

YEAR 12 BIOLOGY CURRICULUM PROGRESSION OVERVIEW

Pupils will build on their biology learning from KS4, extending their knowledge and understanding of biological molecules, cells & the immune system, exchange and transport in living organisms and the basics of genetics and diversity. They will further build upon this learning by grasping more difficult concepts such as photosynthesis, respiration, homeostasis and more complicated applications of genetic technology. Students will become competent at applying their learning in familiar and unfamiliar contexts, and in the interpretation and evaluation of experimental data, including the use of statistics to assess the significance of experimental results.

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	Eukaryotic and Prokaryotic cell structure. Monomers and Polymers	Cells arise from other cells, Transport across cell membrane Structure of DNA and RNA	Cell recognition and the immune system DNA replication	Surface area to volume ratio, Gas exchange ATP	Digestion and absorption Water	Mass transport Inorganic Ions
Core Knowledge/ Threshold Concept	The structure and function of biological molecules, including carbohydrates, lipids, enzymes, DNA, RNA, Water, ATP and inorganic ions. The structure and function of eukaryotic & prokaryotic cells Monomers are the smaller units from which larger molecules are made. Polymers are molecules made from a large number of monomers joined together. Monosaccharides, amino acids and nucleotides are	How cells divide and how the cell membrane functions to allow transport by diffusion, active transport and osmosis. Deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) are important information-carrying molecules.	Cell-surface membranes contain embedded proteins. Some of these are involved in cell signalling – communication between cells. Others act as antigens, allowing recognition of 'self' and 'foreign' cells by the immune system adenine and three phosphate groups. The semi-conservative replication of DNA ensures genetic continuity between generations of cells.	The internal environment of a cell or organism is different from its external environment. The exchange of substances between the internal and external environments takes place at exchange surfaces. A single molecule of adenosine triphosphate (ATP) is a nucleotide derivative and is formed from a molecule of ribose, a molecule of	During digestion, large biological molecules are hydrolysed to smaller molecules that can be absorbed across cell membranes. Water is a major component of cells. It has several properties that are important in biology	Mass transport maintains the final diffusion gradients that bring substances to and from the cell membranes of individual cells. Inorganic ions occur in solution in the cytoplasm and body fluids of organisms, some in high concentrations and others in very low concentrations.

	examples of monomers.					
Why this learning now?	Following AQA specification - Easier topics (which link most closely to GCSE prior learning) are delivered in Y12 in order to ensure this learning is consolidated and extended.	Practical skills are developed through the course with the regular completion of required practicals which address the CPAC skills required to pass the practical element of the course.	More complex learning is delivered in Y13 and builds upon the crucial learning gained in Y12, for example, photosynthesis learning in Y13 cannot be taught until the students have grasped the crucial learning on ATP and enzymes			
Assessment Opportunities:	<ul style="list-style-type: none"> • 4-6 weekly assessment (45 marks, some synoptic content) • Focus on intervention following assessment – all students complete WINs and targeted ZigZag and other practice materials for underperforming students • New 4-weekly multiple choice quizzes to test recall of prior learning • Responsive AfL in lessons • Recall starters (on recent or more synoptic content) every lesson to support retention of crucial learning • Regular structured self and peer assessment (WINs) in lessons • End of year mock exams 					
	<ul style="list-style-type: none"> • Standardised block test (Oct). 	<ul style="list-style-type: none"> • Standardised block test. (Nov) 	<ul style="list-style-type: none"> • Standardised Mock (Jan) 	Standardised block test. (Feb/Mar)	<ul style="list-style-type: none"> • Standardised block test (Apr) • Re-test for underperforming students (Feb) 	<ul style="list-style-type: none"> • Full AS Mock (Jun)
Learning at Home	Staff use a variety of resources including: <ul style="list-style-type: none"> • Exam questions • Online learning (SENECA, MyGCSEScience, YouTube, etc.) 					

	<ul style="list-style-type: none"> Recall activities (quizzes, revision tasks, etc.) 					
Key Vocabulary	Covalent Bond Ionic Bond Hydrogen Bond Polar Molecule Monomer Golgi, Lysosome Ribosome, Cell Wall Vacuole	Nucleotide Polynucleotide Phosphodiester bond Plasma Membrane Phospholipid Bilayer Protein Channel Carrier Protein Glycoprotein	Amino group Carboxyl group R-group Peptide bond Polypeptide Lymphocyte Phagocyte Phagocytosis Lysosome Phagosome	Surface area: volume ratio Exchange surface Concentration gradient ATP Synthase ATP Hydrolase Polymerases	Specific heat capacity Latent heat of Vaporisation Cohesion Surface tension	High affinity Low affinity Oxygen dissociation curve Solvent Inorganic ions Transparent
Spiritual, Moral, Social and Cultural concepts covered	Spiritual: A sense of enjoyment in learning about ourselves and others and the world around us. Moral: The ability to recognise difference between right and wrong and applying it to our own lives. Social: Understand and appreciate the range of cultural influences that shape our heritage.					
Links to careers and the world of work	Staff will regularly link the learning in lessons to real-life contexts. For example, in Biology the pupils will look at the circulatory system which links to medical careers and in Ecology will perform experiments like a biologist.					

