

Key Stage Four Curriculum Overview for Biology (Combined & Separate Science)

Curriculum Intent and Rationale for Exam Boards (for examined subjects)

Our ambition is for all students to understand Biology as the science of life, based on cells and able to explain many significant processes in living things. Students who can effectively propose and investigate hypothesis are scientists by definition. Through investigation students learn how to make sense of the natural world. They are able to marvel at the beauty of nature and the elegance of its laws and apply this understanding to solve real world problems

How does the KS4 curriculum build on that from KS3?

It is important to note that we cannot assume the KS3 science curriculum has been effectively delivered; Covid-19 remote learning implications are evident in student's cumulative disfluency. In KS3 we reinforce macroscale ideas and then push students beyond KS3 by considering how microscopic (in biology) or nanoscopic (in chemistry and physics) processes act as drivers for the macroscopic observations. Linking what they can see to the theory of what they can't see is accepting the explanation proposed

What do students do with their acquired knowledge and skills?

Students who are able to effectively propose and investigate a hypothesis are scientists by definition. Through investigation students learn how to make sense of the natural world. They are able to marvel at the beauty of nature and the elegance of its laws and apply this understanding to solve real world problems.

We are increasingly looking for students to be able to carry out full scientific investigations. Over time students should increasingly be able to:

- propose a hypothesis
- design an experiment
- select suitable apparatus
- identify a variable to change, measure and explain how all others will be controlled
- select a suitable method to record and present data and any relationships therein, followed by a sensible conclusion
- write an honest evaluation of the validity of the method and the reliability of the data

How does the KS4 curriculum align to and go beyond the National Curriculum?

In Year 10 students deepen their understanding of biological interactions of organs systems along with evolution & biodiversity. The final chapters of the GCSE curriculum are designed to summarise and apply many chapter's student's knowledge from the previous years; Biology interaction of organisms, Chemistry macroscopic atmosphere and cycles and Physics electrical energy and forces.

What new knowledge are students taught?

Term	Year 10	Year 11
Autumn	<p>Infection & response</p> <ul style="list-style-type: none"> The role of bacteria and other pathogens in human and plant diseases, and how to calculate the effect of antibacterial chemicals by measuring the area of zones of inhibition. Examples of diseases that can be spread. The impact of exercise and smoking on the human gas exchange system and how exercise and smoking can affect the health of other systems in the body How to interpret data to understand the effect of lifestyle factors including diet, alcohol and smoking on the incidence of non-communicable diseases at local, national and global levels 	<p>Inheritance, variation & evolution</p> <ul style="list-style-type: none"> Short sections of DNA are called genes and different versions of genes are called alleles e.g. eye colour is a gene, blue eyes are a variation (allele) of this gene. The process of meiosis, which is the type of cell division that makes gametes. The importance of selective breeding in the development of plants and animals and the increasing use of genetic engineering for desirable characteristics. How Charles Darwin built up evidence for his theory of evolution
Spring	<p>Bioenergetics</p> <ul style="list-style-type: none"> How plants use light energy, carbon dioxide and water to photosynthesis and how the products of photosynthesis are used. Investigating the process of photosynthesis and how to measure and calculate the rate of photosynthesis along with limiting factors. The differences between aerobic and anaerobic respiration and how the energy released can be used, along with oxygen debt. 	<p>Paper 1 and 2 revision</p> <p>Focussing on drawing ideas together from across Years 7-11, making scientific links & understanding the results and conclusions form Scientific Investigations</p>

	Homeostasis & response <ul style="list-style-type: none"> • The differences between sensory and motor neurone in coordination and control. • How reproduction is controlled by hormones and how hormones can be used in the artificial control of fertility. • Separate only; The arrangement of tissues in the human eye and how the tissues are adapted for their function. 	
Summer	Ecology <ul style="list-style-type: none"> • How the competition between organisms for scarce resources, and adaptations resulting from natural selection and enable them to compete successfully in specific environments. • How material cycles in nature, e.g. carbon cycle, return chemicals from the bodies of organisms to the soil, water, and air. The importance of decomposition and the factors that affect the rate of decay. • How to investigate and measure the distribution and abundance of species in a system e.g. number of daisies in a field. • What is meant by food security and the measures that can be taken to make food production both more efficient and sustainable? 	GCSE external examinations

How and where do students build knowledge through KS4?

Students will spend most of the Year 10 learning the subject content for their GCSE science course; combined or separate.

The focus of the end of Year 10 assessment will be on the content for the paper 1 examinations. Students will finish learning the subject content for the paper 2 in Year 11. The focus then becomes a targeted revision programme to review all content for paper 1 and paper 2 assessments, with paper 2 assessments in the Spring of Year 11. The focus will then be to preparing the students for their GCSE examinations in the Summer. All the subject content will be reviewed, and the key skills will be practiced. A variety of structured revision activities will be used to allow students to identify areas for development and subsequently improve their substantive and disciplinary knowledge.