



Biology Department – Curriculum Intent

Overview of KS4 Curriculum			
Head of Department: Dr O Richards			
Subject: GCSE Biology (Triple Science)		Exam Board: AQA	
	Year 9	Year 10	Year 11
Autumn Term	<p>All students begin learning GCSE Biology content in Year 9. Only topics common to both the Combined and Triple Science pathways are taught in Year 9. Students select which science pathway they wish to pursue for at GCSE in Year 10</p> <ul style="list-style-type: none"> - Course introduction - Introductory Investigation 1 Energy content of food - Cell structure (eukaryotes) - Cell Structure (prokaryotes) - Animal cells - Plant cells <p>Required Practical 1. Use a light microscope to observe, draw and label a selection of plant and animal cells.</p> <p>Topic Test 1 Cells & Tissues</p>	<ul style="list-style-type: none"> - Enzymes <p>Required Practical 5: Investigate the effect of pH on rate of reaction of amylase enzyme.</p> <ul style="list-style-type: none"> - Investigate the effect of temperature on rate of reaction. - Heart, blood vessels and circulatory system - Heart dissection. - Coronary heart disease <p>Topic Test 4: Heart & Circulation</p> <ul style="list-style-type: none"> - Communicable and non-communicable diseases - Cancer - Pathogenic organisms - Communicable diseases (viruses and bacteria) - Communicable diseases (fungi and protists) - Defence against disease: Immunity and Vaccination - Drugs and drug development - Drugs, antibiotics and painkillers - Monoclonal antibodies <p>Topic Test 5: Disease, Immunity & Drugs</p>	<ul style="list-style-type: none"> - Hormonal co-ordination in humans (Endocrine system) - Hormones in human reproduction - Contraception and fertility treatment <p>Topic Test 9: Control of Reproduction</p> <ul style="list-style-type: none"> - Plant hormones - Homeostasis & Control of blood sugar concentration - Control of body temperature - Maintaining water and nitrogen balance in the body <p>Required Practical 8. Investigate the effect of light or gravity on the growth of newly germinated seedlings.</p> <ul style="list-style-type: none"> - Structure and function of DNA and the genome - DNA, protein synthesis & mutations - Genetic inheritance and the understanding of genetics - Advantages & disadvantages of sexual & asexual reproduction - Inherited disease (Cystic fibrosis and Polydactyly) - Sex determination <p>Topic Test 10: Genetic Inheritance</p> <ul style="list-style-type: none"> - Meiosis - Variation and evolution and adaptation
Spring Term	<ul style="list-style-type: none"> - Microscopy - Cell specialisation and differentiation - Stem Cells (& therapeutic cloning) - Use of light microscope to measure images. <p>Topic Test 2 Microscopy</p>	<ul style="list-style-type: none"> - Culturing Micro-organisms - Transport in plant tissues and organs - Plant disease and defence responses <p>Required Practical 2. Investigate the effects of antiseptics or antibiotics on bacterial growth using agar plates.</p> <ul style="list-style-type: none"> - Photosynthesis - Factors affecting the rate of photosynthesis. 	<ul style="list-style-type: none"> - Evolution by natural selection - Development of antibiotic resistance in bacteria - Theory of evolution and speciation <p>Topic Test 11: Natural Selection & Evolution</p>



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Spring Term	<ul style="list-style-type: none"> - Cell division & Chromosomes - Mitosis & Cell Cycle - Transport and the significance of surface area to volume ratio - Transport in cells (diffusion) - Investigate factors affecting rate of diffusion. 	<p>Required Practical 6. Investigate the effect of light intensity on the rate of photosynthesis using pondweed.</p> <ul style="list-style-type: none"> - Respiration (aerobic & anaerobic) - Response to exercise and metabolism <p>Topic Test 6: PS & Respiration</p> <ul style="list-style-type: none"> - Human nervous system - The human brain - The eye <p>Required Practical 7 Plan and carry out an investigation into the effect of a factor on human reaction time.</p> <p>Topic Test 7: Nervous System</p>	<ul style="list-style-type: none"> - Classification of living organisms - Extinction and evidence for evolution - Selective breeding - Genetic engineering - Cloning plants and animals <p>Topic Test 12: Classification & Extinction</p> <p>Year 11 Paper 2 Mock Exam</p>
Summer Term	<ul style="list-style-type: none"> - Transport in cells (osmosis) <p>Required Practical 3. Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue</p> <ul style="list-style-type: none"> - Transport in cells (active transport) <p>Topic Test 3 Transport in Cells</p> <ul style="list-style-type: none"> - Human Digestive system - Cells, tissues, organs and organ systems <p>Required Practical 4. Use qualitative reagents to test for a range of carbohydrates, lipids & proteins</p>	<ul style="list-style-type: none"> - Decomposition - Human impact on ecosystems (biodiversity) - Human impact on ecosystems (waste and pollution) - Human impact on ecosystems (land use/Food & farming) - Human impact on ecosystems (deforestation and global warming) - Human impact on ecosystems (Fisheries and Biotechnology) <p>Required Practical 10: Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.</p>	<p>Revision for Final Exams</p>



