



The Henrietta Barnett School

Physical Education



Authenticity - Kindness - Curiosity
Connection - Endeavour

www.hbschool.org.uk

"Science is a way of thinking much more than it is a body of knowledge"

Carl Sagan

Key Stage 3 - Year 7

In Year 7 we are committed to providing an exciting, varied and challenging experience of science for all students. We place a particular emphasis on collaborative learning and learning through practical investigation. Students learn to explain observations with scientific theory and how to plan and carry out an experiment.

In Biology, students find out about the functions of various parts of a living cell, animal and plant reproduction, variation and adaptation, photosynthesis and the digestive process.

In Chemistry, students learn about the states of matter, atoms, compounds and elements, acids and alkalis as well as simple chemical reactions.

In Physics, students are taught energy transfer and energy resources, electricity, magnets and electromagnets, forces and motion.

Key Stage 3 - Year 8

In Year 8 students expand their knowledge of different areas of Science and start to make crosslinks between different topics. We aim to engage students in higher order thinking, where the girls develop their ability to ask questions and formulate hypotheses. Science investigations help to develop scientific thought processes and communications skills.

In Biology, students find out about the lungs and respiration, muscles and bones, the effects of drugs on health, microbes, inheritance and evolution.

In Chemistry, students learn about the periodic table of elements, extracting metals, the reactions of acids, different types of reactions, and the earth and atmosphere.

In Physics, students are taught about waves, sound and light, heat transfer, the application of forces as well as space.

Key Stage 3 - Year 9

In Year 9 students start studying for their GCSE Sciences. All girls study "Triple Science" (Biology, Chemistry and Physics) and are taught by subject specialist teachers. We follow the AQA specifications.

In Biology, students learn about cell structure, cell division, transport in cells, animal organs and organ systems, adaptations, interdependence, competition and organisation of the ecosystem.

In Chemistry, students learn about atomic structure, the Periodic Table, the different types of chemical bonding, structure and properties of matter and quantitative chemistry.

In Physics, students study electricity, the particle model of matter, and energy.

Key Stage 4 - Year 10

In Year 10, students continue with their study of GCSE Sciences, following the new AQA specifications (GCSE Biology 8461, GCSE Chemistry 8462 and GCSE Physics 8463).

In Biology, students learn about ecology, infection and response, plant tissues, photosynthesis, respiration, the nervous system, inheritance and variation.

In Chemistry, students find out about the reactivity of metals, electrolysis, energy changes in chemical reactions and the rate and extend of chemical reactions.

In Physics, students learn about forces and energy, radioactivity, space and introductory wave theory.

Key Stage 4 - Year 11

In Year 11, students complete their study of GCSE Sciences, following the AQA specifications (GCSE Biology 8461, GCSE Chemistry 8462 and GCSE Physics 8463).

In Biology, students learn about evolution, homeostasis, hormonal control in humans and plant hormones.

In Chemistry, students learn about organic chemistry, energy changes in chemical reaction, analytical Chemistry, the periodic table and water treatment.

In Physics, students learn about waves, magnetism and electromagnetism.

A Level Biology

Biology is the study of life and continues to exert a major influence in all areas of society- medical, technical, environmental and ethical.

Advances in new technologies, such as recombinant DNA and genomics have made this varied discipline more exciting than ever. Biology is a fascinating subject to study and can lead on to a variety of rewarding career paths. You will develop many valuable skills including: research skills, investigative skills and critical analysis. All of these are much sought-after qualities in both Biology related careers and in the world of business.

A solid understanding of both GCSE Biology and Chemistry is essential to progress to A-Level Biology.

Year 12 students follow the 2 year OCR Biology A specification (H420) for A-level. There are no external examinations at the end of Year 12.

