SJBC Curriculum Termly Plan: Year 12 A-Level Biology

Term	Topic(s) and links to other subjects	Core Knowledge	Core Vocabulary	Assessment	Resources
Autumn 1	**Topic 1. Biological molecules.** **Nucleic acids** <u>Subject links:</u> Chemistry - Hydrogen bonding, polarity, hydrolysis and condensation reactions. pH of acids, bases, and buffers. Psychology Protein structure links to hormones and receptors. Role of neurotransmitters and enzymes in synaptic transmission. BTEC- Applied Science *Links within subject* *Cell Biology* *Enzymes and Metabolism* *Genetic Information* *Respiration* *Photosynthesis*	• Monomers join to form polymers via condensation reactions; hydrolysis breaks them down (e.g. carbohydrates, proteins, nucleic acids). • Carbohydrates consist of monosaccharides like glucose; polysaccharides such as starch, glycogen, and cellulose differ in structure and function. • Lipids (triglycerides and phospholipids) are formed from fatty acids and glycerol; their structure relates to roles in energy storage and membranes. • Proteins are made of amino acids linked by peptide bonds; their 3D shape (tertiary structure) determines function (e.g. enzymes, antibodies). • Enzymes catalyse reactions by lowering activation energy; their activity depends on temperature, pH, substrate concentration, and inhibitors. • The induced fit model explains enzyme specificity and how the active site changes shape to bind the substrate. • Water is vital due to its polarity, cohesion, specific heat capacity, and role as a solvent in transport and metabolic reactions. • Inorganic ions (e.g. H^+, Fe^{2+}, Na^+, PO_4^{3-}) are essential in processes such as oxygen transport, pH control, and DNA structure.	Monomer Polymer Condensation reaction Hydrolysis Glycosidic bond Peptide bond Ester bond Saturated fatty acid Unsaturated fatty acid Tertiary structure Active site Enzyme-substrate complex Competitive inhibitor Non-competitive inhibitor Nucleotide Polynucleotide Phosphodiester bond Complementary base pairing Double helix Semi-conservative replication DNA helicase DNA polymerase	Weekly homework tasks- topic past paper questions Weekly UpLearn tasks End of topic test (50 minutes) Common practical assessment component	AQA A Level Biology Student Book 1 ((by OUP, author: Glenn and Susan Toole) AQA GCE Biology Specification 2015 (AQA website) AQA Required Practicals Handbook (AQA website) Past paper questions homework booklets (produced by the department) UpLearn Scientific articles

		Nucleic Acids • DNA and RNA are polymers of nucleotides, each containing a pentose sugar, a phosphate group, and a nitrogenous base. • DNA is double-stranded and stable, with complementary base pairing (A–T, C–G) and a sugar-phosphate backbone forming a double helix. • RNA is single-stranded and contains uracil instead of thymine; it plays roles in protein synthesis (mRNA, tRNA, rRNA). • DNA replication is semi-conservative, involving DNA helicase and DNA polymerase to ensure accurate copying of genetic information. Each new DNA molecule retains one original strand, ensuring continuity between generations of cells. ATP is a modified nucleotide, made of adenine, ribose, and three phosphate groups, and is the main energy currency in cells. • ATP hydrolysis releases energy, and ATP is regenerated from ADP + Pi in respiration and photosynthesis.			

Autumn 2	**Topic 2. Cell structure** **Transport across cell membranes.** **Cell recognition and the immune system** <u>Subject links:</u> Chemistry- Hydrogen bonding and polarity of bases. Phosphate-sugar backbone: involves ester bonds. Psychology- genetic influences on behaviour and Basic knowledge of DNA helps understand studies on genetic predisposition BTEC- Applied Science - DNA extraction, gel electrophoresis, PCR and real-world forensic or medical use. Use of nucleic acids in diagnostic tests Links within subject *Mutations and Genetic Diversity* *Gene Technologies* *Evolution and Natural Selection*	• Cell structure differs between eukaryotic and prokaryotic cells, including the presence or absence of membrane-bound organelles like the nucleus, mitochondria, and ribosomes. • Eukaryotic cells contain specialised organelles (e.g., rough ER, Golgi apparatus, lysosomes, chloroplasts, mitochondria), each with distinct structures and functions. • Prokaryotic cells are simpler, lacking a nucleus and membrane-bound organelles, and may contain plasmids, a capsule, and flagella. • Viruses are non-cellular particles made of genetic material (DNA or RNA), a protein coat (capsid), and sometimes a lipid envelope; they replicate by hijacking host cells. • Microscopy techniques (light, TEM, SEM) differ in resolution and magnification, affecting the level of detail seen in cell structures. • The cell membrane is a selectively permeable barrier composed of a phospholipid bilayer with proteins, allowing for diffusion, osmosis, active transport, and facilitated diffusion. • Cells absorb and remove substances via passive (diffusion, osmosis) and active (carrier proteins, ATP-driven) transport processes across membranes.	Endoplasmic reticulum Golgi apparatus Lysosome Plasmid Capsule Capsid Attachment protein Transmission electron microscope (TEM) Scanning electron microscope (SEM) Homogenisation Ultracentrifugation Fluid mosaic model Channel protein Carrier protein Co-transport Endocytosis Exocytosis Cell cycle Interphase Prophase Metaphase Anaphase Telophase Cytokinesis Tumour Monoclonal antibody ELISA test T-lymphocyte B-lymphocyte Plasma cell Memory cell	Weekly homework tasks- topic past paper questions Weekly UpLearn tasks End of topic test (50 minutes) Common practical assessment component.	AQA A Level Biology Student Book 1 ((by OUP, author: Glenn and Susan Toole) AQA GCE Biology Specification 2015 (AQA website) AQA Required Practicals Handbook (AQA website) Past paper questions homework booklets (produced by the department) UpLearn Scientific articles

		• Mitosis is a type of cell division that ensures genetic consistency; it involves stages (prophase, metaphase, anaphase, telophase) and is regulated by the cell cycle. • The immune system uses white blood cells (phagocytes, T-cells, B-cells, plasma cells) to detect and destroy pathogens, involving antigen presentation and antibody production. • Monoclonal antibodies and vaccines are applications of immune system knowledge used in medicine to detect, treat, and prevent disease.			