# St Bede's Inter-Church School Core Science Years 9-11 Curriculum Map

St Bede's Inter-Church School

'Cum Deo - With God'

| | | Biology | Chemistry | Physics |
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| Year 9 (4 hrs per week Combined, 6 hrs Separate) | **Autumn** | **Genes and evolution**<br>A simple model of chromosomes, genes and DNA in heredity and development of the DNA model. Variation between individuals linked to competition and how that can drive natural selection.<br><br>**Fit and Healthy**<br>Structure and function of the skeleton. The effects of drugs on behaviour, health and life processes.<br><br>**Surface area** (Separate Bio only)<br>A key idea in the Biology curriculum. Students calculate surface area and volume and look at a range of applications including cell transport and gas exchange. | **Reactivity**<br>The reactions of metals with water, acids and oxygen and using these to build a reactivity series.<br><br>**Materials**<br>Properties of ceramics, polymers and composites and how these properties are related to their uses.<br><br>**Green Chemistry* Separate science only**<br>Reducing the impact of waste products and finding alternatives to limited resources. | **Electricity**<br>Static electricity from movement of charge. Investigating series and parallel circuits, evaluating scientific models of electricity.<br><br>**Investigative skills**<br>Apply knowledge and skills to different investigations. Develop hypotheses, plan and implement practical work, analyse and evaluate data.<br><br>**Universe** (Separate Phys only)<br>Exploring beyond our Solar System, looking at types of stars, other planets, and how we can make further discoveries. |
| | **Spring**<br><br>**GCSE starts** | **Cell Biology**<br>How structural differences between types of cells enable them to perform specific functions within the organism. We also looks at the development of stem cell technology | **Atomic structure and Periodic table**<br>This unit explores the structure of the atom and the development of the Periodic table. We look at how the structured organisation of the chemical elements is used to explain their physical and chemical properties and make predictions. | **Energy**<br>How energy can be stored and transferred and the application of the law of conservation energy. We also consider the wider implications of how global energy demand is changing over time. |
| | **Summer** | **Bioenergetics**<br>We consider the process of energy transfer in living organisms. Plants harness the Sun's energy in photosynthesis in order to make food. Respiration (aerobic and anaerobic) in both plants and animals transfers the energy stored in food so that the organism can perform its functions. | **Structure and Bonding**<br>Atoms can be arranged in a variety of ways ranging from simple molecules to giant structures. Theories of bonding and properties of materials are explored along with applications in a range of different technologies. | **Particle model of matter**<br>Structure of matter and how the relative motion of the particles (kinetic theory) can explain the properties of matter. We also explore the energy stored in systems and introduce gas laws. |

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| **Year 10 (5 hrs per week Combined, 7 hrs Separate)** | **Autumn** | **Organisation**<br>Principles of organisation in plants and animals. There is a focus on the digestive and circulatory system in animals and the tissues and organs involved in transport systems in plants. | **Chemical change**<br>Reactivity of metals, oxidation & reduction, extracting metals from their ores. Reactions of acids and producing soluble salts. | **Waves**<br>This topic explores the properties of longitudinal and transverse waves and the relationship between wavelength, frequency and speed. Uses of electromagnetic waves are explored in conjunction with the properties specific to those waves. |
| | **Spring** | **Infection**<br>How we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. We investigate the immune system and how this can be enhanced using vaccination. We also consider the implications of antibiotic resistance. | **Energy changes and rates of reaction**<br>The interaction of particles often involves transfers of energy due to the breaking and formation of bonds. Chemical reactions can occur at vastly different rates, we consider the variables that can be changed in order to speed them up or slow them down.<br><br>**Electrochemistry**<br>The process of electrolysis and understanding which products will be produced from the decomposition of ionic compounds. | **Electricity**<br>How energy is transferred to components in electrical circuits by electricity. The relationship between current, potential difference and resistance are established for ohmic and non-ohmic components, and these can be measured and used to predict unknown quantities. |
| | **Summer** | **Inheritance**<br>How characteristics are passed from parents to offspring and the importance of halving chromosomes in meiosis. We also look at DNA and the importance of understanding the genome.<br><br>**Variation and evolution**<br>The importance of mutations and how evolution takes place by natural selection. We also consider the advantages and disadvantages of techniques including genetic engineering and selective breeding. | **Organic chemistry**<br>The chemistry of carbon compounds including functional groups, basic structures and properties. We also look at how a range of useful products is obtained from crude oil.<br><br>**Using resources**<br>Humans use the Earth's resources to provide warmth, shelter, food and transport. We consider finite and renewable resources and ways in which we can live sustainably. | **Nuclear Physics**<br>We look at the nucleus and its emissions, radioactive decay, each type of radiation and their properties and the pattern of decay over time. We identify the key uses and dangers of radioactive decay and, for separate science students, finish by exploring nuclear fission and fusion.<br><br>**Space* Separate science only**<br>Separate science students will explore the primary constituents of the solar system and Universe, the orbits of natural and artificial satellites and the life cycle of stars. We also consider the evidence for the evolution of the Universe. |

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| **Year 11 (5 hrs per week Combined, 7 hrs Separate)** | **Autumn** | **Ecology**<br>We look at the interaction between humans and their environment. We consider why the cycling of materials in nature is vital for life on Earth and look at issues such as global warming and food production. | **Quantitative chemistry**<br>We look at how to determine the formulae of compounds and to balance equations for reactions and how this information can be used to predict reacting quantities and to calculate the yield of a chemical reaction.<br><br>**Reversible reactions and equilibrium**<br>Chemical reactions may also be reversible and therefore the effect of changing conditions needs to be understood in order to identify how to maximise the yield of desired product. | **Forces**<br>The relationships between distance, displacement, speed, velocity and acceleration and how each can be represented by motion graphs and equations of uniform motion are explored. Newton's laws of motion, momentum and the relationship between force and extension of springs are also investigated.<br><br>Separate science students will extend their ideas about forces by exploring the principle of moments, levers and gears before finishing by exploring pressure (fluid and atmospheric). |
| | **Spring** | **Coordination**<br>Cells in the body can only survive within narrow physical and chemical limits. In order to do this the body requires control systems that constantly monitor and adjust the composition of the blood and tissues. We look at the roles of the nervous system and hormonal system. | **Chemical analysis**<br>How can we use chemical tests to identify unknown substances? There is a focus on the applications of chromatography. Separate science students will also learn tests for ions and how instrumental analysis is used.<br><br>**Atmosphere**<br>We consider how the atmosphere has changed over time and how human activities are thought to be contributing to the greenhouse effect and how we can reduce our carbon footprint. | **Electromagnetism**<br>How the relationship between electricity and magnetism allows us to make use of electromagnets to carry out useful tasks, such as electric motors. For triple science students, the concept of electromagnetic induction is introduced and extended to explain generators. |
| | **Summer** | **GCSE Examinations** | **GCSE Examinations** | **GCSE Examinations** |