

Curriculum Map Year 12 Biology

Topic Name	Term	Skills developed with link to NC Subject content	Reflection on previous link in the curriculum	Progress to future link in the curriculum
3.1 Biological Molecules Teacher 1	Autumn HT1	Understanding of: <ul style="list-style-type: none"> Monomers and polymers, specifically carbohydrates, lipids and proteins. Qualitative food testing. Protein structure and enzymes Structure of DNA and RNA, including DNA replication Role of ATP, water and inorganic ions as molecules in living cells 	GCSE: Digestion, DNA structure, protein synthesis. <ul style="list-style-type: none"> Cell specialisation and differentiation. Digestive system adaptations DNA structure and the role of genes and chromosomes Protein synthesis using mRNA Mutations and their effect on protein structure 	Bonding comes into play when learning about DNA replication, PCR, protein synthesis, photosynthesis and respiration.
3.2 Cells Teacher 2	Autumn HT1	Understanding of: <ul style="list-style-type: none"> Structure of eukaryotic, prokaryotic cells and viruses. Methods of studying cells, including optical and electron microscopes. Cell fractionation and ultracentrifugation for TEM use. Calculating magnification, including use of graticules. Stages of mitosis. (meiosis is sometimes also covered here) Stages of binary fission. 	GCSE: Cells, microscopy, mitosis, binary fission. <ul style="list-style-type: none"> Eukaryotic and prokaryotic cell structure and function of organelles. Microscopy and observing cells, calculating magnification. Mitosis and cell cycle. Cell specialisation and differentiation. Cancer Embryonic and adult stem cells and their uses. 	Yr12: Meiosis, respiration, photosynthesis, protein synthesis.
3.2 Cells continued Teacher 2	Autumn HT2	Understanding of: <ul style="list-style-type: none"> Cell membrane structure and mechanisms of transporting different molecules across the membrane (simple diffusion, osmosis, facilitated diffusion, active transport). Immunity- cell recognition, non-specific and specific immune responses. Primary and secondary responses, vaccines, active and passive immunity. HIV recognition, structure, symptoms and treatment. Monoclonal antibody production and uses in medicine and industry. 	GCSE: cell structure, eukaryotic and prokaryotic cells. Diseases (HIV), Role of immune system and vaccination. <ul style="list-style-type: none"> Infectious diseases and mechanisms of transmission Bacterial, viral and fungal diseases and malaria Defence against disease Immunity and vaccination Developing new medicines and drugs 	Yr12: Respiration and photosynthesis. Yr13: Homeostasis <ul style="list-style-type: none"> Negative and positive feedback in homeostasis. Blood glucose homeostasis, role of insulin, glucagon and adrenaline. Diabetes and use of colorimetry to test glucose levels. Kidney structure and function Water homeostasis.
3.4 DNA, RNA and protein synthesis Teacher 1	Autumn HT2	Understanding of: <ul style="list-style-type: none"> Comparing DNA in nucleus, chloroplasts and mitochondria. Genetic code, triplet codons, introns and exons. Genetic code universality and degenerate nature. Role of DNA and mRNA in protein synthesis. Types of mutations and their effect on genetic code. Stages of meiosis. 	GCSE: DNA structure and protein synthesis. Mutations. <ul style="list-style-type: none"> DNA structure and the role of genes and chromosomes The human genome project Protein synthesis using mRNA Mutations and their effect on protein structure 	Yr13: Inheritance, linkage and epistasis, genome projects and gene technologies. Cancer and regulation of gene expression. <ul style="list-style-type: none"> Sequencing projects Understanding the proteome. Techniques to make DNA fragments Amplifying DNA fragments using PCR.
3.4 DNA, RNA and protein synthesis continued Teacher 1	Spring HT3	Understanding of: <ul style="list-style-type: none"> Genetic diversity and adaptation, alleles, natural selection, directional and stabilising selection DNA technology, species classification and taxonomy. Biodiversity within a community. 	GCSE: Genetics topic. <ul style="list-style-type: none"> Asexual and sexual reproduction Meiosis Gregor Mendel and genetic terminology Inheritance and genetic diseases 	Yr13: Inheritance, linkage and epistasis, genome projects and gene technologies. <ul style="list-style-type: none"> Sequencing projects Understanding the proteome. Techniques to make DNA fragments Amplifying DNA fragments using PCR.

