West Kirby Grammar School

Curriculum Map – Year 12 (part B) – Biology (2024-25)

Topic name	Term	Skills developed	Link to NC subject content	Prior learning	Next link in curriculum
3.2 Cells	Autumn	3.2.1 Cell Structure Students could use iodine in potassium iodide solution to identify starch grains in plant cells. Students should be able to appreciate that there was a considerable period of time during which the scientific community distinguished between artefacts and cell organelles. 3.2.2 All cells arise from other cells Required practical 2: Preparation of stained squashes of cells from plant root tips; set-up and use of an optical microscope to identify the stages of mitosis in these stained squashes and calculation of a mitotic index. Students should measure the apparent size of cells in the root tip and calculate their actual size using the formula: Actual size = size of image/ Magnification Calculation of a mitotic index. 3.2.3 Transport across cell membranes Required practical 3: Production of a dilution series of a solute top produce a calibration curve with which to identify the water potential of plant tissue. Required practical 4: Investigation into the effect of a named variable on the permeability of cell-surface membranes. Students could plot the data from their	• 3.2.1 Cell structure • 3.2.2 All cells arise from other cells • 3.2.3 Transport across cell membranes • 3.2.4 Cell recognition and the immune system All life on Earth exists as cells. These have basic features in common. Differences between cells are due to the addition of extra features. This provides indirect evidence for evolution. All cells arise from other cells, by binary fission in prokaryotic cells and by mitosis and meiosis in eukaryotic cells. All cells have a cell-surface membrane and, in addition, eukaryotic cells have internal membranes. The basic structure of these plasma membranes is the same and enables control of the passage of substances across exchange surfaces by passive or active transport. 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. Interactions between different types of cell are involved in disease, recovery from disease and prevention of symptoms occurring at a later date if exposed to the same antigen, or antigen-bearing pathogen.	Links from GCSE: KS4 YEAR 10 4.1 Cell biology 4.2 Organisation 4.3 Infection and response	3.3 Organisms exchange substances with their environment – specialised cells and transport across membrane 3.6 Organisms respond to changes in their internal and external environments – neurones / cell membrane

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		investigations in an appropriate format. Students could determine the water potential of plant tissues using the intercept of a graph of, e.g., water potential of solution against gain/loss of mass.			
3.4 Genetic information, variation and relationships between organisms	Spring/summer	3.4.1 DNA, genes and chromosomes 3.4.2 DNA and protein synthesis 3.4.3 Genetic diversity Students could examine meiosis in prepared slides of suitable plant or animal tissue. Students could: • use the expression 2n to calculate the possible number of different combinations of chromosomes following meiosis, without crossing over • derive a formula from this to calculate the possible number of different combinations of chromosomes following random fertilisation of two gametes, where n is the number of homologous chromosomes pairs. 3.4.4 Genetic diversity and adaptation Students could use a logarithmic scale when dealing with data relating to large numbers of bacteria in a culture. 3.4.5 Species and taxonomy 3.4.6 Biodiversity within a community Students could be given data from which to calculate an index of diversity and interpret the significance of the calculated value of the index.	• 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 • 3.4.4 Genetic diversity and adaptation • 3.4.5 Species and taxonomy • 3.4.6 Biodiversity within a community • 3.4.7 Investigating diversity	Links from GCSE: KS4 YEAR 11 • 4.6 Inheritance, variation and evolution	3.7 Genetics, populations, evolution and ecosystems

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		3.4.7 Investigating diversity Students could: • design appropriate methods to ensure random sampling • carry out random sampling within a single population • use random samples to investigate the effect of position on the growth of leaves. Students could use standard scientific calculators to calculate the mean values of data they have collected or have been given. Students could calculate, and interpret the values of, the standard deviations of their mean values.			