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Overview of KS4 Curriculum			
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	Year 9	Year 10	Year 11
Autumn Term	<p>All students begin learning GCSE Biology content in Year 9. Only topics common to both the Combined and Triple Science pathways are taught in Year 9. Students select which science pathway they wish to pursue for at GCSE in Year 10</p> <ul style="list-style-type: none"> - Course introduction - Introductory Investigation 1 Energy content of food - Cell structure (eukaryotes) - Cell Structure (prokaryotes) - Animal cells - Plant cells <p>Required Practical 1. Use a light microscope to observe, draw and label a selection of plant and animal cells.</p> <p>Topic Test 1 Cells & Tissues</p>	<ul style="list-style-type: none"> - Enzymes <p>Required Practical 5: Investigate the effect of pH on rate of reaction of amylase enzyme.</p> <ul style="list-style-type: none"> - Investigate the effect of temperature on rate of reaction. - Heart, blood vessels and circulatory system - Heart dissection. - Coronary heart disease <p>Topic Test 4: Heart & Circulation</p> <ul style="list-style-type: none"> - Communicable and non-communicable diseases - Cancer - Pathogenic organisms - Communicable diseases (viruses and bacteria) - Communicable diseases (fungi and protists) - Defence against disease: Immunity and Vaccination - Drugs and drug development - Drugs, antibiotics and painkillers <p>Topic Test 5: Disease, Immunity & Drugs</p>	<ul style="list-style-type: none"> - Hormonal co-ordination in humans (Endocrine system) - Hormones in human reproduction - Contraception and Fertility treatment <p>Topic Test 9: Nervous System</p> <p>Homeostasis & Control of blood sugar concentration</p> <p>Required Practical 8. Investigate the effect of light or gravity on the growth of newly germinated seedlings.</p> <ul style="list-style-type: none"> - Structure and function of DNA and the genome - Genetic inheritance - Sexual & asexual reproduction - Inherited disease (Cystic fibrosis and Polydactyly) - Sex determination <p>Topic Test 10: Genetic Inheritance</p> <ul style="list-style-type: none"> - Meiosis - Variation and evolution and adaptation
Spring Term	<ul style="list-style-type: none"> - Microscopy - Cell specialisation and differentiation - Stem Cells (& therapeutic cloning) - Use of light microscope to measure images. <p>Topic Test 2 Microscopy</p> <ul style="list-style-type: none"> - Cell division & chromosomes - Mitosis & Cell Cycle - Transport and the significance of surface area to volume ratio - Transport in cells (diffusion) - Investigate factors affecting rate of diffusion. 	<ul style="list-style-type: none"> - Transport in plant tissues and organs <p>Required Practical 2. Investigate the effects of antiseptics or antibiotics on bacterial growth using agar plates.</p> <ul style="list-style-type: none"> - Photosynthesis - Factors affecting the rate of photosynthesis. <p>Required Practical 6. Investigate the effect of light intensity on the rate of photosynthesis using pondweed.</p> <ul style="list-style-type: none"> - Respiration (aerobic & anaerobic) - Response to exercise and metabolism <p>Topic Test 6: PS & Respiration</p>	<ul style="list-style-type: none"> - Evolution by natural selection - Development of antibiotic resistance in bacteria <p>Topic Test 11: Natural Selection & Evolution</p> <ul style="list-style-type: none"> - Classification of living organisms - Extinction and evidence for evolution - Selective breeding - Genetic engineering <p>Topic Test 12: Classification & Extinction</p> <p>Year 11 Paper 2 Mock Exam</p>