				<ul style="list-style-type: none"> ● Recombinant DNA technology, gene therapy, gene probes and their uses. ● Genetic fingerprinting.
3.3 Exchange and transport systems Teacher 2	<i>Spring</i> <i>HT3</i>	Understanding of: <ul style="list-style-type: none"> ● Calculating surface area to volume ratio and its impact upon exchange. ● Gas exchange in unicellular organisms, mammals, fish, insects and plants. ● Adaptations to limit water loss in xerophytic plants and insects. ● Human gas exchange system and effects of disease upon gas exchange. ● Mechanism of ventilation in humans, fish and insects. 	GCSE: Adaptation, digestion and lungs. <ul style="list-style-type: none"> ● Ventilatory system. Structure of lungs and gas exchange adaptations. ● Digestive system adaptations 	Yr13: Ecosystems and populations. <ul style="list-style-type: none"> ● ecosystems and their organisation. ● Abiotic and biotic factors affect population size in an ecosystem. ● Predator - prey relationships, inter- and intra-specific competition. ● Investigating populations, sampling methods. ● Succession
3.4 DNA, RNA and protein synthesis continued Teacher 1 3.3 Exchange and Transport systems continued Teacher 1	<i>Spring</i> <i>HT4</i>	Understanding of: <ul style="list-style-type: none"> ● Investigating diversity (statistical tests). ● Xylem and transpiration. ● Phloem, translocation and cohesion-tension theory. 	GCSE: Plant structure and mass transport systems. <ul style="list-style-type: none"> ● Leaf structure and adaptations ● Transpiration ● Translocation 	
3.3 Exchange and Transport systems continued Teacher 2	<i>Spring</i> <i>HT4</i>	Understanding of: <ul style="list-style-type: none"> ● Digestion and absorption of molecules. ● Blood, haemoglobin and oxygen dissociation. ● Circulatory system- heart structure, pressure changes, cardiac cycle, control of cardiac cycle. 	GCSE: Digestive system, heart and circulation, blood. <ul style="list-style-type: none"> ● Need for mass transport, sa:vol ratios ● Circulatory system, including heart, cardiac cycle blood and heart disease. 	
3.5 Photosynthesis Teacher 1	<i>Summer</i> <i>HT5</i>	Understanding of: <ul style="list-style-type: none"> ● Chloroplast structure and function. ● Light-dependent and light-independent reactions. Coenzymes. ● Limiting factors of photosynthesis. ● Varieties of chlorophyll. ● Photosynthesis experiments. 	GCSE: plant structure and photosynthesis, limiting factors of photosynthesis. <ul style="list-style-type: none"> ● Leaf structure and adaptations ● photosynthesis equation ● Limiting factors of photosynthesis ● Uses of glucose by plants ● Increasing photosynthesis ● Pondweed required practical 	Yr13: Succession and conservation. <ul style="list-style-type: none"> ● ecosystems and their organisation. ● Abiotic and biotic factors affect population size in an ecosystem. ● Predator - prey relationships, inter- and intra-specific competition. ● Investigating populations, sampling methods. ● Succession
3.6 Stimuli and responses Teacher 2	<i>Summer</i> <i>HT5</i>	Understanding of: <ul style="list-style-type: none"> ● Taxis and kinesis and tropisms. ● Receptors- Pacinian corpuscles, rods and cones. 	GCSE: Nervous system and reflex responses. <ul style="list-style-type: none"> ● Central and peripheral nervous system ● conscious and reflex responses ● Reaction times experiment ● the eye, long and short sight. 	
3.6 Stimuli and responses continued Teacher 2	<i>Summer</i> <i>HT6</i>	Understanding of: <ul style="list-style-type: none"> ● Action potentials, factors affecting speed of transmission. ● Synapses, summation, drugs at the synapse. 	GCSE: Nervous system, synapses. <ul style="list-style-type: none"> ● Central and peripheral nervous system ● conscious and reflex responses ● Reaction times experiment 	

3.5 Respiration Teacher 1	<i>Summer</i> <i>HT6</i>	Understanding of: <ul style="list-style-type: none">• Types of respiration - aerobic and anaerobic.• Glycolysis, link reaction and Krebs cycle.• Oxidative phosphorylation.• Respiration experiments.	GCSE: Aerobic and anaerobic respiration <ul style="list-style-type: none">• Aerobic respiration in plants and animals• Anaerobic respiration in plants and animals, and how they differ.	
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