**Combined Science Curriculum Map – Key Stage 4**

**Year 10**

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| **Autumn 1 Teacher 1** | **Autumn 1 Teacher 2** | **Autumn 2 Teacher 1** | **Autumn 2 Teacher 2** |
| **CC5-7 Ionic Bonding / Covalent Bonding / Types of Substance**  In this unit we will look at the fundamental forces of attraction that hold atoms and molecules together. These are essential to understand physical changes and chemical reactions. | **CP3 Conservation of Energy CONTINUED**  In this unit you will learn about the ways in which energy can be transferred and stored, how to reduce energy transfers and the renewable and non-renewable resources we use in everyday life. | **CC8 Acids and Alkalis**  In this unit we explore the nature of acidic and alkaline solutions, and investigate their most important reactions properties and uses. | **CB3 Genetics**  In this unit we learn about the DNA code that produces our features and the processes that allow features to be passed on from parents to their offspring.  **CP4 Waves**  This unit introduces you to waves characteristics and how they transfer energy and information. |
| **Assessment**   * End of topic test * Six mark question | **Assessment:**   * End of topic test * Six mark question | **Assessment:**   * End of topic test * Six mark question | **Assessment:**   * End of topic test * Six mark question |
| **Builds upon:**  **From KS3:**   * The particle model of matter * How Dalton’s ideas about atoms and molecules helped explain the properties of matter * How elements are arranged in the periodic table   **From KS4 CC4:**   * How to use the periodic table to predict and model the arrangement of electrons in atoms | **Build upon:**   * Temperature differences lead to energy transfers * How energy can be transferred  by conduction, convection and radiation * Ways of reducing energy transferred by heating * That energy is conserved | **Builds upon:**   * Solubility, solutes, solvents and solutions * Common international hazard symbols * The use of indicators to test the pH of solutions * What happens during simple neutralisation reactions | **Builds upon:**   * The differences between environmental and inherited variation * How two gametes fuse during fertilisation to produce a single zygote * How the nuclei of eukaryotic cells contain chromosomes which contain DNA   **Builds upon:**   * Light and sound waves and how they can be described * How sound waves are produced and detected * Some uses of sound waves * How light can be absorbed, scattered and reflected * Different colours of light |
| **Introduces:**   * How ionic, covalent and metallic bonds are formed * The formation of lattice and molecular structures * How the physical properties of a substance are linked to its bonding and structure | **Introduces:**   * How energy is stored and transferred * How to represent energy transfers using diagrams * How to calculate efficiency * How to reduce transfers of wasted energy * How to calculate gravitational potential energy and kinetic energy * Different renewable and non-renewable energy resources | **Introduces:**   * The ions in acids and alkalis and how their concentrations are linked to pH * The reactions between acids and different types of bases * Different indicators that can be used in titrations * How soluble and insoluble salts can be prepared in the laboratory | **Introduces:**   * How gametes are produced by mitosis * The structure of DNA * Mutations and how genes cause genetic variation * Why certain characteristics are passed down through families   **Introduces:**   * How waves transfer energy and information * How to describe the characteristics of waves * How the speed of a wave is related to its frequency and wavelength * How the speed of a wave is related to time and distance * How waves are refracted at boundaries between different materials |

