Biology Department Curriculum Overview

Curriculum Overview

Biology is a fascinating and demanding subject that explores the living world around us and well as understanding living organisms. We have planned an ambitious and broad curriculum that builds upon the key concepts from ks3. Studying Biology at GCSE and Advanced Level gives a greater understanding of Biochemistry, Digestion, Circulation, DNA technology, Nervous System, Environment, Microbes and Disease and the study of Plant Physiology. Underpinning both KS4 and Ks5 Biology is also the consideration of 'How Science Works' and topics to the relevance of Biology in Society.

The aims and objectives of the biology curriculum is to enable students to develop:

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

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 9	Students will learn how to classify cells as **Eukaryotes** and **Prokaryotes.** Explain the structure and functions of organelles found in **animal** and **plant cells.** Students will also learn that cells can **specialise** to perform a particular function and as organisms develop,	**Biology** Students will learn about how substances like water and minerals are transported in plants cell through different processes by studying the following concepts **Diffusion, Osmosis and Active transport** Biology Required *Core Practical Osmosis*	Students will learn to develop an understanding of size and scale in relation to **cells, tissues, organs and systems.** Students should be able to relate knowledge of **enzymes** to **metabolism** and be able to describe the nature of enzyme molecules and relate	Students will learn about the **heart and lungs** and the different types of **blood vessels**. Students will apply this knowledge to identify causes of **Coronary Heart Diseases.**	Students will learn the different types of communicable diseases; **viral, bacterial, fungal and protist diseases** how they are spread and can be reduced.	Students will learn about **non-communicable diseases** and how **drugs are developed.** Students will learn how **monoclonal antibodies** and made and used

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	stem cells **differentiate** to form different type of cells. *Core Practical - Microscopy*		their activity to temperature and pH changes. *Core Practical Food test*			
Year 10	Students will apply their knowledge about **Photosynthesis** to learn about the **uses of glucose.** Students will learn about different types of Respiration **Aerobic and anaerobic respiration** and where they can occur. Response to exercise, and metabolism. *Core Practical - Investigating the rate of photosynthesis*	Students will learn in more about the **nervous system** and **hormone control** including **Negative feedback.** Students will learn how the eye works and long and short vision. *Core Practical - Reaction time*	Students will learn in more details about **Human endocrine system; Control of blood glucose; The function of the kidney's; Hormones in human reproduction; Contraception and Infertility**	Students will learn about **Plant hormones** and how they affect the way the plant grows and the uses of these hormones. *Core practical – Plant growth*	Students will learn about the environment including how **organisms adapt** and **compete** with each other and their role in **food webs**. Students will learn more about their environment by studying topical issues such as **global warming, deforestation** and **maintaining biodiversity** *Core Practical - Sampling*	Students will be reviewing and consolidating what they have learnt so far.
	Students will be building on their knowledge about genes students will learn about **sexual and asexual reproduction; Meiosis;**	Students will be building on their knowledge about genes students will learn about **Variation; Selective breeding;**	Students will be building on their knowledge about genes students will learn about **Evolution; Genetic engineering; cloning** and the ethics behind this.	Students will learn at how important it is to understand **Fossils** in understanding **evolution and extinction** and also how to **classify organisms**	Students will prepare for the final exams	Students will prepare for the final exams

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Year 11	Students will learn about the discovery of DNA and how this has led to the understanding of **Protein synthesis.** Students will learn about Mendal's work on **Genetic inheritance; Inherited disorders and Sex determination**					
Year 12	**Paper 1:** Students will learn about biological molecules including **Carbohydrates, Lipids, Nucleic acids, DNA and Proteins** **Paper 2:** Students will deepen their knowledge of animal and plant **organelles** and look at the similarities and differences	**Paper 1:** Students will learn about how proteins are made through the process of **Protein synthesis.** They will learn about the importance of **Enzymes.** Students will learn about **water, Cell membranes** and how the membrane helps with the **transport** of substances across it. *Core practical – Enzymes and menbranes*	**Paper 1:** Students will look at **Gas exchange** and relate it to **Fick's law**. Students will start to understand more about genetics and kink to genetic diseases. Students will study in depth **Cystic fibrosis** **Paper 2:** Students will learn more about inheritance especially about	**Paper 1:** Students will learn about **genetic screening and the ethical impacts.** Students will deepen their understanding of the **heart** *Core practical – investigating daphnia* **Paper 2:** Students will learn more about **Biodiversity and**	**Paper 1:** Students will learn about **atherosclerosis and clotting.** Students will investigate the **risks** associated with heart disease and begin to understand **causation and correlation data**. *Core practical – vitamin C*	Introduction to A2 content – students will begin topic5: **Ecosystems and climate change** and topic 6: **Forensics**

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	between them. They will look at **protein transport.** They will also learn about **prokaryotic and eukaryotic cells.** Students will study plants in more detail looking at specific tissues and understanding its strength *Core practical – mineral deficiency in plants* *-Plant strength* *-Plant tissue microscopy*	**Paper 2:** Students will learn about the cell cycle including **mitosis and meiosis.** Students will understand the process of fertilization including the **acrosome reaction**. They will learn about **stem cells and specialisation.**	**polygenetics and epigenetics.**	**classification of organisms.** Students will learn that animals survive due to **adaptations and through natural selection**.	**Paper 2:** Students will learn more about **drug testing and the process.** Students will also understand more about **sustainability**	
Year 13	**Topic 5** Students will understand the impact of **Climate change**. They will study the evidence of climate change and its impact on different organisms. **Topic 6** Students will learn about the immune system including details of **HIV and TB**.	**Topic 5** Students will study the detailed process of **photosynthesis** *Core practical – Hill reaction* **Topic 6** Students will recap on forensics *Core practical – Gel electrophoresis* *-the effect of antibiotics*	**Topic 7** Students will understand how **muscles** work and the detailed process of **respiration** **Topic 8** Students will learn about the **nervous systems** looking at action potentials, structure and function of neurons. Students will also learn at how plants require **hormones** to bring about responses.	**Topic 7** Students will understand how the **Heart** works and controlled by the nervous system and link it to ventilation and exercise. **Topic 8** Students will study the **Brain** and some brain disorders such as **Parkinson's, depression** Students will learn and how the brain is studied through different types of scans. *Core practical - Habituation*	**Topic 7** Students will understand how **homeostasis** looking specifically at temperature control **Topic 8** Students will look at **GMO**. They will understand the ethics behind this topic.	Students will prepare for and sit final examinations

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