SUBJECT CURRICULUM OUTLINE

Term	Topic/Unit of work	Knowledge	Skills	Assessment
Autumn Term 1	3.1.1 Biological Molecules (32)	3.1.1 Monomers and polymers 3.1.2 Carbohydrates 3.1.3 Lipids 3.1.4. Proteins 3.1.4.1 General properties of proteins 3.1.4.2 Many proteins are enzymes	**AT f** Students could use, and interpret the results of, qualitative tests for reducing sugars, non-reducing sugars and starch. Students could use, and interpret the results of, the emulsion test for lipids. **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. **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. **MS 0.5** Students could be given the hydrogen ion concentration of a solution in order to calculate its pH, using the formula: 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	Induction Test RAG Check STAMPS every 2 weeks

	3.2.1 Cell Structure (10) 3.2.2 Cells arise from other cells (8)	3.2.1 Cell structure The cell theory is a unifying concept in biology. 3.2.1.1 Structure of eukaryotic cells 3.2.1.2 Structure of prokaryotic cells and of viruses# 3.2.1.3 Methods of studying cells 3.2.2 All cells arise from other cells	**Practical:** Biochemical test procedures for identifying Reducing and Non-reducing sugar, lipids and protein **AT d, e and f** Students could use iodine in potassium iodide solution to identify starch grains in plant cells. **MS 1.8** **Practical:** Use chromatography with known standard solutions, to separate a mixture of amino acids and identify their components **AT d and e** **MS 0.3** Calculation of a mitotic index. **MS 1.8**	
Autumn Term 2	3.1.1 Biological Molecules (32) 3.2.2 Cells arise from other cells (8) 3.2.4 Cell Recognition (11)	3.1.5 Nucleic acids are important information-carrying molecules 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 3.2.2 All cells arise from other cells 3.2.4 Cell recognition and the immune system	**MS 0.3** Students could use incomplete information about the frequency of bases on DNA strands to find the frequency of other bases. **Required practical 1 –** Investigation into the effect of a named variable on the rate of an enzyme-controlled reaction. **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.	STAMPS every 2 weeks
Spring Term 1	3.2.3 Transport across membranes (15)	3.2.3 Transport across cell membranes	**MS 3.2** Students could plot the data from their investigations in an appropriate format. **MS 3.4** Students could determine the water potential of plant tissues using the intercept of a	STAMPS every 2 weeks

	3.3 Organisms exchange substances with their environment (13) 3.2.4 Cell Recognition (11)	3.3.1 Surface area to volume ratio 3.2.4 Cell recognition and the immune system	graph of, eg, water potential of solution against gain/loss of mass. **Required practical 4:** Investigation into the effect of a named variable on the permeability of cell-surface membranes. **Required practical 3:** Production of a dilution series of a solute to produce a calibration curve with which to identify the water potential of plant tissue.	MOCK Exams
Spring Term 2	3.3 Organisms exchange substances with their environment (13)	3.3.2 Gas exchange	**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 dimensions of cells with different shapes from which to calculate the surface area to volume ratios of these cells **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 threeway taps, manometers and simple respirometers to measure volumes of air involved in gas exchange.	STAMPS every 2 weeks

	3.3.3 Digestion (6) 3.4 Genetic Info (28)	3.3.3 Digestion and absorption Digestion in mammals Mechanisms of absorption	**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 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 the absorption of the products of digestion.	
Summer Term 1	3.3.4 Mass Transport in animals(14) 3.4 Genetic Info (28)	3.3.4.1 Mass transport in animals Haemoglobin Blood Circulation Gross Structure of the heart 3.4.1 DNA, genes and chromosomes	**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 respiratory system (fish gills) or mass transport (heart dissection) **AT j**	STAMPS every 2 weeks MOCK Exam Week

		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	**AT d** Students could examine meiosis in prepared slides of suitable plant or animal tissue. **MS 0.5** 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 **MS 2.5** Students could use a logarithmic scale when dealing with data relating to large numbers of bacteria in a culture. **AT i** **MS 2.3** Students could be given data from which to calculate an index of diversity and interpret the significance of the calculated value of the index. **AT k** 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. **MS 1.2** Students could use standard scientific calculators to calculate the mean values of data they have collected or have been given. **MS 1.10** Students could calculate, and interpret the values of, the standard deviations of their mean values. **Required practical 6:**	

			Use of aseptic techniques to investigate the effect of anti-microbial substances on microbial growth	
Summer Term 2	3.3.4 Mass Transport in plants(14)	3.3.4.2 Mass transport in plants The cohesion-tension theory of water transport in the xylem The mass flow hypothesis for the mechanism of translocation	**AT b** Students could set up and use a potometer to investigate the effect of a named environmental variable on the rate of transpiration. **Required practical 12:** Investigation into the effect of a named environmental factor on the distribution of a given species. **Practical:** Research, reference and present individual posters.	STAMPS every 2 weeks