

SCIENCE YEAR 10

CURRICULUM INTENT

The curriculum and assessment of students at this stage of education has been carefully designed to promote deep learning of science and develop students into scientifically literate and aware individuals:

Building on the fundamental concepts delivered in the year 9 science curriculum, in year 10 students will further develop their understanding of concepts across the three science specialisms. Our approach to teaching will be sequential in nature, further securing their understanding of vital biological processes, the material world and energy systems. Embedded within the curriculum students will learn how to graphically represent and analyse different types of data, identify variables and critically examine practical methodologies to identify sources of error and limitations. By the end of the year all students will have acquired key skills and knowledge to prepare them for year 11 content, as well as a growing confidence to carry out practical activities and apply their understanding to unfamiliar contexts. Students will gain experience with using a range of scientific apparatus, discussing scientific developments in the real world and exploring routes into a number of scientific careers. We will refer to facts from local and national sources, supporting students to build their knowledge of the world. The course as a whole will allow students to develop the foundations for study of sciences at KS5, leading to potential careers in medicine, pharmacy and engineering.

	PRIOR LEARNING	Students have been taught key content from the KS3 national curriculum for all three specialisms, alongside transitional knowledge to prepare students for the rigour of GCSE. Students have developed disciplinary knowledge and skills throughout KS3 which are also built upon at KS4.
	PERSONAL DEVELOPMENT & CURRICULUM LINKS	Personal Development – Students will develop an awareness of food labelling in the UK, consequences to health based on lifestyle choices, and how reports in popular media may be biased / sensationalist (and the importance of peer review to validate claims). They will also develop an understanding of carbon allotropes and how these link to developments in the modern world. They will also be able to make informed decisions based on sustainable energy use. Maths - Percentages (rates of reaction), rearranging to make variables the subject, substituting values for letters in equations, gradients. History - Infection and response, including the discovery and development of drugs.
	EXTRA-CURRICULAR & CULTURAL CAPITAL	STEM club- KS4 students are invited to act as student leaders for KS3 STEM, trips and key speakers regarding STEM, involvement in activities as part of British Science Week, opportunities to contribute to STEM newsletters.

