuels and Environmental Changes
	Physics	Energy Transfers; Efficiency; Electrical Energy Transfers; Generating Electricity; Waves and The Expanding Universe
Combined (Trilogy)	Biology	Cells and organs; Photosynthesis; Organisms & Environments; Proteins; Respiration; Genetics and Species Variation
	Chemistry	Structures & Bonding; Material Properties; Atomic Chemistry; Chemical Reactions and Electrolysis
	Physics	Forces & their Effects; Kinetic Energy; Electrical Currents; Electricity in the Home; Radioactivity and Nuclear Physics
Triple Topics	Biology	Molecules; Transport Systems; Homeostasis and Humans & their Environments
	Chemistry	History of the Periodic Table; Water Analysis; Calculating Energy Change in Reactions; Analysis & Quantitative Chemistry; Ammonia and Alcohols, Carboxylic Acids & Esters
	Physics	Medical Applications of Physics; Mass, Moments & Hydraulics; The Motor Effect and Transformers

### Key Stage 5 (Years 12 & 13 – 6<sup>th</sup> Form)

In Key Stage 5, our students follow studies which will provide them with A-Level's at the end of 2 years of study (or an AS Level is only the first year is completed). In the 6<sup>th</sup> 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 each area is underpinned by weighted assessments.

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.

### **Field Trips & Outreach**

Throughout the Key Stages, we have various opportunities for students to participate in activities both internally and externally. Our students have opportunities to participate in workshops and events at Bournemouth University, Southampton University and Bournemouth & Poole College, as well as opportunities to visit local businesses and places of scientific interest.

Over the past year, our students have participated in Animal Diversity and Conservation workshops at Marwell Wildlife, visited a dairy manufacturing factory, explored the inside of the decommissioned Winfrith Nuclear Research Centre, spend a day exploring the Solent on board one of the National Oceanography Centre's research vessels, and one evening we even travelled to a private observatory in Hampshire to view the Moon and Jupiter through their telescopes. We have also participated in chemical extraction experiments at Southampton and Bristol Universities and studied the human nervous system at Southampton University. Students have also enjoyed reward experiences at the National History Museum and Weymouth Sea Life Centre.

In 2015 we will be undertaking our biggest adventure when, during February Half-Term, two members of staff and eight students from Key Stages 4 and 5 will be travelling to Iceland, where they'll be exploring geysers, waterfalls, a geothermic power station, dormant volcanoes, seeing tropical plants grown in geothermally heated greenhouses, walking along volcanic beaches looking at the ecosystem and wildlife, and as well as enjoying a trip to a geothermic spa they will spend one evening witnessing the Aurora Borealis (Northern Lights) first hand.

### **Where Can Science Lead You?**

The study of science can lead you to a variety of paths in further education as well as various job opportunities. Most universities will require that a student holds at least a maths A-Level and one scientific A-Level (and in the case of studying a science course, at least 2 A-Levels).

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).

Whether studying for, or working in, the field of science you can be sure that it can give you opportunities to see the world and make a difference!

Please email the Subject Leader [Imogen.gater@thebourneacademy.com](mailto:Imogen.gater@thebourneacademy.com) if you have any questions about the curriculum or about your child's progress during the year.