

## Curriculum Subject: Biology KS5

	Autumn Term 1 & 2 (5 lesson cycle)	Autumn Term 1 & 2 (4 lesson cycle)	Spring Term 1 & 2 (5 lesson cycle)	Spring Term 1 & 2 (4 Lesson cycle)	Summer Term 1 & 2 (5 lesson cycle)	Summer Term 1 & 2 (4 lesson cycle)
<b>YEAR 12</b>	<p><b>Cell structure &amp; biological membranes</b> <b>Cell division, cell diversity and cellular organisation</b></p>	<p><b>Biological molecules</b> <b>Nucleic acids &amp; Enzymes</b></p>	<p><b>Exchange surfaces</b> <b>Transport in animals</b> <b>Communicable diseases, disease prevention and the immune system</b></p>	<p><b>Transport in plants</b> <b>Biodiversity</b></p>	<p><b>Communication and homeostasis</b> <b>Excretion</b></p>	<p><b>Classification and evolution</b> <b>Hormonal communication</b> <b>Plant and animal responses</b></p>
	<ul style="list-style-type: none"> <li>• Knowledge &amp; practical skills of microscopy and staining techniques to investigate cells.</li> <li>• Ultrastructure of eukaryotic and prokaryotic cells.</li> <li>• Structure and functions of biological membranes.</li> <li>• Mechanisms for movement of molecules across membranes.</li> <li>• The processes of the cell cycle.</li> <li>• The significance of mitosis and meiosis.</li> <li>• The organisational hierarchy from cells to organ systems.</li> <li>• Knowledge of stem cells and their application in research and medicine.</li> </ul> <p>PAG 1 and PAG 8</p>	<ul style="list-style-type: none"> <li>• Knowledge and understanding of hydrogen bonding, condensation &amp; hydrolysis reactions for water, carbohydrates, lipids and proteins.</li> <li>• Structure and function of glucose, starch, glycogen &amp; cellulose.</li> <li>• Structure and function of triglyceride, phospholipid and cholesterol.</li> <li>• Structure and functions of globular proteins (haemoglobin, enzymes and insulin)</li> <li>• Functions of keratin, collagen and elastin.</li> <li>• Role of cations and anions in reactions.</li> <li>• Structure, function and replication of nucleic acids.</li> <li>• Functions and factors that affect enzyme reactions.</li> </ul> <p>PAG 4, PAG 6, PAG 9 and PAG 10</p>	<ul style="list-style-type: none"> <li>• Features and need for exchange surfaces.</li> <li>• Structure and function of mammalian gaseous exchange system as well as ventilation in mammals, bony fish and insects.</li> <li>• Transport system in mammals to include structure and function of blood vessels, heart, blood and the formation of tissue fluid. Cardiac cycle and role of foetal and adult haemoglobin.</li> <li>• Knowledge of specified pathogens and the diseases they cause.</li> <li>• Non-specific defences in plants and animals.</li> <li>• Specific immune responses.</li> <li>• The importance of primary and secondary responses as well as vaccination.</li> <li>• Medicines and the benefits and risks of antibiotics.</li> </ul> <p>PAG 1, PAG 2 and PAG 10</p>	<ul style="list-style-type: none"> <li>• Why plants need transport systems.</li> <li>• Details of structure and function of vascular systems in dicotyledonous plants.</li> <li>• Pathways water uses to move through plants from roots to leaves.</li> <li>• Transpiration and factors that affect it.</li> <li>• Mechanism for translocation.</li> <li>• Different levels of biodiversity and methods used to measure biodiversity.</li> <li>• Statistical methods and calculations used to assess biodiversity.</li> <li>• To explore and debate the economic, aesthetic and social reasons for maintaining biodiversity.</li> <li>• Research in situ and ex situ conservation methods in different ecosystems.</li> </ul> <p>PAG 1, PAG 2, PAG 3, PAG 5 and PAG 11</p>	<ul style="list-style-type: none"> <li>• Understand the need for a communication system in multicellular organisms.</li> <li>• The principles of homeostasis and the physiological and behavioural adaptations of ecto and endotherms.</li> <li>• Explain how excretion maintains homeostasis and metabolism.</li> <li>• Structure and detailed function of liver to include formation of urea, detoxification and storage of glycogen.</li> <li>• Kidney structure and function to explain the control of water potential in the blood and production of urine.</li> <li>• The effects and treatment of kidney failure and the use of urine in diagnostic tests.</li> </ul> <p>PAG 1 &amp; 2 and PAG 11</p>	<ul style="list-style-type: none"> <li>• Biological classification of species.</li> <li>• Understanding of past and present classification systems leading to 5 Kingdom and 3 Domain classification systems.</li> <li>• Inter and intra specific variation and how and how organisms adapt to their environment.</li> <li>• The evidence for evolution and the consequences for humans.</li> <li>• Mechanism of natural selection and how factors in the environment can change populations over time.</li> <li>• Structure and function of the endo and exocrine glands and the homeostatic regulation of blood glucose.</li> <li>• Types of plant responses.</li> <li>• Investigations with auxin.</li> <li>• The role of hormones in plants and the commercial use of hormones in agriculture.</li> </ul> <p>PAG 11</p>