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC/KNOWLEDGE	All students will know: Biology - Organisation – levels of organisation, enzymes, digestion, food tests, the lungs, the heart, blood and blood vessels, CHD Chemistry – Structure and bonding – ion formation, ionic bonding, ionic compounds, covalent bonding, simple molecular structures, giant covalent structures, polymers, allotropes of carbon, metallic bonding, states of matter, changing state Physics – Atomic Structure – discovery of the atom, elements, ions, isotopes, radioactive decay, half-life.	All students will know: Biology - Infection and response - Health issues, cancer, disease case studies, defence against disease, antibiotics, development of drugs and vaccinations. Chemistry - Chemical changes - Reactivity of metals with acids and oxygen and extraction of metals, acids and alkalis and making a salt, electrolysis of different solutions. Chemistry – Structure and bonding – ion formation, ionic bonding, ionic compounds, covalent bonding, simple molecular structures, giant covalent structures, polymers, allotropes of carbon, metallic bonding, states of matter, changing state	All students will know: Chemistry – Energy Changes – Exothermic and endothermic reactions, reaction profiles, temperature changes and bond energies. Physics - Electricity - Series and parallel circuits, current, potential difference, resistance, ACDC, mains electricity and national grid.	All students will know: Biology - Bioenergetics - Structure of a plant and leaf, photosynthesis, respiration and metabolism Chemistry – Quantitative Chemistry – relative atomic mass, relative atomic number, moles. Physics - Electricity - Series and parallel circuits, current, potential difference, resistance, ACDC, mains electricity and national grid.	All students will know: Biology – Ecology – biotic and abiotic, communities, sampling, food chains, carbon cycle, water cycle, biodiversity. Physics – Energy – energy stores and transfers, calculations, energy resources.	All students will know: Biology – Ecology – biotic and abiotic, communities, sampling, food chains, carbon cycle, water cycle, biodiversity. Chemistry - Rates of Reaction - Collision theory, rates of reaction, effect of concentration, effects of temperature, effect of surface area and pressure and catalysts.
SKILLS	» The difference between quantitative and qualitative data » Understanding the importance of models in science » Evaluation of treatment methods » Practical skills - using a syringe, measuring volumes, dissecting safely	» Begin to explore the use of sampling as a scientific method » Identifying correlation in scatter graphs » Practical skills - measuring volumes...	» Practical skills – creating circuits, using electrical equipment safely » Reading universal circuit diagrams accurately	» Obtaining data from living specimens » How to plan an investigation » Making informed choices about sustainable energy » Converting units and rearranging of equations	» Valid sampling techniques » Making informed choices regarding sustainable energy by evaluating their use	» Practical skills – measuring gas volumes, determining end points of reactions.
ASSESSMENT	Assessment Point 1 - Topics 1-2 for all specialisms are assessed in a GCSE-style assessment. Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.	Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.	Assessment Point 2 - Paper 1 topics covered including topics 1-3 for all three specialisms. Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.	Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.	Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.	Paper 1 mock exams - covering all topics for paper 1 biology, chemistry and physics. Formative assessment strategies are used throughout lesson sequences to monitor and assess progress. This includes low-stakes quizzing, recall based questions and marked work.
VOCAB	Cell, tissue, organ, organ system, enzyme, qualitative, quantitative, atria, ventricles, trachea, bronchi, bronchioles, alveoli, artery, vein, capillary, electrostatic attraction, electron, diamond, graphite, monomer, polymer, delocalized, atom, ion, isotope, half-life, alpha, beta, gamma.	Communicable, non-communicable, bacteria, virus, pathogen, malignant, tumour, benign, acid, base, alkali, pH, soluble salt, neutralisation, reaction, reactants, products, electrolysis, anode, cathode, molten, aqueous	Current, charge, potential difference, resistance, power, LDR, thermistor, series + parallel, exothermic, endothermic, activation energy.	Photosynthesis, rate, metabolism, limiting factor, xylem, phloem, respiration, anaerobic, aerobic, stomata, spongy mesophyll, relative atomic mass, relative atomic number, mole, Avogadro's constant,	Global warming, producer, apex predator, precipitation, transpiration, efficiency, gravitational potential energy, kinetic energy, fossil fuel, renewable, non-renewable.	Collisions, catalysts, kinetic, pressure, temperature.

READING SKILLS

- » Command words
- » Extracting information from various parts of a text
- » Comprehension and reading activities
- » Interpreting data

CAREERS LINKS

- » Nutritionist
- » Analytical chemist
- » Renewable energy engineer

SUPPORTING STUDENTS AT HOME

- Revision guides and workbooks are available to purchase in school or at bookstores
- » www.gcsescience.com
 - » www.senecalearning.com
 - » www.physicsandmathstutor.com

SCIENCE YEAR 11

CURRICULUM INTENT

The curriculum and assessment of students at this stage of education has been carefully designed to promote deep learning of science and develop students into scientifically literate and aware individuals:

Building on the fundamental concepts delivered in the year 10 curriculum, year 11 will provide students with the opportunity to use fundamental concepts taught in lower KS4 to learn about other scientific processes. This sequential approach to teaching will allow students to further explore the human body, ecological relationships, organic chemistry and the properties of waves. Students will continue to develop how to graphically represent and analyse different types of data, identify variables, critically examine practical methodologies to identify sources of error and limitations as well as appreciate and practice how to approach examination style questions. By the end of the year all students will have acquired key skills and knowledge to allow them to access GCSE examinations, write concisely about scientific phenomena and apply their understanding to unfamiliar contexts. Students will continue to gain experience with using a range of scientific apparatus, discussing scientific developments in the real world and exploring routes into a number of scientific careers. We will refer to facts from local and national sources, supporting students to build their knowledge of the world. The course will allow students to develop the foundations for study of sciences at KS5, leading to potential careers in medicine, pharmacy and engineering.

