

## A Level Biology Curriculum Overview

	Y12	Y13
Half Term 1	<p>Module 1 - Cells and Reproduction</p> <ul style="list-style-type: none"> <li>→ Prokaryotic and eukaryotic cells</li> <li>→ Microscopy</li> <li>→ Viruses</li> <li>→ Mitosis</li> <li>→ CPAC 1 - Microscopy</li> </ul> <p>Module 2 - Biochemistry</p> <ul style="list-style-type: none"> <li>→ Carbohydrates - Monosaccharides, Disaccharides, Polysaccharides - starch, cellulose and glycogen</li> <li>→ Proteins - Amino acids and dipeptides, Primary, secondary and tertiary protein structure.</li> <li>→ Lipids - Glycerol, Fatty acids, phospholipids and the fluid mosaic model.</li> <li>→ Enzymes - The lock and key &amp; induced fit model, Rates of reaction, competitive and non competitive inhibition.</li> <li>→ CPAC 2 - Rate of Enzyme controlled reaction.</li> <li>→ The genetic code - DNA, RNA, Transcription and translation.</li> </ul>	<p>Module 5 - Energy for Biological processes</p> <p>Photosynthesis</p> <ul style="list-style-type: none"> <li>→ Absorption and action spectra</li> <li>→ CPAC 10 - investigating how different wavelengths of light affect the rate of photosynthesis.</li> <li>→ CPAC 11 - Chromatography - investigating the pigments photosynthesis.</li> <li>→ The structure and function of a chloroplast.</li> <li>→ Light dependent stage - production of ATP and NADPH</li> <li>→ Light independent stage - Carbon fixation and reduction of GP to GALP with production of biological molecules.</li> </ul> <p>Module 7 - Modern Genetics.</p> <ul style="list-style-type: none"> <li>→ The genome and gene sequencing</li> <li>→ Using PCR.</li> <li>→ Factors affecting gene expression</li> <li>→ The role of transcription factors.</li> <li>→ Splicing og mRNA</li> <li>→ Epigenetic modification - non coding RNA, histone modification and methylation.</li> <li>→ Stem cells and Differentiation</li> <li>→ Totipotent, pluripotent and multipotent stem cells.</li> <li>→ Using epigenetic modification of somatic cells forming Induced pluripotent Stem Cells.</li> <li>→ Gene technology -use of restriction endonucleases and ligase use to form recombinant DNA and genetically modified organisms.</li> <li>→ Use of marker genes and replica plating to identify recombinant cells.</li> <li>→ Use of knockout mice</li> <li>→ Debates about the use of genetically modified organisms</li> </ul>