**Year 10**

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| **Spring 1 Teacher 1** | **Spring 1 Teacher 2** | **Spring 2 Teacher 1** | **Spring 2 Teacher 2** |
| **CB4 Natural Selection and Genetic Modification**  In this unit you will find out more about how organisms are changed genetically by natural selection and by humans.  **CC9 Calculations involving Masses**  This unit will help you to use relative atomic masses to calculate relative formula masses of elements and compounds, calculate the concentration of a solution and work out empirical and molecular formulae of compounds. | **CB5 Health, Disease and the Development of Medicines**  This unit will help you define health, learn about some pathogens and the diseases they cause, medicines and about the immune system. | **CC13-15**  This unit looks at some typical reactions of certain elements and general ideas about how chemical reactions can be controlled and used. | **CP6 Radioactivity**  This unit looks at the structure of atoms, types of radiation and their effect on atoms, and the dangers of radioactive substances and sources |
| **Assessment**   * End of topic test * Six mark question | **Assessment:**   * End of topic test * Six mark question | **Assessment:**   * End of topic test * Six mark question | **Assessment:**   * End of topic test * Six mark question |
| **Builds upon:**   * Evolution - that organisms change over time * That Darwin came up with a theory to explain evolution * How DNA contains instructions for the characteristics of organisms   **Builds upon:**  **From KS3:**   * How to represent elements and compounds using symbols * How mass is conserved during changes of state and chemical reactions * How to show chemical reactions using equations | **Builds upon:**  **KS3:**   * That imbalances in diet can lead to obesity and deficiency diseases * That recreational drugs can affect behaviour, health and life processes   **From KS4 CB1:**   * The structure of bacteria | **Builds upon:**  **KS3:**   * Elements, compounds and the periodic table * What happens during chemical reactions   **From KS4 CC3, CC5 and CC8:**   * The nature of atoms and ions * Writing balanced chemical equations including state symbols | **Builds upon:**   * The particle model of matter * That atoms contain electrons |
| **Introduces:**   * Darwin’s Theory of evolution by natural selection * How different methods such as genetic analysis are being used to investigate evolution * How organisms are classified * Selective breeding * Genetic modification   **Introduces:**   * How to calculate relative formula masses of elements and compounds * How to work out empirical and molecular formulae of compounds * How to calculate the mass of reactants or products in a reaction * How to calculate the concentration of a solution * The Avogadro constant (H) | **Introduces:**   * How we define health * Some pathogens and the diseases they cause * How the spread of pathogens can be reduced or prevented * How the body is protected against infection * The immune system * How antibiotics work * How new medicines are developed | **Introduces:**   * The properties and reactions of the elements in groups 1, 7 and 0 | **Introduces:**   * How the particles inside atoms are arranged * How to represent atoms using symbols * The different types of radiation and how they affect atoms * Background radiation * The dangers of radiation and how we can protect ourselves |

**Year 10**

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| **Summer 1 Teacher 1** | **Summer 1 Teacher 2** | **Summer 2 Teacher 1** | **Summer 2 Teacher 2** |
| **CB6 Plant Structures and their Functions**  This unit will help you learn about the process of photosynthesis and its importance, how plant structures are adapted to their functions and how water, mineral ions and sugar are transported through plants. | **CB9 Ecosystems and Material Cycles**  This unit introduces you to ecosystems, abiotic and biotic factors and communities, parasitism, biodiversity, and the water, carbon and nitrogen cycles. | **CB8 - Exchange and Transport in Animals**  This unit introduces you to diffusion, different kinds of respiration, how the lungs are adapted to their functions, and calculating cardiac output. | **CP7-8 Energy and Forces**  This unit introduces you to the ways in which energy can be changed in a system, and how to calculate power and work done. |
| **Assessment:**   * End of topic test * Six mark question | **Assessment:**   * End of topic test * Six mark question | **Assessment**   * End of topic test * Six mark question | **Assessment:**   * End of topic test * Six mark question |
| **Builds upon:**  **KS3:**   * That plants make their own food using photosynthesis * How light and chlorophyll are necessary for photosynthesis   **From KS4 CB1:**   * How certain plant cells are specialised and adapted to their function | **Builds upon:**  **KS3:**   * How life on earth depends on photosynthesis in plants and algae * The interdependence of organisms, including food webs and insect pollination * How organisms affect and are affected by their environment, including the accumulation of toxic materials | **Builds upon:**  **KS3:**   * How the digestive system gets glucose and other food molecules in the blood * How the respiratory system gets oxygen into the blood   **From KS4 CB1:**   * Diffusion * Different animal cells and their adaptations | **Builds upon:**  **KS3:**   * How energy can be stored and transferred * Balanced and unbalanced forces   **From KS4 CP1 and CP3:**   * The difference between vector and scalar quantities * How to calculate GPE and KE * Energy transfer diagrams and calculating efficiency |
| **Introduces:**   * More about photosynthesis and how different factors affect its rate * How the rate of water uptake by a plant is affected by different factors * How the reactants and products of photosynthesis are transported * More specialised cells: palisade, root hair, xylem and phloem | **Introduces:**   * How ecosystems are organised * How communities are affected by abiotic and biotic factors * How the abundance and distribution of organisms are measured * Parasites and mutualism * Human effects on ecosystems * The benefits of maintaining biodiversity * How materials cycle through ecosystems * The importance of the carbon, water and nitrogen cycles | **Introduces:**   * More about diffusion, gas exchange and the surface area : volume ratio * More about the different types of respiration * How the lungs, heart, blood vessels and blood are adapted for their functions * How to calculate cardiac output | **Introduces:**   * How the energy in a system can be changed * How to calculate power and work done * Force fields and contact forces * Using vector diagrams to work out the effects of forces on an object (H) |

