(Science/KS5 Biology) Long-Term Plan

Ousedale School
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Long-term planning (LTPs) - Planning how the key concepts, knowledge, skills identified in the Progression map will be delivered termly per year group
Ensuring that end points & NC/spec are covered
Identifying what assessments are planned and when
Ensuring whole school intent priorities to be planned for

(Year 12 Biology)						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Unit title:	Cell Structure Cell Membranes Biological Molecules	More Biological Molecules Cells & The Immune System Exchange & Transport Systems	Exchange and Transport Systems DNA, RNA and Protein Synthesis Mass Transport	Mass Transport Diversity & Classification Diversity & Selection	Mass Transport Diversity & Selection	Energy Transfers & Nutrient Cycles (Year 13) Populations & Evolution (Year 13)
Unit length:	Cell Structure – 9 lessons Cell Membranes – 6 lessons Biological Molecules – 15 lessons	More Biological Molecules – 6 lessons Cells & The Immune System – 9 lessons Exchange & Transport Systems – 11 lessons	Exchange & Transport Systems – 11 lessons DNA, RNA and Protein Synthesis – 5 lessons Mass Transport – 18 lessons	Mass Transport – 18 lessons Diversity & Classification – 7 lessons Diversity & Selection – 8 lessons	Mass Transport – 18 lessons Diversity & Selection – 8 lessons	Energy Transfers & Nutrient Cycles – 6 lessons Populations & Evolution – 7 lessons
Key concepts:	Cells and their structure Cell division Cell membrane structure and transport across membranes Structures and functions of carbohydrates, proteins and lipids	Structure and functions of ATP, DNA, RNA Immune response and vaccinations Exchange surfaces in single-celled organisms, fish, insects and lungs	Exchange surfaces in single-celled organisms, fish, insects and lungs Digestion & Absorption Genetic code and protein synthesis Mass transport system in animals – blood vessels, heart, haemoglobin and cardiac cycle	Mass transport system in animals – blood vessels, heart, haemoglobin and cardiac cycle Mass transport systems in plants – xylem and phloem Taxonomy and classification Meiosis and mutations / natural selection	Mass transport system in animals – blood vessels, heart, haemoglobin and cardiac cycle Mass transport systems in plants – xylem and phloem Meiosis and mutations / natural selection	Energy transfer through and ecosystem Nitrogen and phosphorous cycles Speciation and evolution
Knowledge/ Skills:	Required practicals 1, 2, 3 & 4	Calculate volume and surface area of	Use of visking tubing to model absorption	Required practical 5	Required practical 6	Maths skills: Hardy-Weinberg equation

	Calculating mitotic index 'Food' tests Dilution series preparation / calibration curve Use of chromatography to identify amino acids Calculating pH using log Uncertainty measurements Use of tangents to calculate rate Identifying variables Use of microscopes to prepare temporary mounts and observe cells under mitosis Methods of studying cells Calculating magnification Conversion of units Identify the different stages of mitosis from diagrams AO1: Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures AO2: Apply knowledge and	different shapes / 'cells' Calculate pulmonary ventilation rate AO1 AO2 AO3	in the small intestine and interpret the results Calculating cardiac output Analyse and interpret volume and pressure changes during the cardiac cycle Evaluate risk factors associated with cardiovascular disease Use of a potometer to measure the rate of transpiration Recognise correlation and casual relationships Interpret and evaluate data from tracer and ringing experiments AO1 AO2 AO3	Interpreting changes in pressure and volume during the cardiac cycle Interpreting oxygen dissociation curves Use the expression 2n Complete diagrams to show the number of chromosomes in cells after the 1st and 2nd meiotic divisions Compare and contrast mitosis and meiosis Recognise when meiosis occurs when given unknown life cycles Use a logarithmic scale AO1 AO2 AO3	Calculate the index of diversity Use random sampling techniques AO1 AO2 AO3	Given data from which to calculate gross primary production and to derive the appropriate units Calculate the net productivity of producers or consumers from given data and the efficiency of energy transfers within ecosystem Calculate percentage yields AO1 AO2 AO3

	understanding of scientific ideas, processes, techniques and procedures: in theoretical context, in a practical context, when handling qualitative data, when handling quantitative data AO3: Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to: making judgements and reach conclusions, develop and refine practical design and procedures					
End points covered:	To understand the structure of different cell types To understand how different substances move across cell surface membranes To understand how the structure of different biological molecules relate to their function	To understand how ATP, DNA/RNA, water and inorganic ions structured and used by organisms To understand the immune response to a pathogen To understand how substances are exchanged and transported in	To understand how transcription and translation lead to protein synthesis To understand how the human circulatory system is adapted for efficient transport of substances To understand how tissue fluid is formed and allows for	To understand how different species show diversity and how we can classify organisms into different groups To understand how mutations can alter protein structure To understand how natural selection takes place to allow evolution to occur	To understand how mutations can alter protein structure To understand how natural selection takes place to allow evolution to occur	To understand how energy is transferred between trophic levels within an ecosystem and why these transfers are inefficient To understand how nitrogen and phosphorous are recycled through an ecosystem

