ST. CHRISTOPHER'S C.E. HIGH SCHOOL
A Church of England Academy

Programme of Learning – Overview

Key Stage 5 Biology			
Year title / big question:	**A-level Biology Year 1 – Foundations in Biology; Exchange and Transport; Biodiversity, Evolution and Disease**	**Year group:**	**12 Biology**

Autumn Term 1: Cells, microscopes and Biological molecules	**Spring Term 1: Biological membranes, Exchange surfaces, Cell division and Enzymes**	**Summer Term 1: Transport in animals, Communicable Disease, Biodiversity, Classification and Evolution**
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**
To explore the ultrastructure of eukaryotic and prokaryotic cells, and examine how the structures of both compare. To explore how organelles work together in protein synthesis. To explore the use of the magnification formula and how a calibrated eyepiece graticule can be used to measure cells and organelles. To explore the structure, properties and uses of water, proteins, and nucleic acids as biological molecules.	To explore the structure and function of biological membranes, as well as the methods of transport across membranes and factors that affect the rate of these. To explore the methods of gaseous exchange in mammals. To explore tissues, organs and organ systems leading to organisation in multicellular organisms (plants and animals). To explore the structure, function, modes of action and factors that affect the working of enzymes.	To explore the structure, function, and adaptations of the mammalian heart. To explore the wide variety of pathogens that cause disease in animals and plants, as well as the physical defences in animals and plants, phagocytosis and antibody structure. To explore sampling methods and describe how biodiversity can be studied both qualitatively and quantitatively. To explore how biodiversity can be managed worldwide. To explore the different ways in which we can classify living organisms and how this is linked to variation.
Summative assessment:	**Summative assessment:**	**Summative assessment:**
Cell Structure end of topic test. Water and proteins end of topic test.	Biological membranes end of topic test. Cell division, cell diversity and cellular organisation end of topic test. Enzymes test.	Transport in animals end of topic test (part 2). Biodiversity test. Communicable Disease end of topic test (part 1).

Autumn Term 2: Biological molecules and Cell division	Spring Term 2: Exchange surfaces, Transport in animals, and Transport in plants	Summer Term 2: Communicable Disease, Evolution, and Populations, Sustainability
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**
To explore the structure, properties, and uses of carbohydrates and lipids as biological molecules. To explore methods for qualitative and quantitative testing of the range of biological molecules studied. To explore the use of nucleic acids in protein synthesis, and ATP as a phosphorylated nucleotide. To explore the mitotic cell cycle, and its control.	To explore ventilation in mammals. To explore the methods of gaseous exchange in fish and insects. To explore the structure, function and adaptations of blood, and blood vessels. To explore the methods of material transport in plants through the transpiration stream and translocation. To describe how plants are adapted to survive a range of habitats.	To explore how the immune system fights disease and prevents autoimmunity. To explore how we can utilise our knowledge of the immune system and pathogens in vaccines and drugs. To explore how organisms from different kingdoms are adapted and to link this to evolution by natural selection. To explore the factors that limit the size of populations and how humans can use resources sustainably.
Summative assessment:	**Summative assessment:**	**Summative assessment:**
Carbohydrates and lipids end of topic test. Testing for Biological Molecules end of topic test. Nucleotides and nucleic acids end of topic test. Year 12 mid-year PPE.	Exchanges surfaces end of topic test. Transport in animals end of topic test (part 1). Transport in plants end of topic test.	Communicable Disease end of topic test (part 2). Evolution and Classification end of topic test. End of Year 12 Exam. Populations and sustainability end of topic test.

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Key Stage 5 Biology			
Year title / big question:	**A-level Biology Year 2 – Communication, homeostasis and Energy; Genetics, Evolution and Energy.**	**Year group:**	**13 Biology**

Autumn Term 1: Photosynthesis, Respiration, Ecosystems and Communication	**Spring Term 1: Animal Responses, Plant Responses, Excretion and Patterns of inheritance part 1**	**Summer Term 1: Biotechnology and Cloning**
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**
To explore the reaction of and organelle associated with photosynthesis in plants, looking at this on a cellular and biochemical level. To explore the reaction of and organelle associated with respiration (both aerobic and anaerobic), looking at this on a cellular and biochemical level. To explore the use of food chains and energy transfer in ecosystems, with a focus on the cycling of carbon and nitrogen, as well as how organisms change over time in a habitat. To explore what makes an effective communication system, and how endothermic animals respond when they are too hot.	To explore the sliding filament hypothesis of skeletal muscle contraction, along with the control of heart rate and the "flight of fight" response. To explore the use of hormones used in plant development and their applications by humans. To explore the structure and function of the liver and kidney in homeostasis, with reference to the loop of Henle, ASH production, kidney failure, dialysis and urine testing. To explore the stage of meiosis and how these compare to the stages in mitosis. To apply knowledge and understanding meiosis to genetic crosses involving monogenic inheritance, codominance, sex linkage and dihybrid inheritance.	To explore the applications of modern DNA technology in the fields of biotechnology and cloning in terms of making valuable products for humans, and the issues surrounding these new technologies.
Summative assessment:	**Summative assessment:**	**Summative assessment:**
Photosynthesis end of topic test. Ecosystems end of topic test.	Animal Responses end of topic test. Plant Responses end of topic test. Excretion end of topic test.	Biotechnology end of topic test. Cloning end of topic test.