The first year of the course includes:

- Development of practical skills in biology
- Cell structure
- Biological molecules
- Nucleotides and nucleic acids
- Enzymes
- Biological membranes
- Cell division, cell diversity and cellular organisation
- Exchange surfaces
- Transport in animals
- Transport in plants
- Communicable diseases, disease prevention and the immune system
- Biodiversity
- Classification and evolution

In the second year of the course students study the topics below and will take 3 examinations covering content from both years in the summer of Year 13.

- Development of practical skills in biology
- Communication and homeostasis
- Excretion as an example of homeostatic control
- Neuronal communication
- Hormonal communication
- Plant and animal responses
- Photosynthesis
- Respiration
- Cellular control

- Patterns of inheritance
- Manipulating genomes
- Cloning and biotechnology
- Ecosystems, populations and sustainability

All students attend a residential fieldtrip to learn and practise ecological theory and techniques.

Emphasis throughout the course is on increasing knowledge, developing competence and confidence in practical skills and developing problem solving. You will learn how society makes decisions about scientific issues and how science contributes to the success of the economy and society.

A Level Chemistry

Chemistry is the study of the elements and their compounds. It is a science subject, so practical work is an important part of the course. The teachers' aim is to stimulate and sustain the students' interest in and enjoyment of Chemistry. The specification involves chemical calculations but only GCSE standard Mathematics is required. Students follow the OCR specifications for A-level.

Students follow the 2 year OCR Chemistry A specification (H432) for A-level.

The two year course includes:

- Development of practical skills in chemistry
- Atoms and reactions
- Electrons, bonding and structure
- Periodic table and energy
- Group 2 and the halogens
- Reaction rates
- Core organic chemistry
- Organic synthesis
- Analytical techniques
- Physical chemistry and transition elements
- Rates, equilibrium and pH
- Acids, bases and buffers
- Lattice enthalpy
- Redox and electrode potentials
- Transition elements
- Organic chemistry and analysis

In the second year of the course, students will take 3 examinations covering content from both years. These are held in the summer of Year 13. There are no external examinations at the end of Year 12.

Emphasis throughout the course is on increasing knowledge, developing competence and confidence in practical skills and developing problem solving. Students will learn how society makes decisions about scientific issues and the importance of Chemistry in sustainability.

A Level Physics

Physics is the study of matter, energy, and the interaction between them, but what that really means is that physics is about asking fundamental questions and trying to answer them by observing and experimenting.

Physics is a fascinating subject to study and can lead on to a variety of rewarding career paths. You will develop many valuable skills including: critical thinking logical problem solving, team work, experimental skills and independent research skills. All of these are much sought after qualities in most careers, particularly in Physics, Engineering and Computing related careers, as well as in the worlds of finance, technology and data analysis.

A solid understanding of both GCSE Physics and Maths is essential to progress at A-level Physics.

Students follow the 2 year Edexcel Level 3 Advanced GCE in Physics (9PH0) for A-level.

The aims and objectives of the Edexcel Level 3 Advanced GCE in Physics are to enable students to develop:

- essential knowledge and understanding of different areas of the subject and how they relate to each other;
- a deep appreciation of the skills, knowledge and understanding of scientific methods;
- competence and confidence in a variety of practical, mathematical and problem solving skills;
- their interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject;
- an understanding of how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society.

At the start of Year 12 students study the following topics: electric circuits, materials and mechanics. Later in the year students study waves and the particle nature of light, circular motion and oscillations.

Students also carry out 10 core experiments as part of the Science Practical Endorsement (9PH0/04), which is internally assessed and externally moderated.

At the start of Year 13, students study: electric and magnetic fields and nuclear and particle physics. Particle physics is a subject of current research, involving the acceleration and detection of high-energy particles. Later in the year the students study: thermodynamics, nuclear radiation, space and gravitational fields.

Students also carry out 6 core experiments as part of the Science Practical Endorsement (9PH0/04), which is internally assessed and externally moderated.

At the end of Year 13 students sit 3 examinations covering content from both years. There are no external examinations at the end of Year 12.