		different types of organisms	exchange of substances between cells and the blood			To understand how to calculate the frequency of alleles/genotypes/phenotypes within a population To understand how speciation may result in new species arising
NC/Spec coverage:	3.1.2 Carbohydrates 3.1.3 Lipids 3.1.4.1 General properties of proteins 3.1.4.2 Many proteins are enzymes 3.2.1.1 Structure of eukaryotic cells 3.2.1.2 Structure of prokaryotic cells and of viruses 3.2.2 All cells arise from other cells 3.2.3 Transport across cell membranes	3.1.5.1 Structure of DNA and RNA 3.1.5.2 DNA replication 3.1.6 ATP 3.1.7 Water 3.1.8 Inorganic ions 3.2.4 Cell recognition and the immune system 3.3.1 Surface area to volume ratio 3.3.2 Gas exchange	3.3.2 Gas exchange 3.3.3 Digestion and absorption 3.3.4.1 Mass transport in animals 3.4.1 DNA, genes and chromosomes 3.4.2 DNA and protein synthesis 3.4.3 Genetic diversity can arise as a result of mutation or during meiosis	3.3.4.1 Mass transport in animals 3.3.4.2 Mass transport in plants 3.4.4 Genetic diversity and adaptation 3.4.5 Species and taxonomy 3.4.6 Biodiversity within a community	3.4.3 Genetic diversity can arise as a result of mutation or during meiosis 3.4.7 Investigating diversity	3.5.3 Energy and ecosystems 3.5.4 Nutrient cycles 3.7.2 Populations 3.7.3 Evolution may lead to speciation
Cross-curricular links:	Chemistry – biochemistry Maths skills	Maths skills	Maths skills	Maths skills	Maths skills	Maths skills
Assessments:	End of topic tests	End of topic tests	End of topic tests	End of topic tests	End of topic tests	End of topic tests
Other school intent priorities						
New experiences – broadening horizons			External speaker: Dr Matthew Gage – coronary heart disease research	Biology Olympiad for Year 12 students		
Developing character –						

Kind, Hard Working, Successful						
Context specific need – diversity, inclusion; reading, literacy; mental health						
Curriculum Careers - Gatsby 4	Careers in molecular biology		Careers in molecular biology / medicine			

(Year 13 Biology)						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Unit title:	Photosynthesis Respiration	Populations in Ecosystems Stimuli & Response Genetics	Nervous coordination Mutations & Gene expression	Genome projects & Gene Technologies Homeostasis	Revision	N/A
Unit length:	Photosynthesis – Respiration –	Populations in Ecosystems – 6 lessons Stimuli & Response – 7 lessons Genetics – ??	Nervous coordination – 7 lessons Mutations & Gene expression – 9 lessons	Genome projects & Gene Technologies – 8 lessons Homeostasis – 9 lessons		
Key concepts:	The reactions of photosynthesis and respiration & factors which affect their rate	Use of different sampling techniques Biotic & Abiotic factors Succession Conservation Patterns of inheritance Genetic crosses Taxes and kinesis Plant responses Receptors including the Pacinian corpuscle Control of heart rate	Nerve impulses Synaptic transmission Muscle contraction Effect of gene mutations Stem cells Regulation of transcription and translation Tumours and cancer	Positive and negative feedback Control of blood glucose concentration Control of blood water potential Using genome projects Recombinant DNA technology Diagnosing heritable diseases using DNA probes Genetic fingerprinting		
Knowledge/ Skills:	Required practical 7, 8 and 9 Evaluate data relating to common agricultural practices used to overcome the effect of these limiting factors	Required practical 10 and 12 Chi-squared test and interpreting p values Constructing monohybrid and dihybrid genetic crosses to calculate probabilities of	Use appropriate units when calculating the maximum frequency of impulse conduction given the refractory period of a neurone Use information provided to predict and explain the	Required practical 11 Interpret information relating to examples of negative and positive feedback Evaluate the positions of health advisers and the food industry in relation to the		

	identify environmental factors that limit the rate of photosynthesis Students could use a redox indicator to investigate dehydrogenase activity	characteristics in offspring Investigate the distribution of organisms in a named habitat using randomly placed frame quadrats, or a belt transect Use both percentage cover and frequency as measures of abundance of a sessile species Mark-release-recapture method Evaluate evidence and data concerning issues relating to the conservation of species and habitats and consider conflicting evidence	effects of specific drugs on a synapse Relate the nature of a gene mutation to its effect on the encoded polypeptide Evaluate the use of stem cells in treating human disorders	increased incidence of type II diabetes Interpret data showing the results of gel electrophoresis to separate DNA fragments		
End points covered:						
NC/Spec coverage:	3.5.1 Photosynthesis 3.5.2 Respiration	3.6.1.1 Survival and response 3.6.1.2 Receptors 3.6.1.3 Control of heart rate 3.7.1 Inheritance 3.7.4 Populations in ecosystems	3.6.2.1 Nerve impulses 3.6.2.2 Synaptic transmission 3.6.3 Skeletal muscles are stimulated to contract by nerves and act as effectors 3.8.1 Alteration of the sequence of bases in	3.6.4.1 Principles of homeostasis and negative feedback 3.6.4.2 Control of blood glucose concentration 3.6.4.3 Control of blood water potential 3.8.3 Using genome projects		

			DNA can alter the structure of proteins 3.8.2.1 Most of a cell's DNA is not translated 3.8.2.2 Regulation of transcription and translation 3.8.2.3 Gene expression and cancer	3.8.4.1 Recombinant DNA technology 3.8.4.2 Differences in DNA between individuals of the same species can be exploited for identification and diagnosis of heritable conditions 3.8.4.3 Genetic fingerprinting		
Cross-curricular links:	Maths skills	Maths skills Geography – succession	Maths skills	Maths skills		
Assessments:	End of topic tests	End of topic tests	End of topic tests	End of topic tests		
Other school intent priorities						
New experiences – broadening horizons				External speaker – Dr Ryan Pick – molecular biology		
Developing character – *Kind, Hard Working, Successful*						
Context specific need – diversity, inclusion; reading, literacy; mental health						
Curriculum Careers - Gatsby 4		Jobs in conservation / biodiversity	Careers in medicine			