	<b>Autumn Term 1 &amp; 2 Respiration Cellular control</b>	<b>Autumn Term 1 &amp; 2 Nervous system Photosynthesis</b>	<b>Spring Term 1 &amp; 2 Patterns of inheritance Ecosystems, populations and sustainability</b>	<b>Spring Term 1 &amp; 2 Manipulating genomes cloning and biotechnology</b>	<b>Revision</b>	<b>External exams</b>
<b>YEAR 13</b>	<ul style="list-style-type: none"> <li>Review of cell structure from Year 1 and focus on mitochondria and cytoplasm with their roles in aerobic and anaerobic respiration.</li> <li>Detailed biochemistry of the stages of aerobic respiration with a review of biological molecules from Year 1.</li> <li>Process of oxidative phosphorylation and theory of chemiosmosis.</li> <li>Anaerobic respiration in eukaryotes and practical investigations with yeast.</li> <li>Use and application of RQ calculations.</li> <li>Review of Nucleic acids, transcription &amp; translation from Year 1.</li> <li>Types of mutations.</li> <li>Regulatory mechanisms for gene expression.</li> <li>Homeobox gene sequences in eukaryotes.</li> <li>Review of cell division from Year 1.</li> <li>Understand mechanisms of mitosis and apoptosis in development of body plans.</li> </ul> <p>PAG 4, PAG 10, PAG 11 and PAG 12</p>	<ul style="list-style-type: none"> <li>Role of sensory receptors as transducers.</li> <li>Structure and function of the three types of neurones, synapses and the generation and transmission of a nervous impulse in mammals.</li> <li>Organisation of nervous system, reflex actions and the structure and function of the main parts of the brain.</li> <li>Co-ordinated hormonal and nervous system responses of 'fight or flight' and heart rate.</li> <li>Compare structure and function of voluntary, involuntary and cardiac muscles. Mechanism of contraction.</li> <li>Review plant cells with focus on chloroplasts and details of biochemistry of light dependent and independent stages of photosynthesis.</li> <li>Factors affecting photosynthesis.</li> <li>A comparison of and interdependence of respiration &amp; photosynthesis.</li> </ul> <p>PAG 1, PAG 4, PAG 6 and PAG 10</p>	<ul style="list-style-type: none"> <li>Review of meiosis from Year 1. Understand variation and factors that affect it including sexual reproduction.</li> <li>Genetic basis of continuous and discontinuous variation.</li> <li>Inheritance of monogenetic, dihybrid and multiple alleles.</li> <li>Use of chi-squared and Hardy-Weinburg to investigate allele patterns.</li> <li>Factors affecting evolution and speciation.</li> <li>Principles and ethics of artificial selection.</li> <li>Review of Year 12 ecosystems.</li> <li>Factors affecting ecosystems, energy transfers and recycling of C and N.</li> <li>Understanding of succession, conservation and preservation.</li> <li>Population ecology and sustainability.</li> <li>Management of global ecosystems to balance conflicting needs.</li> </ul> <p>PAG 3</p>	<ul style="list-style-type: none"> <li>Development and applications of gene sequencing.</li> <li>The principles of PCR, gel electrophoresis and uses of DNA profiling.</li> <li>Technique of genetic engineering and understanding of ethical issues.</li> <li>The development of gene therapy in medicine.</li> <li>Uses of natural and artificial plant clones.</li> <li>Animal cloning and its application and limitations.</li> <li>Evaluate use of microbes in biotechnical processes.</li> <li>Understanding advantages and disadvantages of batch and continuous cultures.</li> <li>Methods to immobilise enzymes to produce useful products.</li> </ul> <p>PAG 6, PAG 7, PAG 11 and PAG 12</p>	<ul style="list-style-type: none"> <li>Synoptic skills practice with an emphasis on linking knowledge, particularly from Module 2.</li> <li>How to decipher exam questions.</li> <li>Revisiting challenging concepts and topics.</li> <li>Applying knowledge to new scenarios (AO3) and using Biological science review magazines.</li> <li>Module 1 practical skills exam questions.</li> <li>Maths skills and formulae</li> </ul>	<p><b>Biological processes</b></p> <p><b>Paper 1</b></p> <p><b>4<sup>th</sup> June am</b></p> <p><b>Biological Diversity</b></p> <p><b>Paper 2</b></p> <p><b>11<sup>th</sup> June am</b></p> <p><b>Unified Biology</b></p> <p><b>Paper 3</b></p> <p><b>15<sup>th</sup> June am</b></p>

**St Bede's Curriculum Design Principles**

Within subjects: depth, relevance, sequencing, spacing

Between subjects: breadth, cultural capital, coherence, progression, interlinking