YEAR 13 BIOLOGY CURRICULUM PROGRESSION OVERVIEW

Pupils will build on their biology learning from Year 12, extending their knowledge and understanding of Energy transfers in and between organisms, Organisms respond to changes in their internal and external environments, Genetics, populations, evolution and ecosystems and the control of gene expression. They will further build upon this learning by grasping more difficult concepts such as photosynthesis, respiration, homeostasis and more complicated applications of genetic technology. Students will become competent at applying their learning in familiar and unfamiliar contexts, and in the interpretation and evaluation of experimental data, including the use of statistics to assess the significance of experimental results.

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Topic	Photosynthesis & Respiration Inheritance	Energy and Ecosystems Population	Organisms respond to changes in their environment Evolution may lead to speciation	Nervous coordination Populations in ecosystems	Skeletal muscles The control of gene expression	Homeostasis Gene technologies
Core Knowledge/ Threshold Concept	Life depends on continuous transfers of energy. In photosynthesis, light is absorbed by chlorophyll and this is linked to the production of ATP. In respiration, various substances are used as respiratory substrates. The genotype is the genetic constitution of an organism. The phenotype is the expression of this genetic constitution and its	In any ecosystem, plants synthesise organic compounds from atmospheric, or aquatic, carbon dioxide. Species exist as one or more populations. A population as a group of organisms of the same species occupying a particular space at a particular time that can potentially interbreed.	A stimulus is a change in the internal or external environment. A receptor detects a stimulus. A coordinator formulates a suitable response to a stimulus. An effector produces a response. Individuals within a population of a species may show a wide range of variation in phenotype. This is due to genetic and environmental factors.	The establishment of a resting potential in terms of differential membrane permeability, electrochemical gradients and the movement of sodium ions and potassium ions. Populations of different species form a community. A community and the non-living components of its environment together form an ecosystem.	Muscles act in antagonistic pairs against an incompressible skeleton. Cells are able to control their metabolic activities by regulating the transcription and translation of their genome	Homeostasis in mammals involves physiological control systems that maintain the internal environment within restricted limits. Recombinant DNA technology involves the transfer of fragments of DNA from one organism, or species, to another.

	interaction with the environment.					
Why this learning now?	Following AQA specification – links from Year 12 content. Conceptually easier than other topics.	The ability to recall and apply learning of A level content (crucial knowledge) to familiar contexts and unfamiliar contexts.	Practical skills. The ability to follow written procedures, apply investigative approaches and methods when using instruments and equipment, the safe use of practical equipment and materials, making and recording observations & researching, referencing and reporting findings. The ability to apply various statistical tests with confidence.	Build upon: Structure and function of chloroplasts & mitochondria Knowledge of ATP production & enzymes Movement of substances Ions Circulatory system DNA structure and function Biodiversity Mitosis		
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	<ul style="list-style-type: none"> • Standardised Mock (Sep) 	<ul style="list-style-type: none"> • Standardised block test. (Oct/Nov) 	<ul style="list-style-type: none"> • Standardised Mock (Jan) 	Standardised block test. (Feb/Mar)	<ul style="list-style-type: none"> • Standardised block test (Apr) • Re-test for 	<ul style="list-style-type: none"> • Full A level Mock (Jun)

					underperforming students (Feb)	
Learning at Home	Staff use a variety of resources including: <ul style="list-style-type: none"> • Exam questions • Online learning (SENECA, MyGCSEScience, YouTube, etc.) • Recall activities (quizzes, revision tasks, etc.) 					
Key Vocabulary	Genetic Diversity Allele frequency Gene pool Photolysis Oxidation Reduction Co-enzyme NADP NADPH	Biomass Calorimetry Producer Consumer Ecosystem Population Community Habitat Niche	Taxis Kinesis Tropism IAA Normal distribution curve Biodiversity Species	Peripheral nervous system Neurone Sensory neurons Motor neurons Species diversity Ecosystem Diversity Genetic diversity Species richness Index of diversity	Skeletal muscle Smooth muscle Cardiac muscle Sarcolemma Sarcoplasm	Osmoreceptors ADH (antidiuretic hormone) Recombinant DNA Promoter Terminator DNA polymerase Restriction endonuclease Gene machine Oligonucleotide
Spiritual, Moral, Social and Cultural concepts covered	Spiritual: A sense of enjoyment in learning about ourselves and others and the world around us. Moral: The ability to recognise difference between right and wrong and applying it to our own lives. Social: Understand and appreciate the range of cultural influences that shape our heritage.					
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