West Kirby Grammar School

Curriculum Map – Year 12 (part A) – Biology (2023-24)

Topic Name	Term	Skills developed	Link to NC subject content	Prior learning	Next link in curriculum
3.1 Biological molecules.	Autumn term, Year 12	CARBOHYDTRATES AT f Students could use, and interpret the results of, qualitative tests for reducing sugars, non-reducing sugars and starch. AT g Students could use chromatography, with known standard solutions, to separate a mixture of monosaccharides and identify their components. AT c Students could produce a dilution series of glucose solution and use colorimetric techniques to produce a calibration curve with which to identify the concentration of glucose in an unknown solution. LIPIDS AT f Students could use, and interpret the results of, the emulsion test for lipids. PROTEINS AT f Students could use, and interpret the results of, a biuret test for proteins. AT g Students could use chromatography with known standard solutions, to separate a mixture of amino acids and identify their components. ENZYMES MS 0.5 Students could be given the hydrogen ion concentration of a solution in order to calculate its pH, using the formula:	All life on Earth shares a common chemistry. This provides indirect evidence for evolution. Despite their great variety, the cells of all living organisms contain only a few groups of carbon-based compounds that interact in similar ways. Carbohydrates are commonly used by cells as respiratory substrates. They also form structural components in plasma membranes and cell walls. Lipids have many uses, including the bilayer of plasma membranes, certain hormones and as respiratory substrates. Proteins form many cell structures. They are also important as enzymes, chemical messengers and components of the blood. Nucleic acids carry the genetic code for the production of proteins. The genetic code is common to viruses and to all living organisms, providing	Links from GCSE: KS4 YEAR 10 4.1.3.2 Osmosis 4.2.2.1 The human digestive system 4.1.3.2 Plant organ systems – xylem 4.4.1.3 Uses of glucose from photosynthesis. 4.4.2.3 Metabolism KS4 YEAR 11 4.6.1.4 DNA and the genome 4.6.1.5 DNA structure	3.2.3 transport across cell membranes. 3.3.1 Digestion and absorption 3.4.1 DNA, genes and chromosomes. 3.4.2 DNA and protein synthesis. 3.3.4.2 Mass transport in plants

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		pH = −log10 H+ PS 2.4 Students could identify the variables that must be controlled in their investigation into rate of reaction. PS 3.3 Students could calculate the uncertainty of their measurements of the rate of reaction. MS 3.2 Students could select an appropriate format for the graphical presentation of the results of their investigation into the rate of enzyme-controlled reactions. MS 3.6 Students could use a tangent to find the initial rate of an enzyme-controlled reaction. Required practical 1: Investigation into the effect of a named variable on the rate of an enzyme-controlled reaction. NUCLEIC ACIDS MS 0.3 Students could use incomplete information about the frequency of bases on DNA strands to find the frequency of other bases.	evidence for evolution. The most common component of cells is water; hence our search for life elsewhere in the universe involves a search for liquid water. 3.1.1 Monomers and polymers 3.1.2 Carbohydrates 3.1.3 Lipids 3.1.4. Proteins 3.1.4.2 Enzymes 3.1.5.1 Nucleic acids 3.1.5.2 DNA replication 3.1.6 ATP 3.1.7 Water 3.1.8 Inorganic ions		
3.3. Organisms exchange substances with their environment.	Spring and summer term, Year 12	Surface area to volume ratio PS 1.1 Students could use agar blocks containing indicator to determine the effect of surface area to volume ratio and concentration gradient on the diffusion of an acid or alkali. MS 4.1 Students could be given the	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. To truly enter	Links from GCSE: KS4 YEAR 10 4.1.3.1 Diffusion 4.4.2 Respiration 4.2.2.1 The human digestive system	3.5.1 Photosynthesis 3.6.1.3 control of heart rate

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		dimensions of cells with different shapes from which to calculate the surface area to volume ratios of these cells. Gas exchange AT j Students could dissect mammalian lungs, the gas exchange system of a bony fish or of an insect. AT d Students could use an optical microscope to: • examine prepared mounts of gas exchange surfaces of a mammal, fish and insect, or temporary mounts of gills • examine vertical sections through a dicotyledonous leaf. AT b Students could use three-way taps, manometers and simple respirometers to measure volumes of air involved in gas exchange. MS 2.2 Students could be given values of pulmonary ventilation rate (PVR) and one other measure, requiring them to change the subject of the equation: PV R = tidal volume × breathing rate Digestion and absorption PS 1.1 Students could: • design and carry out investigations into the effect of a pH or bile salts on the rate of reaction catalysed by a digestive enzyme • use Visking tubing models to investigate	or leave an organism, most substances must cross cell plasma membranes. In large multicellular organisms, the immediate environment of cells is some form of tissue fluid. Most cells are too far away from exchange surfaces, and from each other, for simple diffusion alone to maintain the composition of tissue fluid within a suitable metabolic range. In large organisms, exchange surfaces are associated with mass transport systems that carry substances between the exchange surfaces and the rest of the body and between parts of the body. Mass transport maintains the final diffusion gradients that bring substances to and from the cell membranes of individual cells. It also helps to maintain the relatively stable environment that is tissue fluid. 3.3.1 Surface area to volume ratio	4.2.3 Plant tissues, organs and systems 3.2.2.2 The heart and blood vessels 3.2.2.3 Blood 3.2.2.4 CHD 4.4.2 Respiration KS4 YEAR 11 4.5.1 Homeostasis 4.7.1.4 Adaptations	3.6.4 Homeostasis

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		the absorption of the products of digestion. Mass transport in animals AT h Students could design and carry out an investigation into the effect of a named variable on human pulse rate or on the heart rate of an invertebrate, such as Daphnia. MS 2.2 Students could be given values of cardiac output (CO) and one other measure, requiring them to change the subject of the equation: CO = stroke volume × heart rate Required practical 5: Dissection of animal or plant gas exchange system or mass transport system or of organ within such a system. Mass transport in plants AT b Students could set up and use a potometer to investigate the effect of a named environmental variable on the rate of transpiration.	3.3.2 Gas exchange 3.3.3 Digestion and absorption 3.3.4 Mass transport in animals and plants		