

Biology Year 12 Curriculum Overview

What is the Year 12 Biology curriculum aiming to achieve?

What do we want our Year 12 Biologists to be like?	How are we building on prior learning?	How can parents/carers support their child's learning?
<ul style="list-style-type: none"> To develop essential knowledge and understanding of different areas of the subject and how they relate to each other To develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods To develop competence and confidence in a variety of practical, mathematical and problem solving skills To develop interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject To understand how society makes decisions about scientific issues and how Biology contribute to the success of the economy and society 	<ul style="list-style-type: none"> We will make links to and build on the Biology topics from AQA Combined Science and AQA Biology GCSE We will build on our working scientifically skills in the areas of analysis, communication, enquiry and problem solving 	<ul style="list-style-type: none"> Talk to your child about what they are learning in lesson Be curious about the world around you and discuss with your child Support with homework tasks Purchase Pearson OCR A level Biology Student books 1 Purchase CGP revision guide

How are we organising the Year 12 Biology curriculum?

Teacher 1	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topics	Cell Biology	Biological Molecules	Cell division, cell diversity and cell differentiation	Nucleic Acids	Enzymes	Biological membranes
Threshold Concepts	<ul style="list-style-type: none"> Function of eukaryotic and prokaryotic organelles Interrelationship between the organelles involved in protein synthesis Importance of the cytoskeleton Comparison of prokaryotic and eukaryotic cells 	<ul style="list-style-type: none"> Monomers, polymers molecular bonding Hydrogen bonding, properties of water and its role in living organisms Structure, function and properties of carbohydrates Structure, function and properties of lipids Structure, function and properties of proteins Key inorganic ions involved in biological processes Principles of chromatography 	<ul style="list-style-type: none"> Stages of the cell cycle Significance and stages of mitosis Significance and stages of meiosis Stem cells, differentiation and specialised cells Organisation of cells, tissues, organs and organ systems 	<ul style="list-style-type: none"> DNA structure as well as the synthesis and breakdown of polynucleotides Semi-conservative DNA replication Nature of the genetic code and the synthesis of polypeptides 	<ul style="list-style-type: none"> Role of enzymes in intra and extracellular reactions Mechanism of enzyme action Factors affecting enzyme function Cofactors and coenzymes 	<ul style="list-style-type: none"> Role of plasma membrane Structure of plasma membrane Factors that affect permeability Diffusion and facilitated diffusion Osmosis Active transport
Skills	<ul style="list-style-type: none"> Manipulate magnification formulae Understand term 'resolution' Use a microscope to calibrate a graticule and view and measure organelles Interpret photomicrographs Preparing slides to view with a microscope and understand the use of staining 	<ul style="list-style-type: none"> Quantitative and qualitative tests for carbohydrates, proteins and fats Separation techniques Data recording and display and quantitative and quantitative analysis of data <p>PAG 9 Qualitative testing Tasks 1,2 & 3 PAG 5 Determining the effect of temperature on membrane permeability</p>	<ul style="list-style-type: none"> Examination of stained sections and squashes to view mitosis and meiosis using a microscope Biological drawings Interpreting photomicrographs and drawings of mitosis and meiosis <p>PAG 1 Task 1 Using a light microscope to mitosis</p>	<ul style="list-style-type: none"> DNA extraction qualitative analysis of results ICT skills – DNA computer modelling <p>PAG 10 Task 1 Investigating DNA structure using RasMol</p>	<ul style="list-style-type: none"> Investigate the effects of pH and temperature on enzyme function Measure the rate of reaction Controlling variables Processing results Using graphs to calculate rate of reaction Series dilutions <p>PAG 4 Task 2 The effect of enzyme concentration on the rate of a reaction Task 1 The effect of substrate concentration on</p>	<ul style="list-style-type: none"> Use of colorimeters Control of variables Processing results Analysing graphs Investigations into factors affecting osmosis and permeability of membranes <p>PAG 8 Task 1 Investigating into water potential of potato cells</p>

