

Curriculum Map: Year 13 Biology Autumn Term

Autumn		
	Teacher 1	Teacher 2
<p>Content Declarative knowledge 'I Know'</p>	<p>Module 6: Genetics, Evolution and Ecosystems</p> <p>6.1.1 Cellular Control Know the types of gene mutations and their possible effects on protein production and function. Know the regulatory mechanisms that control gene expression at the transcriptional level, posttranscriptional level and posttranslational level. Know the genetic control of the development of body plans in different organisms. Know the importance of mitosis and apoptosis as mechanisms controlling the development of body form.</p> <p>6.1.2 Patterns of inheritance Know the contribution of both environmental and genetic factors to phenotypic variation. Know the genetic basis of continuous and discontinuous variation. Know the factors that can affect the evolution of a species. Know the role of isolating mechanisms in the evolution of new species. Know the principles of artificial selection and its uses. Know the ethical considerations surrounding the use of artificial selection.</p> <p>6.1.3 Manipulating genomes Know the principles of DNA sequencing and the development of new DNA sequencing techniques. Know the principles of DNA profiling and its uses. Know the principles of the PCR and its application in DNA analysis. Know the principles and uses of electrophoresis for separating nucleic acid fragments or proteins. Know the principles of genetic engineering. Know the techniques used in genetic engineering. Know the principles of, and potential for, gene therapy in medicine.</p>	<p>Module 5: Communication, Homeostasis and Energy</p> <p>5.1.1 Communication and homeostasis Know the need for communication systems in multicellular organisms. Know that cells communicate by cell signalling. Know the principles of homeostasis. Know the physiological and behavioural responses involved in temperature control in ectotherms and endotherms.</p> <p>5.1.2 Excretion as an example of homeostatic control Know the structure of a nucleotide as the monomer from which nucleic acids are made. Know the term excretion and its importance in maintaining metabolism and homeostasis. Know the structure and functions of the mammalian liver. Know the structure, mechanisms of action and functions of the mammalian kidney. Know the effects of kidney failure and its potential treatments. Know how excretory products can be used in medical diagnosis.</p> <p>5.1.3 Neuronal communication Know the roles of mammalian sensory receptors in converting different types of stimuli into nerve impulses. Know the structure and functions of sensory, relay and motor neurones. Know how nerve impulses are generated and transmitted. Know the structure and roles of synapses in neurotransmission.</p> <p>5.1.4 Hormonal communication Know about endocrine communication by hormones. Know the structure and functions of the adrenal glands. Know the histology of the pancreas. Know the differences between Type 1 and Type 2 diabetes mellitus. Know the potential treatments for diabetes mellitus.</p> <p>5.1.5 Plant and animal responses Know the types of plant responses Know the roles of plant hormones. Know the experimental evidence for the role of auxins in the control of apical dominance.</p>

		<p>Know the experimental evidence for the role of gibberellin in the control of stem elongation and seed germination.</p> <p>Know the commercial use of plant hormones.</p> <p>Know the organisation of the mammalian nervous system.</p> <p>Know the structure of the human brain and the functions of its parts.</p> <p>Know the function of reflex actions.</p> <p>Know the effects of hormones and nervous mechanisms on heart rate.</p> <p>Know the structure of mammalian muscle and the mechanism of muscular contraction.</p>
<p>Skills Procedural Knowledge 'I know how to'</p>	<p>Know how sexual reproduction can lead to genetic variation within a species.</p> <p>Know how to use genetic diagrams to show patterns of inheritance.</p> <p>Know how to use phenotypic ratios to identify linkage and epistasis.</p> <p>Know how to use the chi-squared test to determine the significance of the difference between observed and expected results.</p> <p>Know how to use the Hardy-Weinburg principle to calculate allele frequencies in populations.</p> <p>Know how gene sequencing has allowed for genome-wide comparisons between individuals and between species.</p> <p>Know how gene sequencing has allowed for the sequences of amino acids in polypeptides to be predicted.</p> <p>Know how gene sequencing has allowed for the development of synthetic biology.</p>	<p>Know how to examine and draw stained sections to show the histology of liver tissue.</p> <p>PAG 1: Using a light microscope to examine kidney tissue.</p> <p>Know how to safely and correctly use a range of practical equipment and materials.</p> <p>Know how to keep appropriate records of experimental activities.</p> <p>Know how to present information and data in a scientific way.</p> <p>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.</p> <p>Knows how to ensure the safe and ethical use of organisms to measure animal responses.</p> <p>Know how to produce scientific drawings from observations with annotations.</p> <p>Know how to examine and draw stained sections to show the histology of nephrons.</p> <p>Know how the water potential of the blood is controlled.</p> <p>Know how to examine and draw stained sections of the pancreas to show the histology of the endocrine tissues.</p> <p>Know how blood glucose concentration is regulated.</p> <p>Know how to carry out practical investigations into phototropism and geotropism.</p> <p>Know how to carry out practical investigations into the effect of plant hormones on growth.</p> <p>Know how the fight or flight response is coordinated by the nervous and endocrine systems.</p> <p>Know how to examine stained sections or photomicrographs of skeletal muscle.</p> <p>PAG 11.1: Investigation into the effect of exercise on pulse rate</p> <p>Know how to apply investigative approaches and methods to practical work.</p>
<p>Strategies Conditional Knowledge 'I know when to'</p>	<p>Understand the ethical issues relating to the genetic manipulation of animals, plants and microorganisms.</p>	<p>Consider applications and implications of science and evaluate their associated benefits and risks.</p> <p>Consider ethical issues in the treatment of humans, other organisms and the environment.</p>

		Evaluate the role of the scientific community in validating new knowledge and ensuring integrity. Evaluate the ways in which society uses science to inform decision making.
Key Questions	How is gene expression regulated? How are genes inherited? What factors can influence evolution? How can desirable characteristics be obtained by artificial selection? How can genomes be manipulated?	How do multicellular organisms communicate between cells? How are harmful substances excreted from the body? How do organisms respond to stimuli and coordinate their response?
Assessment topics	6.3.1 Ecosystems multiple choice test (25 minutes) in mid-October. AS assessment: Modules 2, 3, 4 (1 hour and 30 minutes) in early December.	
Cross curricular links/Character Education	<p>Psychology: The brain and nervous system. PE: Regulation of heart rate, muscle contraction.</p> <p>Maths: Recognise and make use of appropriate units in calculations, recognise and use expressions in decimal and standard form, use ratios, fractions and percentages, 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, make order of magnitude calculations, understand measures of dispersion, including standard deviation and range, identify uncertainties in measurements and use simple techniques to determine uncertainty when data are combined, understand and use the symbols: =, 1, «, », 2, \, +, change the subject of an equation, substitute numerical values into algebraic equations using appropriate units for physical quantities, 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.</p> <p>Character education: Understanding the ethical issues surrounding artificial selection, gene therapy and genetic engineering.</p>	