Curriculum Map: Year 13 Biology Spring Term

Spring		
	Teacher 1	**Teacher 2**
Content Declarative knowledge 'I Know'	**Module 6: Genetics and Evolution** **6.2 Cloning and biotechnology** Know examples of natural clones in plants and the production of clones for use in horticulture. Know examples of natural clones in animal species. Know the advantages and disadvantages of using microorganisms to make food for human consumption. Know the importance of manipulating the growing conditions in batch and continuous fermentation in order to maximise the yield of product required. Know the standard growth curve of a microorganism in a closed culture. Know the uses of immobilised enzymes in biotechnology and different methods of immobilisation.	**Module 5: Communication, Homeostasis and Energy** **5.2.1 Photosynthesis** Know the interrelationship between the process of photosynthesis and respiration. Know the structure of a chloroplast and the sites of the two main stages of photosynthesis. Know the importance of photosynthetic pigments in photosynthesis. Know the light-dependent stage of photosynthesis. Know the fixation of carbon dioxide and the light independent stage of photosynthesis. Know the uses of triose phosphate. Know the factors affecting photosynthesis. **5.2.2 Respiration** Know the need for cellular respiration. Know the structure of the mitochondrion. Know the process and site of glycolysis. Know the link reaction and its site in the cell. Know the process and site of the Krebs cycle. Know the importance of coenzymes in cellular respiration. Know the process and site of oxidative phosphorylation. Know the chemiosmotic theory. Know the process of anaerobic respiration in eukaryotes. Know the difference in relative energy values of carbohydrates, lipids and proteins as respiratory substrates.
Skills Procedural Knowledge 'I know how to'	Know how to take plant cuttings as an example of a simple cloning technique. Know how to produce artificial clones of plants by micropropagation and tissue culture. Know how artificial clones can be produced by artificial embryo twinning or by enucleation and somatic cell nuclear transfer. Know how microorganisms are used in biotechnological processes. **PAG 7.1: The effect of antibiotics on bacterial growth.** Know how to culture microorganisms effectively, using aseptic techniques. Know how to carry out serial dilutions. Know how to safely and correctly use a range of practical equipment and materials. Know how to keep appropriate records of experimental activities. Know how to present information and data in a scientific way.	Know how to examine and draw cells observed in blood smears. Know how evolution in some species has implications for human populations. **PAG 6.3: Investigation using thin layer chromatography to separate photosynthetic pigments.** Know how to safely and correctly use a range of practical equipment and materials. Know how to apply investigative approaches and methods to practical work. Know how to keep appropriate records of experimental activities. Know how to present information and data in a scientific way. Know how to use a wide range of experimental and practical instruments, equipment and techniques appropriate to the knowledge and understanding included in the specification. Know how to separate biological compounds using thin layer chromatography.

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Strategies Conditional Knowledge 'I know when to'	Understand the arguments for and against artificial cloning in plants. Understand the arguments for and against artificial cloning in animals.	Know that scientific knowledge and understanding develops over time. Evaluate the role of the scientific community in validating new knowledge and ensuring integrity.
Key Questions	What natural animal and plant clones exist? What are the advantages and disadvantages of using microorganisms to make food? How can the growing conditions in batch and continuous fermentation be maximised? What are the uses of immobilised enzymes in biotechnology?	What is the interrelationship between photosynthesis and respiration? What are the light-dependent and light-independent stages of photosynthesis? What factors affect the rate of photosynthesis? What is the need for cellular respiration? What are the processes and sites of glycolysis, Krebs cycle and oxidative phosphorylation? What is the chemiosmotic theory? How do eukaryotes respire anaerobically?
Assessment topics	PPE: Biological Processes - modules 2, 3, 5, (2 hours and 15 minutes) and Biological Diversity – modules 2, 4, 6 (2 hours and 15 minutes) in February.	
Cross curricular links/Character Education	**Maths:** Recognise and make use of appropriate units in calculations, recognise and use expressions in decimal and standard form, use ratios, fractions and percentages, estimate results, use an appropriate number of significant figures, find arithmetic means, construct and interpret frequency tables and diagrams, bar charts and histograms, understand the terms mean, median and mode, identify uncertainties in measurements and use simple techniques to determine uncertainty when data are combined, use a scatter diagram to identify a correlation between two variables, select and use a statistical test, understand measures of dispersion, including standard deviation and range, understand and use the symbols: =,1, «, », 2, \, +, solve algebraic equations, translate information between graphical, numerical and algebraic forms, plot two variables from experimental or other data, understand that $y = mx + c$ represents a linear relationship, calculate rate of change from a graph showing a linear relationship, draw and use the slope of a tangent to a curve as a measure of rate of change, calculate the circumferences, surface areas and volumes of regular shapes. **Character education:** Understanding the issues surrounding artificial cloning.	

During the summer term in year 13 another PPE is sat in April: Unified Biology – modules 2, 3, 4, 5, 6 (1 hour and 30 minutes). The remainder of the term is spent preparing the students for the final summer examination series.