	PRIOR LEARNING	Students will use substantive and disciplinary knowledge acquired at both KS3 and KS4 to build on further in year 11.
	PERSONAL DEVELOPMENT & CURRICULUM LINKS	Personal Development – Students will develop a greater understanding of hormonal and reproductive health, as well as evaluating the use of various contraceptive methods for different groups of people. They will also learn about the causes and effects of climate change, and how governments are trying to reduce carbon emissions globally. In physics, students will appreciate the importance of protecting themselves against ionizing radiation such as UV rays. Maths - Ratios and percentages (Inheritance), rearranging to make variables the subject, substituting values for letters in equations, gradients. Geography - composition of the atmosphere (Chemistry of the atmosphere).
	EXTRA-CURRICULAR & CULTURAL CAPITAL	STEM club- KS4 students are invited to act as student leaders for KS3 STEM, opportunities to contribute to STEM newsletters.

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1
TOPIC/KNOWLEDGE	All students will know: » Biology – homeostasis and response - Nervous system, reflexes, hormones, menstrual cycle, contraception, blood glucose control, diabetes. Physics - Forces - Scalars and vectors, centre of mass, Hooke's Law, speed, acceleration, distance-time graphs, terminal velocity and stopping distances.	All students will know: » Chemistry - organic chemistry - Hydrocarbons, alkanes, alkenes, cracking and combustion. Chemistry - Chemical Analysis - Pure substances, mixtures, formulations, chromatography and testing for chlorine/oxygen/hydrogen/carbon dioxide. Physics - Waves - Longitudinal and transverse waves, speed of a wave, EM spectrum, refraction, radiation.	All students will know: Biology - Inheritance - Reproduction, meiosis, DNA and the genome, genetic conditions, embryo screening, variation, selective breeding, evolution and natural selection. Chemistry - Chemistry of the Atmosphere - Early atmosphere, greenhouse gases, pollution and carbon footprints.	All students will know: Chemistry - Using Resources - Natural and finite resources, life cycle assessment, potable water and water treatment. Physics - Magnets and Electromagnets - Magnetic fields, electromagnets and motor effect - Space - Triple students only. Revision - all specialisms - students will be revising content from their KS4 science journey.	All students will know: This term will be used as examination preparation for Year 11. Plans for this half term will be in response to question level analysis from both sets of mock exams to ensure that weaknesses are addressed before the GCSE examination period.
SKILLS	» Interpreting graphs and drawing conclusions about medical conditions » Writing extended answers » Collecting results and describing trends in data	» Identifying formulae and drawing displayed formulae » Understanding ray diagrams	» Completing and constructing genetic diagrams to predict phenotypic ratios » Evaluating medical processes » Describing trends and changes in data	» How to map magnetic fields » Recalling key ideas » Applying knowledge to unfamiliar contexts » Analysing a range of data types	» Recalling key ideas » Applying knowledge to unfamiliar contexts » Analysing a range of data types
ASSESSMENT	Students will complete exam-style questions and low stakes quizzes as part of their lessons.	Mock Window: students will complete three paper one examinations, one on each specialism. Students will complete exam-style questions and low stakes quizzes as part of their lessons.	Mock Window: students will complete three paper one examinations, one on each specialism. Students will complete exam-style questions and low stakes quizzes as part of their lessons.	Students have workshops planned into curriculum time. These modelled sessions focus on a variety of substantive and disciplinary knowledge, such as variables, graph plotting and evaluating data. GCSE examinations - biology, chemistry and physics paper 1.	GCSE examinations - biology, chemistry and physics paper 2. Students will complete exam-style questions and low stakes quizzes as part of their lessons.
VOCAB	Homeostasis, hormone, effector, receptor, scalar, vector, velocity, displacement, acceleration, Newton, momentum, extension, spring constant.	Alkene, alkane, combustion, distillation, soluble, chromatography, separate, mobile, stationary, wavelength, frequency, refraction, electromagnetic spectrum.	Sexual, asexual, mitosis, genotype, phenotype, dominant, recessive, allele, carbon dioxide, methane, climate change.	Magnet, induced magnet, pole, finite, potable, reverse osmosis, desalination, identify, describe, explain, plot, relationship, correlation, evaluate, apply.	Identify, describe, explain, compare, evaluate, calculate, state, suggest, analyse.

READING SKILLS

- » Command words
- » Extracting information from various parts of a text
- » Comprehension and reading activities
- » Interpreting data

CAREERS LINKS

- » Genetic counsellor
- » Organic chemist
- » Radiographer

SUPPORTING STUDENTS AT HOME

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