<p>Half Term 2</p>	<p>Module 1</p> <ul style="list-style-type: none"> <li>→ Cell cycle</li> <li>→ Mitosis</li> <li>→ Chromosomal mutation</li> <li>→ Sexual Reproduction in plants</li> <li>→ Sexual Reproduction in mammals.</li> <li>→ CPAC 4 Pollen Grain investigation.</li> <li>→ Module 1 assessment and DIRT</li> </ul> <p>Module 2</p> <ul style="list-style-type: none"> <li>→ Mutations - silent, missense, nonsense and frame shifts.</li> <li>→ Ions - Magnesium, calcium, nitrate and phosphate.</li> <li>→ Water - water as a polar molecule. Hydrogen bonding, universal solvent and coolant.</li> <li>→ Module 2 Assessment and DIRT</li> </ul>	<p>Module 8 - Origins of Genetic Variation.</p> <ul style="list-style-type: none"> <li>→ Origins of genetic variation - mutation, random assortment and crossover during meiosis.</li> <li>→ Fertilisation - random fusion of gametes.</li> <li>→ Transfer of genetic information - genotypes to include homozygous dominant, homozygous recessive and heterozygous phenotypes.</li> <li>→ Pedigree diagrams and punnett squares.</li> <li>→ Linked and unlinked genes, including statistical analysis of observed and expected ratios using Chi Square.</li> <li>→ Sex linkage on the x chromosome including haemophilia in humans.</li> <li>→ Gene Pools and selection pressures including stabilising and disruptive selection.</li> <li>→ Changes in allele frequencies including genetic drift, population bottlenecks and the founder effect.</li> <li>→ Use of Hardy Weinberg to monitor changes in Allele Frequencies in a population.</li> </ul>
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<p>Half Term 3</p>	<p>Module 3 - Evolution &amp; Biodiversity</p> <ul style="list-style-type: none"> <li>→ Classification - Linnaean system of Binomial nomenclature.</li> <li>→ Evolution by natural selection.</li> <li>→ Phylogenetics and fossils as evidence of evolution by natural selection.</li> <li>→ Biodiversity and the index of biodiversity - species richness and evenness.</li> <li>→ Module 3 assessment and DIRT</li> </ul> <p>Module 4 - Transport in plants and animals</p> <ul style="list-style-type: none"> <li>→ Surface area to volume ratio.</li> <li>→ Fick's law and mass transport.</li> <li>→ Fluid mosaic model of cell membranes</li> <li>→ CPAC 5 - Investigation membrane permeability.</li> <li>→ Diffusion</li> <li>→ Facilitated diffusion</li> <li>→ Active transport</li> <li>→ Water potential &amp; Osmosis</li> <li>→ CPAC 6 - Determine the water potential of plant tissue.</li> </ul>	<p>Module 6 - Microbiology and Pathogens</p> <ul style="list-style-type: none"> <li>→ Aseptic technique and Culturing techniques.</li> <li>→ Understanding the phases of bacterial growth</li> <li>→ Core practical 12 - Investigating the rate of growth of bacteria in liquid culture</li> <li>→ Core practical 13 - isolating individual species of bacteria from a mixture culture using streak plating.</li> <li>→ Bacteria as pathogens</li> <li>→ Endo and exo toxin production</li> <li>→ Action of antibiotics - bacteriostatic and bactericidal antibiotics.</li> <li>→ Natural selection and the spread of antibiotic resistance.</li> <li>→ Other pathogenic agents - Stem rust fungus, influenza and the malaria parasite</li> <li>→ Controlling endemic disease</li> <li>→ Response to infection - macrophages, neutrophils, T and B lymphocytes</li> <li>→ The humoral response</li> <li>→ The cell mediated response</li> <li>→ The role of memory cells in the secondary immune response</li> <li>→ Natural and artificial immunity.</li> <li>→ Active and passive immunity</li> <li>→ Vaccination and Herd immunity</li> </ul> <p>Module 9 - Control systems</p> <ul style="list-style-type: none"> <li>→ Understanding that homeostasis is a dynamic state of equilibrium.</li> <li>→ Controlling pH, temperature and water potential</li> <li>→ Positive and negative feedback</li> <li>→ Endocrine system - comparing peptide and steroid hormones.</li> </ul> <p>Chemical control in plants</p> <ul style="list-style-type: none"> <li>→ Auxins, cytokinins and gibberellins</li> <li>→ CPAC 14 Gibberellin starch assay.</li> <li>→ Auxin as a stimulant for apical dominance and root growth</li> <li>→ Antagonistic actions of cytokinins and Auxins</li> <li>→ Phytochrome and photomorphogenesis</li> </ul>
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<p>Half Term 4</p>	<p>Module 4</p> <ul style="list-style-type: none"> <li>→ Gas Exchange in insects, fish, plants and mammals.</li> <li>→ CPAC 7 Dissection of the gas exchange organs of a locust.</li> <li>→ Circulation - structure of the heart and blood vessels.</li> <li>→ Myogenic muscle and the electrical conductivity of the heart.</li> <li>→ Cardiac cycle</li> <li>→ Blood - Erythrocytes, leukocytes, neutrophils and eosinophils, B Lymphocytes and T lymphocytes.</li> <li>→ Blood clotting cascade</li> <li>→ Atheroma</li> </ul>	<p>Module 9</p> <ul style="list-style-type: none"> <li>→ Mammalian nervous system.</li> <li>→ CNS, spinal cord and peripheral nervous system.</li> <li>→ The brain to include medulla, cerebellum, cerebrum and hypothalamus.</li> <li>→ Peripheral nervous system - somatic and autonomic nervous systems</li> <li>→ Autonomic nervous system - antagonistic nature of the sympathetic and parasympathetic nervous systems.</li> </ul>
<p>Half Term 5</p>	<p>Module 4</p> <ul style="list-style-type: none"> <li>→ Exchange of materials between cells</li> <li>→ Tissue fluid and oncotic pressure</li> <li>→ Lymphatic system.</li> <li>→ Oxygen Dissociation curves to include foetal haemoglobin and myoglobin.</li> <li>→ Transport in plants</li> <li>→ Structure and function of xylem and phloem.</li> <li>→ Symplast and apoplast pathways</li> <li>→ Root pressure</li> </ul>	<p>Module 10 – Ecology</p> <ul style="list-style-type: none"> <li>→ Ecosystems</li> <li>→ Techniques for sampling and investigating ecosystems</li> <li>→ Energy transfer through ecosystems</li> <li>→ Changes in Ecosystems</li> <li>→ Human impacts on ecosystems</li> </ul>

Half Term 6	<p>Module 4</p> <ul style="list-style-type: none"><li>→ Tension &amp; cohesion model of transpiration.</li><li>→ Translocation - mass flow hypothesis</li><li>→ CPAC - Investigation factors that affect transpiration using a potometer.</li></ul> <p>Revision and end of year examinations.</p> <p>Module 5 - Energy for Biological processes</p> <p>Respiration</p> <ul style="list-style-type: none"><li>→ ATP cycle</li><li>→ Glycolysis</li><li>→ Link reaction</li><li>→ Krebs Cycle</li><li>→ Electron transport and Chemiosmosis.</li><li>→ Anaerobic respiration</li><li>→ CPAC 9 - investigation a factor which affects respiration.</li></ul>	
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