

# Science

## **Introduction**

Our purpose-built Science Centre contains eight laboratories, one of which is a specialist A-Level lab and an ICT Suite.

The Science Department deliver the KS3 Science curriculum to Years 7 and 8 using an exciting resource called 'Activate'. The course has been designed to capture the imagination of students at every opportunity. Science teachers are using interactive teaching materials and engaging activities to build around the key areas of student motivation, personalisation, and the integration of How Science Works. Students are assessed for each topic and their progress is monitored throughout the course.

## **Curriculum Information: Key Stage 3**

The units of study for Key Stage 3 are outlined below:

<b>Year 7 Activate Science:</b>	<b>Year 8 Activate Science:</b>
Working Scientifically	Biology 2.1: Health and lifestyle
Biology 1.1: Cells	Biology 2.2: Ecosystem processes
Biology 1.2: Structure and function of body systems	Biology 2.3: Adaptation and inheritance
Biology 1.3: Reproduction	Chemistry 2.1: The periodic table
Chemistry 1.1: Particles and their behaviour	Chemistry 2.2: Separation techniques
Chemistry 1.2: Elements, atoms, and compounds	Chemistry 2.3: Metals and acids
Chemistry 1.3: Reactions	Chemistry 2.4: The Earth
Chemistry 1.4: Acids and alkalis	Physics 2.1: Electricity and magnetism
Physics 1.1: Forces	Physics 2.2: Energy
Physics 1.2: Sound	Physics 2.3: Motion and pressure
Physics 1.3: Light	
Physics 1.4: Space	

### **Curriculum Information: Key Stage 4**

From Year 9 students will start the new AQA Science specification. This offers a double combined Science or a triple separate Science pathway. Below is a summary of the content covered.

<b>Biology</b>	<b>Chemistry</b>	<b>Physics</b>
Cell biology	Atomic structure and the periodic table	Forces
Organisation	Bonding, structure, and the properties of matter	Energy
Infection and response	Quantitative chemistry	Waves
Bioenergetics	Chemical changes	Electricity
Homeostasis and response	Energy changes	Atomic structure
Inheritance, variation and evolution	The rate and extent of chemical change	Magnetism and electromagnetism
Ecology	Organic chemistry	Particle model of matter
	Chemical analysis	
	Chemistry of the atmosphere	
	Using resources	

### **Curriculum Information: Key Stage 5**

#### **Biology**

Year 12, 1<sup>st</sup> Year A Level Biology (Exam Board – OCR)

The Year 12, 1<sup>st</sup> year Biology course consists of four modules:

Module 1: Development of Practical Skills

Practical activities will be incorporated into all relevant topics throughout the year. Twelve specific skill sets or Practical Activity Groups (PAGs) will be assessed over the course of two years with several opportunities to demonstrate capability and a pass/ fail grade will be given for each skill set/ PAG.

<b>Module 2: Foundations in Biology</b>	<b>Module 3: Exchange and Transport</b>	<b>Module 4: Biodiversity, Evolution and Disease</b>
Cell Structure and Microscopy	Exchange Surfaces	Communicable Diseases
Biological Molecules	Transport in animals	Biodiversity
Enzymes	Transport in plants	Classification and evolution
Biological Membranes		
Cell Division		

**Exams in June cover all 4 modules:**

1. Breadth in Biology 50%
2. Depth in Biology 50%

## Year 13, 2<sup>nd</sup> Year A Level Biology

During the 2<sup>nd</sup> Year of the A Level Biology course, two additional modules will be covered:

<b>Module 5: Communication, Homeostasis and Energy</b>	<b>Module 6: Genetics, Evolution and Ecosystems</b>
Communication and homeostasis	Cellular control
Excretion as an example of homeostatic control	Patterns of inheritance
Neuronal communication	Manipulating genomes
Hormonal communication	Cloning and biotechnology
Plant and animal responses	Ecosystems
Respiration	Populations and sustainability

<b>Assessment Overview: 2nd Year A Level Biology</b>		
<b>Component details</b>	<b>Topics assessed</b>	<b>Weighting</b>
<b>01: Biological Processes</b>  100 marks 2 hrs 15 minutes Written paper	Modules 1, 2, 3 and 5	37% of total A level
<b>02: Biological Diversity</b>  100 marks 2 hrs 15 minutes Written paper	Modules 1, 2, 4 and 6	37% of total A level
<b>03: Unified Biology</b>  70 marks 1hr 30 minutes Written paper	Modules 1 to 6	26% of total A level
<b>04: Practical Endorsement in biology</b> Non exam assessment (carried out over the course of two years)	12 Practical Activity Groups	Reported separately