Autumn Term 2: Respiration, Neuronal Communication, Animal Responses, Communication, Hormonal Communication and Excretion	Spring Term 2: Cellular, Control Manipulating genomes and Patterns of Inheritance parts 1 and 2	Summer Term 2:
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**
To explore methods for measuring the rate of respiration. To explore the resting and action potential in neurones, as well as the junctions between neurones. To explore the different organs and branches of the nervous system. To explore mammalian muscle and neuromuscular junctions. To explore how endothermic animals respond when they are too cold, and compare response of endotherms to ectotherms. To explore the use of the hormones insulin, glucagon and adrenaline and their associated organs of manufacture and target. To explore the structure and function of the liver and kidney in homeostasis, with reference to ultrafiltration and selective reabsorption.	To explore gene expression in prokaryotes and eukaryotes. To explore the applications of modern DNA technology in the field of genetic engineering in terms of making valuable products for humans, and the issues surrounding these new technologies. To explore epistasis. To explore the use of the chisquared test to study phenotypic ratios. To explore population genetics with reference to evolutionary forces, speciation, and artificial selection. To explore allele frequencies in populations.	
Summative assessment:	**Summative assessment:**	**Summative assessment:**
Respiration end of topic test. Neuronal Communication end of topic test. Communication end of topic test. Hormonal Communication end of topic test.	Cellular Control end of topic test. Manipulating Genomes end of topic test. Patterns of Inheritance end of topic test part 1. Patterns of Inheritance end of topic test part 2.	

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Key Stage 5			
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Autumn Term 1 title:	**Spring Term 1 title:**	**Summer Term 1 title:**	
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**	
Introduction to chemistry **Atomic Structure** **Acids and salts** **Quantitative chemistry (part 1)**	**Inorganic analysis** **Thermodynamics** **Introduction to organic chemistry** **Alkanes**	**Halolkanes** **Alcohols** **Organic analysis**	
Summative assessment:	**Summative assessment:**	**Summative assessment:**	
Atomic Structure test **Acids and salts test**	**Redox test** **Thermodynamics test** **Organic intro test**	**Haloalkanes and Alcohols test** **Analysis test**	
Autumn Term 2 title:	**Spring Term 2 title:**	**Summer Term 2 title:**	
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**	
Quantitative (part 2) **Bonding and structure** **Redox and periodic table**	**Alkenes** **Kinetics** **Equilibrium**	**Revision** **Further Organic Analysis** **- Chromatography**	
Summative assessment:	**Summative assessment:**	**Summative assessment:**	
Quantitative chemistry test **Bonding and structure test** **PPE**	**Alkanes and alkenes test** **Kinetics and Eqm test**	**PPE**	

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Key Stage 5			
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Autumn Term 1 title:	**Spring Term 1 title:**	**Summer Term 1 title:**	
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**	
Further Thermodynamics Further Analysis - NMR Carbonyl chemistry	Equilibrium in gases Acid Base Equilibrium Nitrogen based organic chemistry	Revision	
Summative assessment:	**Summative assessment:**	**Summative assessment:**	
Analysis test Thermodynamics test	Combined Eqm test Nitrogen chem test Acid-Base eqm test	2nd PPE	
Autumn Term 2 title:	**Spring Term 2 title:**	**Summer Term 2 title:**	
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**	
Kinetics and The Rate Equation Aromatic chemistry Dynamic equilibrium in solutions	Redox and electrode potentials Transition metals Redox titrations and conversions		
Summative assessment:	**Summative assessment:**	**Summative assessment:**	
Carbonyl test Kinetics test Aromatics test PPE	Electrode potential test Transition metal test Redox titrations test		

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Key Stage 4 Physics			
Year title / big question:	**Physics Paper 1**	**Year group:**	**10 Physics**