**Year 11**

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| **Autumn 1 Teacher 1** | **Autumn 1 Teacher 2** | **Autumn 2 Teacher 1** | **Autumn 2 Teacher 2** |
| **CB9 Ecosystems and Material Cycles**  This unit introduces you to ecosystems, abiotic and biotic factors and communities, parasitism, biodiversity, and the water, carbon and nitrogen cycles. | **CP9 Electricity and Circuits**  This unit introduces you to electric circuits, current and potential difference, charge and energy, resistance, transferring energy, and power | **CB8 - Exchange and Transport in Animals**  This unit introduces you to diffusion, different kinds of respiration, how the lungs are adapted to their functions, and calculating cardiac output. | **CP10-11 Magnetism and the Motor Effect / Electromagnetic Induction**  CP10 introduces you to magnets and magnetic fields, electromagnetism and magnetic forces. CP11 covers transformers and energy. |
| **Assessment:**   * End of topic test * Six mark question | **Assessment:**   * End of topic test * Six mark question | **Assessment**   * End of topic test * Six mark question | **Assessment**   * End of topic test * Six mark question |
| **Builds upon:**  **KS3:**   * How life on earth depends on photosynthesis in plants and algae * The interdependence of organisms, including food webs and insect pollination * How organisms affect and are affected by their environment, including the accumulation of toxic materials | **Builds upon:**  **KS3:**   * That current is measured in Amps and potential difference is measured in volts * That components can be connected in series or parallel * That conductors have low resistance and insulators have high resistance | **Builds upon:**  **KS3:**   * How the digestive system gets glucose and other food molecules in the blood * How the respiratory system gets oxygen into the blood   **From KS4 CB1:**   * Diffusion * Different animal cells and their adaptations | **Builds upon:**  **KS3:**   * How to plot the shape of a magnetic field and that the Earth has a magnetic field * That electric currents cause electric fields, including electromagnets and motors |
| **Introduces:**   * How ecosystems are organised * How communities are affected by abiotic and biotic factors * How the abundance and distribution of organisms are measured * Parasites and mutualism * Human effects on ecosystems * The benefits of maintaining biodiversity * How materials cycle through ecosystems * The importance of the carbon, water and nitrogen cycles | **Introduces:**   * Current, charge and potential difference * How to calculate resistance, power and energy transferred * Components with changing resistance * The UK domestic electricity supply and safety features | **Introduces:**   * More about diffusion, gas exchange and the surface area : volume ratio * More about the different types of respiration * How the lungs, heart, blood vessels and blood are adapted for their functions * How to calculate cardiac output | **Introduces:**   * Permanent and induced magnets, and how to represent a magnetic field * The magnetic field around a current in a wire * The magnetic field in a solenoid * The power equation for transformers * How transformers are used in the national grid * How current can be induced in a wire (H) * How to calculate the force on a wire in a magnetic field (H) * How to work out the direction of the force on a wire in a magnetic field (H) |

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| **Spring 1 Teacher 1** | **Spring 1 Teacher 2** | **Spring 2 Teacher 1** | **Spring 2 Teacher 2** |
| **CC16-17 Fuels / Earth and Atmospheric Science**  This section introduces you to crude oils and natural gas, hydrocarbons, fractional distillation, the alkane homologous series, combustion, pollution, the earth's atmosphere and climate change. | **CP12-13 Particle Model / Forces and Matter**  This unit introduces you to particles and density, energy and changes of state, energy calculations, and gas temperature and pressure. It also covers bending and stretching, and extension and energy transfers. | Revision  PPE’s | Revision  PPE’s |
| **Assessment:**   * End of topic test * Six mark question | **Assessment:**   * End of topic test * Six mark question |  |  |
| **Builds upon:**   * That mixtures may be separated using fractional distillation * Fuels and energy resources * The acidity of non-metal oxides * The production of carbon dioxide by human activity and the impact on climate | **Builds upon:**  **KS3:**   * That mass is conserved during changes of state * The properties of solids, liquids and gases * How particles are arranged in solids, liquids and gases, and how this is affected by temperature   **From KS4 CP2:**   * The effects that forces have on objects |  |  |
| **Introduces:**   * The hydrocarbons found in crude oil and natural gas * How crude oil is separated into useful fractions * The alkanes as an homologous series * The problems caused by some atmospheric pollutants * The cracking of oil fractions * The advantages and disadvantages of different fuels for cars * How the Earth’s atmosphere has changed in the past and how it is changing now * More about the causes and effects of climate change | **Introduces:**   * How to calculate densities of substances * How to calculate specific heat capacity and specific latent heat * How changing the temperature of a gas affects its pressure * The Kelvin and Celsius temperature scales * Elastic and inelastic distortion * The relationship between force, extension and the spring constant * How to calculate the work done when stretching a spring |  |  |

**Year 11**

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