## Chemistry

Years 12 and 13 A level Chemistry: OCR specification A (H432)

The Year 12 Chemistry course consists of 4 modules:

Development of Practical Skills in Chemistry	Foundations in Chemistry	Periodic Table and Energy	Core Organic Chemistry
Planning and experimental design	Atoms, compounds, molecules and equations	The periodic table and periodicity	Basic Concepts
Analysing data	Amount of substance	Group 2 and the halogens	Hydrocarbons
Plotting and interpreting data	Acid-base redox reactions	Qualitative analysis	Alcohols and haloalkanes
Evaluating experiments	Electrons, bonding and structure	Enthalpy changes	Organic synthesis
		Reaction rates and equilibrium (qualitative)	Analytical techniques (IR and MS)

The Year 13 Chemistry course consists of 2 modules:

Physical Chemistry and Transition Elements	Organic Chemistry and Analysis
Reaction rates and equilibrium (quantitative)	Aromatic compounds
pH and buffers	Carbonyl compounds
Enthalpy, entropy and free energy	Carboxylic acids and esters
Redox and electrode potentials	Nitrogen compounds
Transition elements	Polymers
	Organic synthesis
	Chromatography and spectroscopy (NMR)

Examinations in year 13:

Assessment Overview: 2nd Year A Level Biology		
Component details	Topics assessed	Weighting
<b>01: Periodic table, elements and physical chemistry</b> 100 marks 2 hrs 15 minutes Written paper	Modules 1, 2, 3 and 5	37% of total A level
<b>02: Synthesis and analytical techniques</b> 100 marks 2 hrs 15 minutes Written paper	Modules 1, 2, 4 and 6	37% of total A level
<b>03: Unified chemistry</b> 70 marks 1hr 30 minutes Written paper	Modules 1 to 6	26% of total A level
<b>04: Practical Endorsement in biology</b> Non exam assessment (carried out over the course of two years)	12 Practical Activities	Reported separately

Extra-curricular activities:

Each year students attend a Chemistry in Action day at the institute of education in London. Students also have the opportunity to experience hands on Spectroscopic Analysis when students from Imperial College come into school and run a workshop. Close links with NPL also presents opportunities for students to attend Science events and exhibitions as well as work experience.

## Physics

Physics A-level provides an excellent grounding for students considering careers in Science, Engineering, medicine and finance. We develop maths, experimental and problem-solving skills through a broad a varied curriculum which covers the whole universe from the very smallest particles to supermassive black holes. We visit the Particle Physics department at Royal Holloway and meet the scientists who discovered the Higgs Boson.

The Year 12 Physics course consists of 4 modules:

<b>Development of Practical Skills</b>	<b>Foundations of Physics</b>	<b>Forces and Motion</b>	<b>Electrons, waves and Photons</b>
Planning and experimental design	Physical Quantities, units and measurements	Kinematics	Electricity: Current and Charge
Analysing data	Uncertainties and Errors	Forces in Action	Electricity: Energy, Power and Resistance
Plotting and interpreting data	Nature of Quantities (Scalar and Vector)	Work Energy and Power	Electricity: Circuits
Evaluating experiments		Materials	Waves
			Quantum Physics

The Year 13 Physics course consists of three units:

<b>The Newtonian World</b>	<b>Fields, Particles and Frontiers of Physics</b>	<b>Practical Skills in Physics 2</b>
Newton's laws and momentum	Electric and magnetic fields	Qualitative, quantitative and evaluative tasks
Circular motion and oscillations	Capacitors and exponential decay	
Thermal physics	Nuclear physics	
	Medical imaging	
	Modelling the universe	

## Extra-Curricular Activities

Students go on visits and to lectures such as The Big Bang Fair, GCSE Science Live!, Biology in Action, Chemistry in Action and Physics in Action.

Year 7 and 8 students are encouraged to participate in Science Projects and STEM Club to promote science and encourage students to study it beyond A level.

In year 12 six students have the opportunity to work with an engineer from BP on the Engineering and Enterprise Scheme. This includes 2 days in a University Engineering Department and a presentation at BP Sunbury to senior executives. This allows them to achieve a Gold Crest Award.

At Bishop Wand we offer a broad and balanced curriculum with opportunities for all students to join in the fun and develop their understanding of Science in an ever-changing world.