Autumn Term 1 title: Energy Calculations	**Spring Term 1 title: Electricity**	**Summer Term 1 title: Radioactivity**
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**
To explore the concept of energy, including conservation, stores & transfers, efficiency, dissipation. To begin the training in using the famous "physics equations", starting with energy related ones such as gravitational potential energy, kinetic energy and elastic potential energy. To calculate power & know it as the ***rate*** of energy use	The four key concepts of electricity: charge, current, potential difference and resistance. Each defined separately and then brought together holistically. Building various circuits to investigate those above quantities and how they behave in series and parallel. To explore various component characteristics with the associated required practicals. Also the properties of other components such as thermistors & LDRs. Calculations for current, potential difference, resistance & charge ***Triples: static charge, and electric fields***	A detailed history of the atomic model, via five scientific discoveries, with a focus on Rutherford's Gold Foil experiment. Isotopes, atomic number, mass number. The properties and uses of alpha, beta and gamma radiation. The concept of half-life, with calculations and graph work, along with Activity and the random nature of radioactive decay. Contamination vs. irradiation. Safety precautions ***Triple: Nuclear Fission and Fusion; medical uses.***
Summative assessment:	**Summative assessment:**	**Summative assessment:**
Half term assessment on this topic & prior content	Half term assessment on this topic & prior content	PPE: covering all content covered thus far

Autumn Term 2 title: Heating Processes	**Spring Term 2 title: Electricity in the Home**	**Summer Term 2 title: Waves**
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**
The concept of conduction and how we can use insulation and conductivity to control and predict heat transfers. This extends to applications in the home. The states of matter and changes of state, in terms of macroscopic observations & microscopic explanations. The concept and calculation of specific heat capacity & specific latent heat, with practical work Internal energy of a substance, the explanation of pressure and how temperature affects pressure. ***Triple students pressure vs. volume calculations***	First, complete the electricity topic from the previous half term (Y10 work experience curtails Spring Term 1) To identify the difference between AC and DC. The National Grid: Power calculations for step up/step down transformers (Combined only: Triple pupils do this in Y11) To identify the components of a plug, and the purpose of live, neutral and earth wires. The process and risk of electrocution when touching the live wire Calculations for electrical energy and power.	First, complete the electricity topic from the previous half term (Y10 PPEs shorten curtail lesson time). To explore the nature of waves and explore the properties of waves: transverse vs. longitudinal; wavelength, amplitude, frequency, period The Wave Equation & the time period equation. Required Practicals investigating wave properties, with a string vibrating under tension, and ripples in a water tank. ***Triple: Ultrasound, Seismic Waves***
Summative assessment:	**Summative assessment:**	**Summative assessment:**
Half term assessment on this topic & prior content	Half term assessment on this topic & prior content	Half term assessment on this topic & prior content

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Key Stage 4 Physics			
Year title / big question:	**Physics Paper 2**	**Year group:**	**11 Physics**

Autumn Term 1 title: Waves	**Spring Term 1 title: Motion**	**Summer Term 1 title: Revision**
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**
Continuation of the Waves topic from the Y10 summer term to completion: Electromagnetic waves and the EM Spectrum: uses, dangers, properties, communication uses. Infra-red radiation required practical ***Triple: Colour and light, optics and lenses*** ***Triples will also study a stand-alone Space topic, covering star formation, orbital patterns, the expanding universe and the Big Bang Theory***	Newton's First and Second Laws, which tie together forces and how they affect motion. Acceleration required practical. Graph work to include distance-time graphs & speed-time graphs. Calculations for distance, speed, time & acceleration, and linking these to the above-mentioned graphs. The concept of weight, drag & terminal velocity, applied to vertical and horizontal objects. Momentum calculations, braking, thinking & stopping distances for vehicles. ***Triple: extra aspects: Impact force calculations & road safety***	To review and revise content for the external GCSE exams. A practice of Paper 2 exams
Summative assessment:	**Summative assessment:**	**Summative assessment:**
Half term assessment on this topic & prior content	Half term assessment on this topic & prior content	External GCSE examinations
Autumn Term 2 title: Forces	**Spring Term 2 title: Electromagnetism**	**Summer Term 2 title: GCSE Exams**
Intent and composite knowledge (overview):	**Intent and composite knowledge (overview):**	**Intent and composite knowledge (overview):**
The concept of vectors vs. scalars. Introduction of force as a vector. The various forces that act in our world, both contact forces and non-contact forces. Newton's Third law and examples of it in use. To combine forces to find the resultant force. And resolving a force into perpendicular components. To calculate work done when forces change the motion of objects. Centre of mass definitions and applications Elastic physics & Hooke's Law required practical ***Triple: Moments calculations, levers & gears***	To explore magnetic fields and the properties of magnets, the phenomenon of electromagnetism. The principles of the Motor Effect, including calculations and a thorough description of the DC rotating motor ***Triples: the Generator Effect, loudspeakers and microphones. The National Grid, including step up and step down transformers, with calcualtions*** ***Triples will also study a stand-alone Pressure topic, covering pressure calculations, liquid pressure, buoyancy and atmospheric pressure***	
Summative assessment:	**Summative assessment:**	**Summative assessment:**
PPE on all Y10 and Y11 content up to this point.	Half term assessment on this topic & prior content	