					the rate of a reaction OR Task 3 The effect of temperature on amylase activity	
Teacher 2	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topics	Module 3 Exchange surfaces and breathing	Transport in Animals Transport in plants	Module 4 Communicable diseases	Classification and evolution	Biodiversity	Module 5 Regulating blood glucose and diabetes
Threshold Concepts	<ul style="list-style-type: none"> The features of an efficient exchange surface The structure, function and mechanisms of the mammalian gaseous exchange system The histology of exchange surfaces The relationship between vital capacity, tidal volume, breathing rate and oxygen uptake The mechanisms of ventilation and gas exchange in bony fish and insects 	<ul style="list-style-type: none"> The need for transport systems The different types of transport systems The structure and functions of arteries, arterioles, capillaries, venules, and veins The formation of tissue fluid The external and internal structure of the mammalian heart The cardiac cycle The coordination of the cardiac cycle The role of haemoglobin The need for transport systems in multicellular plants Structure and function of the vascular system in roots, stems and leaves in dicots Structure and function of xylem vessels, sieve tube elements and companion cells Mechanism of water movement Factors affecting transpiration rate Adaptations of hydrophytes and xerophytes Mechanism of translocation 	<ul style="list-style-type: none"> Pathogens that cause disease in plants and animals Transmission of pathogens Primary non-specific defences in animals Defences against disease in plants The immune system Antibody structure Primary and secondary immune responses Vaccination Autoimmune diseases Antibiotics and other medicines 	<ul style="list-style-type: none"> The biological classification of species The binomial naming system The features used in classification The evidence used in classification The relationship between classification and phylogeny The evidence for natural selection The different types of variation The different types of adaptations of organisms to their environment Natural selection and evolution 	<ul style="list-style-type: none"> Habitat, genetic and species biodiversity Factors affecting biodiversity Biodiversity and conservation 	<ul style="list-style-type: none"> Histology of the pancreas Regulation of blood glucose levels, action of insulin and glucagon and role of the liver Control of insulin secretion Causes and treatments of Type 1 and type 2 diabetes Potential treatments for diabetes mellitus Summer task Temperature regulation in ectotherms and endotherms
Skills	<ul style="list-style-type: none"> Microscopic examination of exchange surfaces Using a spirometer calculations of breathing rates and various other spirometer-related numerical values Dissection and examination of a bony fish 	<ul style="list-style-type: none"> Heart dissection Pulse rate calculations Examine and draw sections of plant tissue Dissection of stems Potometers to investigate factors that affect transpiration rate <p>PAG 2 Task 2 Dissection of the heart</p> <p>PAG 5 Task 3 Using a potometer</p>	<ul style="list-style-type: none"> Viewing and identifying WBC using microscopes 	<ul style="list-style-type: none"> Application of various statistical techniques 	<ul style="list-style-type: none"> Sampling habitats including random and non-random methods Calculating species richness, species evenness and Simpson's Index of Biodiversity Assessing genetic biodiversity 	<ul style="list-style-type: none"> Examine and draw stained sections of the pancreas

Enrichment within the curriculum	
Cross curricular links	
Extra-curricular opportunities	Biology clinics Biology drop in sessions

What are the intended outcomes of the Year 12 Biology curriculum?

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Opportunities to show progress (Assessments)	End of unit tests Cell Structure and Exchange surfaces	End of unit tests Biological molecules, Animal transport and Plant transport	PPE 1 End of unit tests Communicable diseases and Cell division	End of unit tests Nucleic acids and classification and evolution	PPE 2 End of unit tests Biodiversity and Enzymes	End of unit test Biological membranes
Impact on personal development (SMSC)	Ethic consideration of the use of stem cells Use of animal organs for dissection					
Preparation for the next stage of education	Students should feel confident to approach Year 13 using the knowledge and skills gained in Year 12. A level qualification in Biology can lead to a further Biological study at university or even a degree in Biological sciences. There are also doors opened to medicine, veterinary medicine, animal health, midwifery, physiotherapy, nursing, agriculture and many more.					