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Summer Term	<ul style="list-style-type: none">- Transport in cells (osmosis) <p>Required Practical 3. Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue</p> <ul style="list-style-type: none">- Transport in cells (active transport) <p>Topic Test 3 Transport in Cells</p> <ul style="list-style-type: none">- Human Digestive system- Cells, tissues, organs and organ systems <p>Required Practical 4. Use qualitative reagents to test for a range of carbohydrates, lipids & proteins</p>	<ul style="list-style-type: none">- Human nervous system <p>Required Practical 7 Plan and carry out an investigation into the effect of a factor on human reaction time.</p> <p>Topic Test 7: Nervous System</p> <ul style="list-style-type: none">- Human impact on ecosystems (Biodiversity)- Human impact on ecosystems (Waste and pollution)- Human impact on ecosystems (Deforestation and global warming)- Human impact on ecosystems (Fisheries and - Biotechnology) <p>Required Practical 10: Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.</p>	<p>Revision for Final Exams</p>
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KS5 Curriculum Intent				
Subject: A Level Biology			Exam Board: AQA	
	Year 12		Year 13	
	Teacher A	Teacher B	Teacher A	Teacher B
Autumn Term	Course Introduction Structure of eukaryotic cells Prokaryotic cells & viruses Methods of studying cells Structure of cell membranes Transport across cell membranes Transport and absorption Cell recognition, immune system & HIV Phagocytosis, antigens & antibodies Cell mediated immunity Humoral immunity	Course Introduction Biological molecules: carbohydrates Biological molecules: lipids & proteins Biological molecules: ATP and water Enzymes structure Factors affecting enzyme action Digestive System Proteases (Endo- & Exopeptidases) DNA genes & chromosomes Structure of DNA and RNA Protein synthesis & Gene mutation	Photosynthesis Energy & Ecosystems Energy transfers and organisms Respiration Inheritance (Monohybrid and Dihybrid) Population Genetics Evolution and Speciation	Survival & Response in Plants and Animals Ecology & Field Study Receptors (Pacianian Corpuscles & Retina) Nerve Impulses and Reflexes Control of Heart Rate Synaptic Transmission
Spring Term	Organisms exchange substances Surface area to volume ratio Gaseous exchange Risk factors & Lung Disease Transport of gases Structure and function of the heart	DNA replication Cell division, mitosis & cell cycle Meiosis Meiosis and genetic variation Genetic diversity and adaptation Genetic diversity and selection Investigating diversity	Gene mutation and gene expression Toti-, Pluri- and Unipotent cells Regulation of transcription and translation Gene expression and cancer Genome sequencing Recombinant DNA technology DNA to identify & diagnose heritable conditions Genetic Fingerprinting	Effectors and Skeletal Muscle (A level Essay Preparation) Homeostasis and Negative Feedback Control of Blood Sugar Control of blood water potential
Summer Term	Circulatory system Mass transport in plants Introduction to A2 Biology Investigating ecosystems Estimating population size	Species diversity and classification Biodiversity Populations in ecosystems (abiotic factors) Populations in Ecosystems (biotic factors) Nitrogen, carbon & phosphorus cycles Ecological Succession & Conservation	Exam Preparation	Exam Preparation



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Curriculum Rationale:

The complex and diverse phenomena of the natural world can be described in terms of a small number of key ideas in biology. These key ideas are of universal application, and we have embedded them throughout the subject content. They underpin many aspects of the science assessment.

These ideas include:

- life processes depend on molecules whose structure is related to their function
- the fundamental units of living organisms are cells, which may be part of highly adapted structures including tissues, organs and organ systems, enabling living processes to be performed effectively
- living organisms may form populations of single species, communities of many species and ecosystems, interacting with each other, with the environment and with humans in many different ways
- living organisms are interdependent and show adaptations to their environment
- life on Earth is dependent on photosynthesis in which green plants and algae trap light from the Sun to fix carbon dioxide and combine it with hydrogen from water to make organic compounds and oxygen
- organic compounds are used as fuels in cellular respiration to allow the other chemical reactions necessary for life
- the chemicals in ecosystems are continually cycling through the natural world
- the characteristics of a living organism are influenced by its genome and its interaction with the environment
- evolution occurs by a process of natural selection and accounts both for biodiversity and how organisms are all related to varying degrees.

The Biology curriculum in KS4 and 5 provides students with the knowledge and skills needed to progress onto a broad range of different career pathways. These include the following:

Laboratory Technician, Forensic Scientist, Criminologist, Police, Oncology, Cancer Research, Genetic Engineer, Physiologist, Urologist, Dietician, Driving Instructor, Toxicologist, Forensic Biologist, Diabetic Nurse, Biochemist, Agriculturalist, Climatologist, Waste Water Treatment, Horticulturalist, Recycling Technician, Genetic Counsellor, Town & Country Planning, Zookeeper, Oncologist, Conservationist, Environmental Consultant, Geneticist, Ecologist, Microbiologist; Pathologist; Transplant Co-ordinator; Sexual Health Clinician; Fertility Advisor; Pharmacology; Drug Development; Laboratory Technician; Medicine, Farming, Biogas generator, Genetic Counsellor, Ecologist, Conservation management, Evolutionary Biologist, Anatomist, Data Scientist, Bioinformatics, Forensic Science, Dietician, Food Technology, Genetic Counsellor, Lawyer & Patenting, Dietician, Horticulture, Cardiovascular, Nurse, Physiotherapist; Occupational Therapy, Fitness/Personal Trainer, Gardener, Hydroponics